हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.)

(पूर्व नाम- दुर्ग विश्वविद्यालय, दुर्ग)

रायपुर नाका, दुर्ग (छ.ग.)-491001

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क्र. 4034 /अका./2025 दुर्ग, दिनांक : 15/07/25

प्राचार्य,
समस्त संबद्ध महाविद्यालय,
हेमचंद यादव विश्वविद्यालय,
दुर्ग (छ.ग.)

विषयः– स्नातक स्तर के नवीन पाठ्यक्रम के भाग–तीन को सत्र 2025–26 से विश्वविद्यालय में लागू करने विषयक।
संदर्भः– अपर संचालक, उच्च शिक्षा संचालनालय, नवा रायपुर, अटल नगर का पत्र क्र. 3985/237/आउशि/2023, दिनांक 13.06.2023।

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विषयांतर्गत लेख है कि संदर्भित पत्र के माध्यम से प्राप्त स्नातक स्तर भाग– तीन के निम्नलिखित कक्षा/विषयों के परिवर्तित/संशोधित पाठ्यक्रम शिक्षा सत्र 2025–26 से लागू किये जाते हैं:–

1.	बी.ए.	–	आधार पाठ्यक्रम–हिन्दी भाषा, अंग्रेजी भाषा, हिन्दी साहित्य, अंग्रेजी साहित्य, राजनीतिशास्त्र, अर्थशास्त्र, नृत्य, दर्शनशास्त्र, समाजशास्त्र, इतिहास, संस्कृत, मानवविज्ञान, भूगोल, मनोविज्ञान, कम्प्यूटर।
2.	बी.एस–सी.	–	आधार पाठ्यक्रम–हिन्दी भाषा, अंग्रेजी भाषा, जीव विज्ञान, मानवविज्ञान, गणित, बायोटेक्नोलॉजी, कम्प्यूटर साईंस, भौतिकी, प्राणीशास्त्र, भूविज्ञान, आई.टी., सूक्ष्मजीवविज्ञान, वनस्पतिशास्त्र, इलेक्ट्रॉनिक्स, रसायन शास्त्र, भूगोल।
3.	बी.एस–सी. (गृह विज्ञान)	–	आधार पाठ्यक्रम – हिन्दी भाषा, अंग्रेजी भाषा एवं गृह विज्ञान।
4.	बी.कॉम.	–	आधार पाठ्यक्रम – हिन्दी भाषा, अंग्रेजी भाषा एवं वाणिज्य।
5.	विधि	–	एल.एल.बी.
6.	प्रबंध	–	बी.बी.ए.
7.	कम्प्यूटर	–	बी.सी.ए.
8.	शिक्षा	–	बी.एड.
9.	लाईब्रेरी साईंस	–	बी.लिब.

उपरोक्त विषयों को शिक्षा सत्र 2025–26 से संशोधित रूप में स्नातक स्तर भाग–तीन के लिए लागू किया जाता है।

अतः आपसे अनुरोध है कि पाठ्यक्रम परिवर्तन/संशोधन से महाविद्यालय के शिक्षकों एवं छात्र–छात्राओं को अवगत कराने का कष्ट करेंगे।

टीप :– परिवर्तित/संशोधित पाठ्यक्रम विश्वविद्यालय की वेबसाईट पर उपलब्ध है।

संलग्न : उपरोक्तानुसार।

कुलसचिव

क्र. 4035 /अका./2025 दुर्ग, दिनांक 15/07/25

प्रतिलिपिः–

1. अपर संचालक, उच्च शिक्षा संचालनालय, नवा रायपुर, अटल नगर का पत्र क्र. 3985/237/आउशि/2023, दिनांक 13.06.2023 के परिपेक्ष्य में सूचनार्थ।
2. कुलपति के निज सहायक एवं कुलसचिव के निज सहायक, हेमचंद यादव विश्वविद्यालय, दुर्ग।
3. उपकुलसचिव, परीक्षा विभाग एवं उपकुलसचिव, गोपनीय विभाग हेमचंद यादव विश्वविद्यालय, दुर्ग।

उपकुलसचिव (अका.)

REVISED ORDINANCE NO. 21

BACHELOR OF SCIENCE

1. The three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-Ii examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the thirdyear.

2. A candidate who after passing (10+2) Higher Secondary or Intermediate examination of C.G. Board of Secondary Education Bhopal or any other Examination recognised by the University or C.G. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-Iexamination.

3. A candidate who, after passing the B.Sc.-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIexamination.

4. A candidate who, after passing the B.Sc. Part-Ii examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIIexamination.

5. Besides regular students, subject to their compliance with this Ordinance ex-student and non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department orCollege.

6. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in-

   (i) Foundation Course:

   (ii) Any one of the following combinations of three subjects:-

      1. Physics, Chemistry &Mathematics.
      2. Chemistry, Botany &Zoology.
      3. Chemistry, Physics &Geology.
      4. Chemistry, Botany &Geology.
      5. Chemistry, Zoology &Geology.
      6. Geology, Physics &Mathematics.
      7. Chemistry, Mathematics &Geology.
      8. Chemistry, Botany & DefenceStudies.
      9. Chemistry, Zoology & DefenceStudies
      10. Physics, Mathematics & DefenceStudies.
      11. Chemistry, Geology & DefenceStudies

12. Physics, Mathematics &Statistics
13. Physics, Chemistry &Statistics
14. Chemistry, Mathematics &Statistics.
15. Chemistry, Zoology &Anthropology.
16. Chemistry, Botany &Anthropology.
17. Chemistry, Geology &Anthropology.
18. Chemistry, Mathematics &Statistics.
19. Chemistry, Anthropology & DefenceStudies.
20. Geology, Mathematics &Statistics.
21. Mathematics, Defence Studies &Statistics
22. Anthropology, Mathematics &Statistics
23. Chemistry, Anthropology & AppliedStatistics
24. Zoology, Botany &Anthropology
25. Physics, Mathematics &Electronics.
26. Physics, Mathematics & ComputerApplication
27. Chemistry, Mathematics & ComputerApplication
28. Chemistry, Bio-Chemistry &Pharmacy
29. Chemistry, Zoology &Fisheries.
30. Chemistry, Zoology &Agriculture
31. Chemistry, Zoology &Sericulture
32. Chemistry, Botany & EnvironmentalBiology
33. Chemistry, Botany &Microbiology
34. Chemistry, Zoology &Microbiology
35. Chemistry, Industrial Chemistry &Mathematics
36. Chemistry, Industrial Chemistry &Zoology
37. Chemistry, Biochemistry,Botany
38. Chemistry, Biochemistry,Zoology
39. Chemistry, Biochemistry,Microbiology
40. Chemistry, Biotechnology,Botany
41. Chemistry, Biotechnology,Zoology
42. Geology, Chemistry &Geography
43. Geology, Mathematics &Geography
44. Mathematics, Physics &Geography
45. Chemistry, Botany &Geography

(iii) Practical in case prescribed for coresubjects.

7. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part-I examination in the subjects which he proposes to offer and then the B.Sc. Part-II and Part-III examination in the same subject. Successful candidates will be given a certificate to thateffect.

8. In order to pass at any part of the three year degree course examination an examinee must obtain not less than 33% of the total marks in each subject/ group of subjects. In subject/ group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examinationseparately.

9. Candidate will have to pass separately at the Part-I, Part-II and Part-III examinations. No division shall be assigned on the result of the Part-I and Part-II examination. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part-II and Part-III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/ group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/ group in which he appeared at the supplementaryexamination.

10. Successful examinee at the Part-III examination obtaining 60% or more marks shall be places in the First Division, those obtaining less than 60% but not less than 45% marks in the Second Division and other successful examinees in the ThirdDivision.

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SCHEME OF EXAMINATION

	Subject	Paper	Max. Marks	Total Marks	Min. Marks
C	Environmental Studies		75	100	33
	Fild Work		25		
Foundation Course					
	Hindi Language		75	75	26
	English Language		75	75	26

नोटः– प्रत्येक में से 02 (दो) प्रश्न करने होगें । सभी प्रश्न समान अंक के होगें।

Three Elective Subject :					
1.	Physics	I	50	100	33
		II	50		
		Practical		50	17
2.	Chemistry	I	33		
		II	33	100	33
		III	34		
		Practical		50	17
3.	Mathematics	I	50		
		II	50	150	50
		III	50		
4.	Botany	I	50	100	33
		II	50		
		Practical		50	17
5.	Zoology	I	50	100	33
		II	50		
		Practical		50	17
6.	Geology	I	50	100	33
		II	50		
		Practical	50		17
7.	Statistics	I	50	100	33
		II	50		
		Practical		50	17
8.	Anthropology	I	50	100	50
		II	50		
		Practical		50	17

Subject	Paper	Max. Marks	Total Marks	Min. Marks
CompulsorySubject–FoundationCourse:				
9. DefenseStudies	I	50	100	33
	II	50		
	Practical		50	17
10. MicroBiology	I	50	100	33
	II	50		
	Practical		50	17
11. ComputerSciences	I	50	100	33
	II	50		
	Practical		50	17
12. Information Technology	I	50	100	33
	II	50		
	Practical		50	17
13.IndustrialChemistry	I	34		
	II	33	100	33
	III	33		
	Practical		50	17
14. BioChemistry	I	50		
	II	50	100	33
15.BioTechnology	Practical	50	50	17
	I			
	II	50	100	33
	Practical		50	17

USE OF CALCULATORS

The Students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examnination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-1-1986.

1. Student will bring their own Calculators.
2. Calculators will not be provided either by the University or examination centres.
3. Calculators with, memoty and following variables be permitted +, -, x, , square, reciprocal, expotentials log, square root, trignometric functions, wize, sine, cosine, tangent etc. factiorial summation, xy, yx and in the light of objective approval of merits and demerits of the viva only will be allowed.

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बी.ए./ बी.एस-सी./ बी.कॉम./ बी.एच.एस.सी. भाग- तीन

(आधार पाठ्यक्रम)

प्रथम प्रश्नपत्र

हिंदी भाषा

कोड....

पूर्णांक 75

क्रेडिट 05

पाठ्यक्रम का उद्देश्य:-

1. हिंदी साहित्य की मूल संवेदना से सामान्य रूप से परिचित कराना ।
2. भारत की सामाजिक, आर्थिक एवं पर्यावरण संबंधी समग्र राष्ट्रीय विकास की रणनीति के विषय में सामान्य जानकारी प्रदान करना।
3. हिंदी में अभिव्यक्ति की पद्धतियों से अवगत कराना एवं उनके संप्रेषण कौशल में वृद्धि करना।
4. कामकाजी भाषा का सम्यक ज्ञान प्रदान करना।

23/2/23

23.2.2023

23/2/23

इकाई 1 (क) भारत माता : सुमित्रानंदन पंत शहर से सोचता हूँ : विनोद कुमार शुक्ल (ख) कथन की शैलियाँ: 1. विवरणात्मक शैली 2. मूल्यांकनपरक शैली 3. व्याख्यात्मक शैली 4. विचारात्मक शैली	अंक 15 18 कालखंड
इकाई 2(क)सूखी डाली : उपेंद्रनाथ अश्क अपोलो का रथ : श्रीकांत वर्मा (ख) विभिन्न संरचनाएँ 1. विनम्रता सूचक संरचना 2. विधिसूचक संरचना 3. निषेधपरक संरचना 4. कालबोधक संरचना 5. स्थान बोधक संरचना 6. दिशाबोधक संरचना 7. कार्य-कारण संबंध संरचना 8. अनुक्रम संरचना	अंक 15 18 कालखंड
इकाई 3 (क) रहीम चाचा: शानी निमित्त : भीष्म साहनी (ख) कार्यालयीन पत्र 1. परिपत्र 2. आदेश 3. अधिसूचना 4. ज्ञापन 5. अनुस्मारक 6. पृष्ठांकन	अंक 15 18 कालखंड
इकाई 4(क) आज भी खरे हैं तालाब (आज भी खरे हैं तालाब काअध्याय) : अनुपम मिश्र एक गाँव में विश्व पर्यावरण वर्ग (धरती की पुकार का अध्याय) : सुंदरलाल बहुगुणा (ख) समसामयिक विषयों पर एक निबंध (शब्द सीमा 250)	अंक 15 18 कालखंड
इकाई 5 (क)संस्कृतिऔरराष्ट्रीयएकीकरण : योगेश अटल शक्तिमानता का अर्थशास्त्र :ओंकारशरणश्रीवास्तव	अंक 15 18 कालखंड

23/1/23 23.2.2023

(ख) घटनाओं, समारोहोंका प्रतिवेदन, विभिन्न प्रकार के निमंत्रण पत्र	

मूल्यांकन योजना:-

प्रत्येक इकाई से एक-एक प्रश्न पूछे जाएंगे। एक प्रश्न के 15 अंक होंगे। प्रत्येक प्रश्न में आंतरिक विकल्प होगा। प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमश:08 एवं 07 होंगे। प्रश्नपत्र का पूर्णांक75 निर्धारित है।प्रश्नपत्रकेपूर्णांककादसप्रतिशतअंकआंतरिकमूल्यांकनकेलिएनिर्धारितहै।

पाठ्यक्रम के संभावित परिणाम:-

1. हिंदी साहित्य से सामान्य परिचय हो सकेगा ।
2. हिंदी में अभिव्यक्ति की पद्धतियों से परिचय होगा एवं उनके संप्रेषण कौशल में वृद्धि हो सकेगी।
3. कामकाजी भाषा लेखन का कौशल विकसित हो सकेगा ।
4. भारतीय संस्कृति के समन्वयात्मक स्वभाव के प्रति विश्वास जागृत हो सकेगा।

23/2/23 23.2.2023 23/2/23

BA/B.Sc./B.Com/B.Sc. Home.Sc. (Part-III)
Foundation Course Paper-II English Language

Max. Marks:75
Total credits: 05

Qualifying Marks:26

Paper-II	Mark's	Period's	Credit
Unit-I English in Use: A Textbook for College Students (Semester III), Macmillan Publishers India Pvt Ltd	3x5=15	18	01
Unit -II Writing Skills Writing a Film Review Book Review Editorial Writing Story Wrtiting	1x10=10	18	01
Unit -III Reading Comprehension (a) Unseen Passage (MCQ -based) (b) Vocabulary (Text-based)	1x5=05 1x10=10	09	0.5
Unit -IV CV Writing: Chronological CV & Functional CV Precis Writing	1x10=10	09	01
Unit-V Grammar • Reported speech • Punctuation . • Simple, Compound & Complex Sentences • Clause Analysis: Co-ordinate Clauses & Subordinate Clauses • Translation from English to Hindi(5 sentences only)	1x25=25	27	1.5
Total	**75**	**90**	**05**
Recommended Books- 1. Essential English Grammar, 2nd Edition by Raymond Murphy, Cambridge Publication 2. English Grammar in use 5th edition by Raymond Murphy, Cambridge Publication. 3. Advanced English Grammar by Martin Hewings Cambridge University Press.			

11/07/2023
(P.C. Chowdhury)

त्रिवर्षीय उपाधि पाठ्यक्रम
(सत्र–2022–23)

बी.ए. भाग – तीन
हिन्दी साहित्य
प्रथम – प्रश्नपत्र
छत्तीसगढ़ी भाषा एवं साहित्य

पूर्णांक : 75
क्रेडिट – 5, 90 कालखण्ड

प्रस्तावना एवं उद्देश्य –

1. छत्तीसगढ़ी भाषा और संस्कृति के प्रति रूचि और सजगता का विकास।
2. छत्तीसगढ़ी भाषा के स्वरूप से परिचय।
3. लोक– साहित्य तथा उसकी विभिन्न विधाओं से परिचय तथा छत्तीसढ़ी लोक–संस्कृति के प्रति जागरूकता का विकास।
4. समकालीन छत्तीसगढ़ी साहित्य से परिचय।
5. छत्तीसगढ़ी भाषा के संरचनात्मक एवं प्रयोजनात्मक पक्ष से परिचय।
6. छत्तीसगढ़ी के सामाजिक जीवन एवं संस्कृति तथा व्यवहार से सामान्य परिचय।

पाठ्य विषय :

इकाई – 01 छत्तीसगढ़ी भाषा : संरचनात्मक विशेषताएँ एवं प्रयोजनीयता — 18 कालखण्ड

क. छत्तीसगढ़ी की व्याकरणिक कोटियाँ

संज्ञा, सर्वनाम, विषेषण, क्रिया विशेषण, लिंग, वचन और कारक

ख. 1. कार्यालयीन पत्र व्यवहार

2. रेडिया पत्रकारिता : उद्घोषणा, रेलवे, आकाशवाणी एवं अन्य

इकाई – 02 क. छत्तीसगढ़ी लोक साहित्य – 1 : अर्थ, स्वरूप एवं महत्व — 18 कालखण्ड

ख. छत्तीसगढ़ी लोक काव्य :

करमा – 1 चोला रोवत हे राम बिन देखे परान

2. करिया सियाही कागद लिख ना गा

सुवा गीत : – 1. पहिली गबन के मोला डेहरी बैठाये

2. तरी नरी न न ना तरी नरी ना ना

ददरिया :– 1. कया के पेड मा, हड़िया के मारे, तवा के रोटी, पीपर के पाता, तोर मन चलती, फूटहा रे मंदिर मोर जरत करेजा, गोरी के अचरा, नवा घर मा, चंदा तो दाई

23/01/23

इकाई – 03 क. छत्तीसगढी लोक साहित्य – 18 कालखण्ड

2 लोक नाट्य नाचा : (सामान्य परिचय)

गम्मत : माया–परीच्छा

पंथीगीत – 1 सत्यनाम सार .....2 माटी के चोला.....

ख. छत्तीसगढ़ी लोक कथाएं : 1. जा रे ठेकवा नेवता खा

2. घोड़ी वाला जिमींदार

इकाई – 04 आधुनिक छत्तीसगढ़ी काव्य : ऐतिहासिक विकास 18 कालखण्ड

क. छत्तीसगढ़ी काव्य : संत काव्य परंपरा – 1 संत धर्मदास– तीन पद

क. गुरू पइंया लागों नाम लखा दीजो हो।
ख. नैन आगे ख्याल घनेरा।
ग. भजन करौं भाई रे, अइसन तन पाय के।
(सन्दर्भ– धर्मदास के शब्दावली से उद्धृत)

ख. छत्तीसगढ़ काव्य : आधुनिक काव्य – 1 भगवती लाल सेन –

1 दही के भोरहा मां

2. आ गे बसंत

2. विनय कुमार पाठक

1. तॅय उठथस सुरूज उथे

2. एक किसिम के नियाव

3. जीवनलाल यदु

1. बादर करय साहूकारी

2. चेत चेत रे चिरैय्या

इकाई – 05 क. आधुनिक छत्तीसगढ़ी गद्य – ऐतिहासिक विकास 18 कालखण्ड

1. छत्तीसगढ़ी कहिनी – 1. केयूर भूषण – ऑसूं म फिले अंचरा,

2. डॉ. परदेशी राम वर्मा – लोहार बारी

2 छत्तीसगढ़ी निबंध – 1. लखन लाल गुप्त – सोनपान

2. डॉ. सत्यभामा आडिल – सीख – सीख के गोठ

अंक विभाजन–

3 व्याख्याएं	21 अंक
2 आलोचनात्मक प्रश्न	24 अंक
3 लघु उत्तरीय प्रश्न	15 अंक
15 अति लघु उत्तारीय प्रश्न	15 अंक

कुल – 75 अंक

23/02/23

3.2.2023

संदर्भ ग्रंथ–

1.छत्तीसगढ़ी भाषा और साहित्य, संपादक – डॉ.सत्यभामा आड़िल (प्रकाशक–विकल्प प्रकाशन, रायपुर, छ.ग.)

2.जनपदीय भाषा–साहित्य छत्तीसगढ़ी, संपादक– डॉ.सत्यभामा आड़िल (प्रकाशक–छत्तीसगढ़ राज्य हिंदी ग्रन्थ अकादमी वि.वि. परिसर, रायपुर, छ.ग.)

3. मानक छत्तीसगढ़ी व्याकरण – चंद्रकुमार चंद्रकार

4. छत्तीसगढ़ी की व्याकरणिक कोटियां – डॉ. चितरंजन कर

5 छत्तीसगढ़ी भाषा, साहित्य व संस्कृति के विकास में डॉ. विनय पाठक का योगदान–डॉ. मनीष कुमार दीवान, छत्तीसगढ़ टुडे पब्लिकेशन, रायपुर

पाठ्यक्रम अध्ययन की परिलब्धियॉ (CLO) :

इस पाठ्यक्रम का अध्ययन करने क पश्चात् विद्यार्थी –

1. छत्तीसगढ़ी भाषा और संस्कृति के प्रति अभिमुख होगे।
2. छत्तीसगढ़ी भाषा के स्वरूप का सामान्य परिचय प्राप्त होगा।
3. लोक साहित्य एवं उसकी विभिन्न विधाओं से परिचय होगा।
4. छत्तीसगढ़ी लोक संस्कृति के प्रति जागरूकता का विकास होगा।
5. छत्तीसगढ़ी समकालीन साहित्य से परिचय होगा।
6. छत्तीसगढ़ी भाषा के संरचनात्मक एवं प्रयोजनात्मक पक्ष से परिचत होगें
7. छत्तीसगढ़ी के सामाजिक जीवन एवं संस्कृति तथा भाषा व्यवहार से परिचय होगा।
8. छत्तीसगढ़ी भाषा के क्षेत्र में करियर बनाने के इच्छुक विद्यार्थियों को तैयार करना।
9. राज्य स्तरीय प्रतियोगी परीक्षाओं के लिए विद्यार्थियों को तैयार करना

23/02/23

बी.ए. भाग–3
(हिंदी साहित्य द्वितीय प्रश्नपत्र)
हिंदी भाषा–साहित्य का इतिहास तथा काव्यांग विवेचन

पूर्णांक 75
क्रेडिट – 5, 90 कालखण्ड

प्रस्तावना : हिंदी भाषा का इतिहास जितना प्राचीन है उतना ही गूढ़–गहन भी। इसमे रचित साहित्य ने लगभग डेढ़ हजार वर्षो का इतिहास पूरा कर लिया है। इसलिए हिंदी भाषा और साहित्य के ऐतिहासिक विवेचन की बड़ी आवश्यकता है। साथ–साथ हिंदी ने अपना जो स्वतंत्र साहित्य शास्त्र निर्मित किया है उसे भी रूपायित करने की आवश्यकता है। संज्ञान द्वारा विद्यार्थी की मर्मग्राहिणी प्रतिभा का विकास होगा और ऐतिहासिक परिप्रेक्ष्य में शुद्ध साहित्यिक विवेक का समावेश होगा।

पाठ्य विषय :

(क) हिंदी भाषा का स्वरूप–विकास : हिंदी की उत्पत्ति, हिंदी की मूल आकर भाषाएँ तथा विभिन्न विभाषाओं का विकास।
हिंदी भाषा के विभिन्न रूप– 1.बोलचाल की भाषा 2.रचनात्मक भाषा 3.राष्ट्रभाषा 4.राजभाषा 5.संपर्क भाषा 6.संचार भाषा।
हिंदी का शब्द भंडार– तत्सम, तद्भव, देशज, आगत शब्दावली।

(ख) हिंदी साहित्य का इतिहास : आदिकाल एवं मध्यकाल (पूर्व मध्यकाल, उत्तर मध्यकाल, युगीन प्रवृत्तियां)

(ग) आधुनिक काल :सामाजिक सांस्कृतिक पृष्ठभूमि, प्रमुख युगीन प्रवृत्तियाँ।
विशिष्ट रचनाकार, और उनकी प्रतिनिधि कृतियॉ, साहित्यिक विशेषताएँ।

(घ) काव्यांग : काव्य का स्वरूप एवं प्रयोजन। रस के विभिन्न भेद, अंग, विभावादि तथा उदाहरण।
प्रमुख पाँच छंद : दोहा, सोरठा, चौपाई, कुंडलियाँ तथा सवैया।
अलंकार : शब्दालंकार–अनुप्रास, यमक, श्लेष, वक्रोक्ति, पुनरुक्ति प्रकाश।
अर्थालंकार : उपमा, रूपक, उत्प्रेक्षा, अतिशयोक्ति, भ्रांतिमान तथा संदेह अलंकार।

अंक विभाजन :

4 आलोचनात्मक प्रश्न	44 अंक
4 लघुउत्तरीय प्रश्न	16 अंक
15 वस्तुनिष्ठ / अतिलघुउत्तरीय प्रश्न	15 अंक
कुल	75 अंक

23/02/23

इकाई विभाजन :

इकाई एक	– हिंदी भाषा का स्वरूप– विकास (खण्ड–क)	18 कालखण्ड
इकाई दो	–हिंदी का शब्द भंडार (खण्ड–क, का अंतिम भाग)	18 कालखण्ड
इकाई तीन	–हिंदी साहित्य का इतिहास (खण्ड–ख एवं ग)	18 कालखण्ड
इकाई चार	–काव्यांग– रस, छंद, अंलकार (खण्ड–घ)	18 कालखण्ड
इकाई पाँच	–लघुत्तरीय एवं वस्तुनिष्ठ प्रश्न (सम्पूर्ण पाठ्यकम से)	18 कालखण्ड

संदर्भ ग्रंथ :

1.हिंदी साहित्य का इतिहास – सं. डॉ. सुनील त्रिवेदी एवं बाबूलाल शुक्ल, (प्रकाशक– म.प्र. उच्च शिक्षा अनुदान आयोग)

2.राजभाषा हिंदी –मलिक मोहम्मद (प्रभात प्रकाशन दिल्ली)

3.हिंदी भाषा – डॉ. भोलानाथ तिवारी

4.हिंदी भाषा साहित्य का इतिहास तथा काव्यांग विवेचन – डॉ. प्रतिभा चतुर्वेदी, डॉ. हरिमोहन बुधोलिया (प्रकाशक–मध्यप्रदेश हिंदी ग्रन्थ अकादमी)

पाठ्यकम अध्ययन की परिलब्धियाँ (CLO)

1. हिंदी भाषा के आधारभूत ज्ञान प्राप्ति के साथ, हिंदी के विविध रूपों से अवगत कराना।
2. हिंदी के शब्द भंडार से परिचित कराना जिससे विद्यार्थियों की भाषा समृद्ध और परिमार्जित हो सके।
3. भाषा साहित्य तथा संस्कृति के प्रति विद्यार्थियों की समझ और विवेक को विकसित करना।
4. हिंदी साहित्य के इतिहास की संक्षिप्त जानकारी देकर विद्यार्थियों को साहित्य की प्रमुख युगीन प्रवृत्तियों के साथ विकास क्रम से अवगत कराना तथा उस काल की ऐतिहासिक, सामाजिक, सांस्कृतिक पृष्ठभूमि से भी परिचित कराना।
5. काव्यांग विवेचन में अलंकारों और छंदों का अध्ययन कर भाषा के सौंदर्य के साथ–साथ, काव्य– परंपरा को भी समृद्ध करना।

23.2.2023

23/02/23

Part - I
SYLLABUS FOR ENVIRONMENTAL STUDIES AND HUMAN RIGHTS
(Paper code-0828)

MM. 75

इन्वारमेंटल साईंसेस के पाठ्यक्रम को स्नातक स्तर भाग–एक की कक्षाओं में विश्वविद्यालय अनुदान आयोग के निर्देशानुसार अनिवार्य रूप से शिक्षा सत्र 2003–2004 (परीक्षा 2004) से प्रभावशील किया गया है। स्वशासी महाविद्यालयों द्वारा भी अनिवार्य रूप से अंगीकृत किया जाएगा।

भाग 1, 2 एवं 3 में से किसी भी वर्ष में पर्यावरण प्रश्न–पत्र उत्तीर्ण करना अनिवार्य है। तभी उपाधि प्रदाय योग्य होगी।

पाठ्यक्रम 100 अंकों का होगा, जिसमें से 75 अंक सैद्धांतिक प्रश्नों पर होंगे एवं 25 अंक क्षेत्रीय कार्य (Field Work) पर्यावरण पर होंगे।

सैद्धांतिक प्रश्नों पर अंक – 75 (सभी प्रश्न इकाई आधार पर रहेंगे जिसमें विकल्प रहेगा)

(अ) लघु प्रश्नोंत्तर – 25 अंक

(ब) निबंधात्मक – 50 अंक

Field Work – 25 अंकों का मूल्यांकन आंतरिक मूल्यांकन पद्धति से कर विश्वविद्यालय को प्रेषित किया जावेगा। अभिलेखों की प्रायोगिक उत्तर पुस्तिकाओं के समान संबंधित महाविद्यालयों द्वारा सुरक्षित रखेंगे।

उपरोक्त पाठ्यक्रम से संबंधित परीक्षा का आयोजन वार्षिक परीक्षा के साथ किया जाएगा।

पर्यावरण विज्ञान विषय अनिवार्य विषय है, जिसमें अनुत्तीर्ण होने पर स्नातक स्तर भाग–एक के छात्र/छात्राओं को एक अन्य विषय के साथ पूरक की पात्रता होगी। पर्यावरण विज्ञान के सैद्धांतिक एवं फील्ड वर्क के संयुक्त रूप से 33: (तैंतीस प्रतिशत) अंक उत्तीर्ण होने के लिए अनिवार्य होंगे।

स्नातक स्तर भाग–एक के समस्त नियमित/भूतपूर्व/अमहाविद्यालयीन छात्र/छात्राओं को अपना फील्ड वर्क सैद्धांतिक परीक्षा की समाप्ति के पश्चात् 10 (दस) दिनों के भीतर संबंधित महाविद्यालय/परीक्षा केन्द्र में जमा करेंगे एवं महाविद्यालय के प्राचार्य/केन्द्र अधिक्षक, परीक्षकों की नियुक्ति के लिए अधिकृत रहेंगे तथा फील्ड वर्क जमा होने के सात दिनों के भीतर प्राप्त अंक विश्वविद्यालय को भेजेंगे।

UNIT-I THE MULTI DISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and

Importance Natural Resources:

Renewable and Nonrenewable Resources

(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people and relevant forest Act.

(b) Water resources: Use and over-utilization of surface and ground water, floods drought, conflicts over water, dam′ s benefits and problems and relevant Act.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging,salinity.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.

(f) Land resources: Land as a resource, land degradation, man induced landslides soil erosion and desertification.

(12 Lecture)

UNIT-II ECOSYSTEM

(a) Concept, Structure and Function of and ecosystem

- Producers, consumers and decomposers.
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, Types, Characteristics Features, Structure and Function of Forest, Grass, Desert and Aquatic Ecosystem.

(b) Biodiversity and its Conservation

- Introduction - Definition: genetic. species and ecosystem diversity
- Bio-geographical classification of India.
- Value of biodiversity: Consumptive use. Productive use, social ethics, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as mega-diversity nation.

- Hot spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wild life conflict.
- Endangered and endemic species of India.
- Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.

(12 Lecture)

UNIT- III

(a) Causes, effect and control measures of

- Air water, soil, marine, noise, nuclear pollution and Human population.
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Disaster Management: floods, earthquake, cyclone and landslides.

(12 Lecture)

(b) Environmental Management

- From Unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people, its problems and concerns.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- Wasteland reclamation
- Environment protection Act: Issues involved in enforcement of environmental legislation.
- Role of Information Technology in Environment and Human Health.

UNIT- IV

General background and historical perspective- Historical development and concept of Human Rights, Meaning and definition of Human Rights, Kind and Classification of Human Rights. Protection of Human Rights under the UNO Charter, protection of Human Rights under the Universal Declaration of Human Rights, 1948. Convention on the Elimination of all forms of Discrimination against women. Convention on the Rights of the Child, 1989.

UNIT- V

Impact of Human Rights norms in India, Human Rights under the Constitution of India, Fundamental Rights under the Constitution of India, Directive Principles of State policy under the Constitution of India, Enforcement of Human Rights in India. Protection of Human Rights under the Human Rights Act, 1993- National Human Rights Commission, State Human Rights Commission and Human Rights court in India. Fundamental Duties under the Constitution of India.

Reference/ Books Recommended

1. SK Kapoor- Human rights under International Law and Indian Law.
2. HO Agrawal- Internation Law and Human Rights
3. एस.के. कपूर – मानव अधिकार
4. जे.एन. पान्डेय – भारत का संविधान
5. एम.डी. चतुर्वेदी –भारत का संविधान
6. J.N.Pandey - Constitutional Law of India
7. Agarwal K.C. 2001 Environmental Biology, Nidi pub. Ltd. Bikaner
8. Bharucha Erach, the Biodiversity of India, Mapin pub. Ltd. Ahmedabad 380013, India, Email: mapin@icenet.net(R)
9. Bruinner R.C. 1989, Hazardous Waste Incineration. McGraw Hill Inc.480p
10. Clark R.S. Marine pollution, Clanderson press Oxford (TB)
11. Cuningham, W.P.Cooper. T.H.Gorhani, E & Hepworth. M.T,200
12. Dr. A.K.- Environmental Chemistry. Wiley Eastern Ltd.
13. Down to Earth, Center for Science and Environment (R)
14. Gloick, H.P. 1993 Water in crisis. pacific institute for studies in Deve. Environment & Security. Stockholm Eng. Institute. Oxford University, Press. m 473p.
15. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R)

16. Heywood, V.H. & Watson, T.T.1995 Global Biodiversity Assessment, Cambridge Univ. Press 1140p
17. Jadhav H. & Bhosale, V.H. 1995 Environmental Protection and Law. Himalaya pub. House, Delhi 284p
18. Mckinney M.L.& School R.M.1996, environmental Science systems & solutions, web enhanced edition, 639p
19. Mhadkar A.K. Matter Hazardous, Techno-Science publication(TB)
20. Miller T.G.Jr. Environment Science, Wadsworth publication co. (TB)
21. Odum E.P.1971, Fundamentals of Ecology, W.B. Saunders Co. USA,574p
22. Rao M.N. & Datta, A.K. 1987, Waste water treatment. Oxford & IBH pub.co.pvt. Ltd 345p
23. Sharma B.K. 2001, Environmental chemistry, Goel pub. House, Meerut
24. Survey of the Environment, The Hidu(M)
25. Townsend C. Harper J. And Michael Begon, Essentials of Ecology, Blackwell Science(TB)
26. Trivedi R.K.Handbook of Environment Laws, Rules, Guidlines, Compliances and Standards, Vol land II, Environment Media(R)
27. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science publication (TB)
28. Wanger K.D.1998, Environmental Management. W.B. Saunders Co. Philadelphia, USA 499

B.A. Part III

English Literature

Paper-I

Indian Writings in English

Total Credits: 5 **Total Marks: 75**

(i) Unit – I of Annotation is compulsory. Two passages from each unit (Unit II to V) to be set and three to be attempted.

3x5=15

(ii) Very short answer type questions to be set from Unit VII, seven to be set, five to be attempted.

5x2= 10

(iii) Long answer questions from Unit-II to Unit-VI. Five questions from each unit to be set with internal choices. Word Limit for each answer 300 to 400 words.

5x10=50

Unit I : Annotations from unit II to Unit V.

Unit II : Poetry **15 periods.** **1 credit**

Toru Dutt : Our Casuarina Tree
Rabindranath Tagore : Song 1 & 103 from 'Gitanjali'
Sarojini Naidu : The Ecstasy, The Lotus
Kamala Das : The Old PlayHouse
Jayant Mahapatra : Dawn at Puri
A.K. Ramanujan : A River

Unit III: Prose **15 periods.** **1 credit**

(a) Jawaharlal Nehru : The Relationships of Languages; Language Writing and Numerals

(b) Dr. S. Radhakrishnan : The Call of the Suffering

Unit IV : Drama **15 periods.** **1 credit**

(a) Girish Karnad : Hayavadana
(b) Vijay Tendulkar : Silence! The Court is in session

Unit V: Folk Literature of Chhattisgarh. 13 periods. 1 credit

(a) Habib Tanveer : Charandas Chor

(b) Elwin Verrier : The Folk Songs of Chhattisgarh
The Ballad of Lorik and Chandaini

Unit VI : Fiction **10 periods.** **0.5 credit**

(a) R.K. Narayan : The Guide

(b) V.S. Naipaul : The House for Mr. Biswas

Unit VII : **05 periods.** **0.5 credit**

- Mysticism
- Imagery
- Myth
- Indian Feminism
- Archetype
- Regional Novel
- Confessional Poetry
- Diaspora Literature
- Folk Songs of Chhattisgarh
- Folk Theatre

Recommended reading:

1. K.R. Srinivasa Iyengar : Indian Writings in English
2. Birjadish Prasad. : A Background to the Study of English Literature
3. M.K. Naik : Aspects of Indian Writing in English (Macmillan)
4. Parthasarthy, R. (ed.). : Ten Twentieth Century Indian Poets
5. M.H. Abrams : A Glossary of Literary Terms

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B.A. Part III

English Literature

Paper-II (A)

American Literature

Total Credits: 5 **Total Marks : 75**

(i) Unit – I of Annotation is compulsory. Two passages from each unit (Unit II to V) to be set and three to be attempted.

3x5=15

(ii) Very short answer type questions to be set from Unit VII, seven to be set, five to be attempted.

5x2= 10

(iii) Long answer questions from Unit-II to Unit-VI. Five questions from each unit to be set with internal choices. Word Limit for each answer 300 to 400 words.

5x10=50

Unit I: Annotations from unit II to Unit V.

Unit II: Poetry **15 periods.** **1 credit**

(a) Walt Whitman : O Captain! My Captain!
Passage to India

(b) Edgar Allan Poe : The Bells
Bridal Ballad

Unit III: Poetry **15 periods.** **1 credit**

(a) Emily Dickinson : Hope is the Thing with Feathers
I Felt a Funeral in My Brain

(b) E. E. Cummings : The Cambridge Ladies
As Freedom is a Breakfast Food

Unit IV: Prose **15 periods.** **1 credit**

(a) Emerson : Self Reliance
(b) Thoreau : Civil Disobedience

Unit V: Drama **15 periods.** **1 credit**

(a) Arthur Miller : All My Sons

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(b) Eugene O'Neil : The Hairy Ape

Unit VI: Fiction **10 periods** **0.5 credit**

(a) Ernest Hemingway : For Whom the Bell Tolls

(b) Mark Twain : Adventures of Huckleberry Finn

Unit VII **05 periods.** **0.5 credit**

- Naturalism
- Realism
- Art for Art's Sake
- Expressionism
- Symbolism
- American Renaissance
- Existentialism
- Stream of Consciousness

Recommended reading:

1. S. Bradley : The American Tradition in Literature
2. Robert P. Weeks : Hemingway: A Collection of Critical Essays
3. Henry Nash Smith : Mark Twain: twentieth Century Views
4. John Gassner (ed.) : *Best American Plays* (Several Different Anthologies)

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B.A. Part III
English Literature
Paper-II (B)
Twentieth Century Literature in English

Total Credits: 5 **Total Marks: 75**

(i) Unit – I of Annotation is compulsory. Two passages from each unit (Unit II to V) to be set and three to be attempted.

3x5=15

(ii) Very short answer type questions to be set from Unit VII, seven to be set, five to be attempted.

5x2= 10

(iii) Long answer questions from Unit-II to Unit-VI. Five questions from each unit to be set with internal choices. Word Limit for each answer 300 to 400 words.

5x10=50

Unit I: Annotations from unit II to Unit V.

Unit II: Poetry **15 periods. 1 credit**
T. S. Eliot : Journey of Maggi
A Cooking Egg

Unit III: Poetry **15 periods 1 credit**
Stephen Spender : Pylons
A Father in Time of War

(a) W. H. Auden : In Memory of W. B. Yeats
Partition

(b) Unit IV: Prose **15 periods. 1 credit**
(a) Virginia Woolf : The Death of the Moth
(b) Graham Greene : The Lost Childhood

Unit V: Drama **15 periods. 1 credit**
(a) Henrik Ibsen : Ghosts
(b) T. S. Eliot : Murder in the Cathedral

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Unit VI: Fiction **10 periods. 0.5 credit**

(a) Joseph Conrad : Heart of Darkness

(b) Chinua Achebe : Things Fall Apart

Unit IIV **05 periods 0.5 credit**

- The Two World Wars
- The Russian Revolution
- The Great Depression
- The Vietnam War
- Poetic Drama
- Absurdism
- Modernism and Postmodernism
- New Development in Fiction and Drama

Recommended reading:

1. Michael Roberts (ed.) : The Faber Book of Modern verse
2. William J. Long : English Literature
3. William Hutchings : Samuel Beckett's Waiting for Godot: A Reference Guide
4. Charles Carrington : Rudyard Kipling- His Life and Works
5. Edward Quinn : Critical Companion to George Orwell: A literary Reference to His Life and Works

B.A. PART III

ENGLISH LITERATURE

The duration of the B.A. Third year Literature course will be of one academic year

Course Title : B.A. Part III, English Literature

Title of the Paper : Paper I - Indian Writings in English

Paper II (A) American Literature

Paper II (B) Twentieth Century Literature in English

S.No	Paper	Paper Name	Maximum	Minimum	Total passing
1	I	Indian Writings in English	75	—	
2	II (A)	American Literature	75	—	Paper I Paper II Total obtained marks =50
3	II (B)	Twentieth Century Literature in English	75		

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B.A. Part III
English Literature
Paper I - Indian Writings in English
Course Outcomes

After completing the course the students will be able to demonstrate :

CO1 - a comprehensive knowledge of the literary works in English produced by Indian writers. This knowledge will include the various literary forms fictional as well as non-fictional employed by the Indian Writers in English and Historical and Literary topics as well.

CO2 - a critical understanding of the poets like Toru Dutt, R.N. Tagore and Sarojini Naidu; playwrights like Girish Karnad and Vijay Tendulkar; non-fictional writers like J.L. Nehru and Dr. S. Radhakrishnan and the novelists like R.K. Narayan.

CO3 - a capacity to compare and contrast the different literary qualities of their writers and critically rank them in evaluative terms.

CO4 - a critical inclination to read literature as a socio-cultural document.

CO5 - a research tendency to go for innovative studies of Indian Writing in English in the Postcolonial light of the latest research insights.

CO6 - a socio-political sense of responsibility to stand up against colonising human tendencies.

CO7 - a visible literary- critical bent towards understanding life through literature and vice-versa

CO8 - to get an insight of knowledge of folk culture through folk literature and to imbibe local values and ethos.

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B.A. Part III

English Literature

Paper II (A) - American Literature

Course Outcomes

After completing the course the students will be able to demonstrate :

CO1 - a comprehensive knowledge of the literary works in English produced by American writers. This knowledge will include the various literary forms fictional as well as non-fictional employed by the American Writers in English.

CO2 - a critical understanding of the poets like E.A.Poe, Walt Whitman, E. Dickinson, Cummings; playwrights like Eugene O'Niell and Arthur Miller; non-fictional writers like Emerson and Thoreau and the novelists like Mark Twain and Ernest Hemingway.

CO3 - a capacity to compare and contrast the different literary qualities of their writers and critically rank them in evaluative terms.

CO4 - a critical inclination to read literature as a socio-cultural document.

CO5 - a research tendency to go for innovative studies of American Literature in the Postcolonial light of the latest research insights.

CO6 - a socio-political sense of responsibility to stand up against colonising human tendencies.

CO7 - a visible literary- critical bent towards understanding life through literature and vice-versa.

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Scheme of B. Sc. Physics

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	PHY-1T	Mechanics	Theory	4	50	17
	PHY-2T	Electricity and Magnetism	Theory	4	50	17
	PHY-1P	LAB 1: Mechanics, Electricity and Magnetism	Practical	2	50	17
Second year	PHY-3T	Thermal Physics and Statistical Mechanics	Theory	4	50	17
	PHY-4T	Waves and Optics	Theory	4	50	17
	PHY-2P	LAB 2: Thermal Physics, Statistical Mechanics, Waves and Optics	Practical	2	50	17
Third year	PHY-5T	Digital and Analog Circuits and Instruments	Theory	4	50	17
	PHY-6T	Elements of Modern Physics	Theory	4	50	17
	PHY-3P	LAB 3: Digital and Analog Circuits and Instruments, Modern Physics	Practical	2	50	17

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the university concern.

Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc.**	Year: **Third Year**	Session: **2024-25**
1	Course Code	**PHY- 5T**		
2	Course Title	Digital, Analogue Circuits and Instrumentation		
3	Course Type	Theory		
4	Pre-requisite (if any)	Passed B.Sc. II		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the basic principles and industrial applications of semiconductor diode, Zener diode and transistor • Understand the construction working and applications of transistor • Gain the knowledge of analogue and digital circuits • Understand the construction and working principles of various instruments that are used in the physics laboratory • Develop interest in electronic components		
6	Credit Value	Theory :4		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lectures: 60		
Unit	**Topics**	**No. of Lectures**
1	Semiconductor Devices and Amplifiers: Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode, PN junction and its characteristics, Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.	12
2	Power Supply: Half-wave Rectifier, Central-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, L-section filter and π-section filter, Zener diode as voltage regulator. Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α, β and γ. Relations between α, β and γ. Load Line analysis of Transistors. DC Load line and Q-point. Classification of Amplifiers: Class A, B, and C	12
3	Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output impedance. Current, Voltage and Power Gains. Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers (2) Adder (3) Subtractor (4) Differentiator (5) Integrator, (6) Zero Crossing Detector.	12
4	Sinusoidal Oscillator: Barkhausen's criterion for Self-sustained oscillations, Determination frequency of RC oscillator. Wein Bridge Oscillator, Hartley oscillator and Phase shift oscillator Introduction to CRO: Block diagram, construction and working of CRO, Applications of CRO in (i) study of waveform (ii) measurement of voltage, current , frequency and phase difference,	12
5	Digital Circuits Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. Binary Addition. Binary Subtraction using 2's Complement Method).Half Adders and Full Adders and Subtractors, 4-bit binary Adder-Subtractor.	12

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: • Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill. • Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill. • Microelectronic Circuits, M.H. Rashid, 2nd Edn.,2011, Cengage Learning. • Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning • Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011, Tata McGraw Hill • Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press. • Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd. • OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd. • **e-resources:** 1. https://www.quora.com 2. https://www.allaboutcircuit.com 3. https://www.wileyindia.com 4. https://www.instrumentationtools.com 5. https://www.ibiblio.com 6. https://www.easyengineering.net 7. https://www.elsevier.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method: Maximum Marks: 50 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam. (UE): 50 Marks
Internal Assessment: Max. Marks: 10 Class Test/Assignment/Presentation (Proposed)

DECLARATION

This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

01/ Dr.S.K.Gupta, Govt. E.R.R. P.G Science College, Bilaspur - Chairman

02/ Dr. Jagjeet Kaur Saluja, Govt. V Y T P.G. College, Durg - Member

03/ Dr.Meera Gupta, Govt. Dr. W.W.Patankar Girls P.G. College, Durg, - Member

04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member

08/ Dr.Smriti Agrawal, Govt. College ,Vaishali nagar, bhilai - Member

09/ Dr.S.K.Shrivastava, Govt.P.G. College, Ambikapur - Member

10/ Dr.Kamal K.Prasad Govt.N.E.S.College, Jaspur - Member

11/ Dr. A.P.Goswami, Govt.Bilasa Girls P.G. College, Bilaspur - Member

12/ Dr. V.K. Dubey, Govt.N.P.G. Science College, Raipur - Member

13/ Dr. Anil Kumar Panigrahi, Kirodimal Govt. Arts/Science College, Raigarh - Member

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member 8.6.22

16/ Dr.Shashi Kant Rathor,Dr. B.R. Ambedkar Govt.College,Baloda,Dist-Janjgir-Champa- Member

17/ Dr. Vikas Gulhare, Govt. G.N.A. P.G. College, Bhathapara - Member

Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc. III year**	Year: **2024** Third Year	Session: **2024-25**
1	Course Code	**PHY- 6T**		
2	Course Title	ELEMENTS OF MODERN PHYSICS		
3	Course Type	Theory		
4	Pre-requisite (if any)	B.Sc. II		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Gain of advanced theoretical and experimental method including the use of numerical method • Understand the basic postulates of quantum mechanics • Gain knowledge about physical quantities as operators • Understand the Schrodinger equation and its applications • Gain knowledge about structure of nucleus, nuclear fission and fusion and be familiar of nuclear energy		
6	Credit Value	Theory :4		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lectures: 60		
Unit	**Topics**	**No. of Lectures**
1	Planck's quantum theory, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson Germer experiment. Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.	12
2	Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle, Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence	12
3	Matter waves and wave function; probabilistic interpretation of wave function, Probability and probability current densities in one dimension. Normalization of wave function, Expectation value of dynamical variables, Operators: Position, Momentum and Energy operators; stationary states; probabilities and normalization; Schrodinger equation for non-relativistic particles;	12
4	One dimensional infinitely rigid box- energy eigenvalues and eigen function, Quantum dot; Quantum mechanical scattering and tunneling in one dimension - across a step potential and across a rectangular potential barrier. Schrodinger equation in spherical polar co-ordinates, spherical symmetric potential, energy states of hydrogen using Schrodinger equation	12
5	Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy. Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α- decay; β-decay, energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission. Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.	12

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: • Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill • Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson,2009, PHI Learning • Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill • Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co. • Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning • Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill • e-Resources: 1. https://link.springer.com 2. https://web.pdx.edu 3. https://yooktal.in 4. https://www.bookfobia.com.av 5. https://www.nhbs.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method: Maximum Marks: 50 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam. (UE): 50 Marks
Internal Assessment: Max. Marks: 10 Class Test/Assignment/Presentation (Proposed)

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This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

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04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member 8/6/22

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Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc. III year**	Year: **2024** Third Year	Session: **2024-25**
1	Course Code	**PHY- 3 P**		
2	Course Title	LAB 3		
3	Course Type	Practical		
4	Pre-requisite (if any)	NO		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the working of semiconductor diode, LED, transistor, and their characteristics • Understand the working of rectifier, filter, regulator etc. • Understand the function of Zener diode as voltage regulator • Gain knowledge about amplifier and logic gates,		
6	Credit Value	Practical : 2		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course
Total No. of Lectures: 60
Experiments
At least 12 experiments from the following or other experiments of equal standards 1. To study IV characteristics of p n junction diode, Zener diode and LED 2. To study the characteristics of p n p and n p n transistor in CE configuration 3. To study the characteristics of p n p and n p n transistor in CB configuration 4. To study regulated power supply and determination of ripple factor and voltage regulation factor 5. To draw and study the frequency response curve of two stage RC coupled amplifier 6. To design and study the CE amplifier of a given gain using voltage divider biasing circuit 7. To measure voltage and frequency of a periodic waveform using a CRO 8. To design and study Wein Bridge Oscillator 9. To design and verify the truth table of AND, OR, NOT AND XOR gates 10. To determine Boltzmann constant using I-V characteristics of p n diode 11. To determine function of material of filament of directly heated vacuum diode valve 12. To determine Planck's constant using LEDs of at least four different colors 13. To determine ionization potential of mercury 14. To measure the susceptibility of paramagnetic solution (Quinke's method) 15. To draw the B-H curve of iron using a solenoid and determine the energy loss from hysteresis 16. To measure the resistivity of semiconductor (Ge) crystal with temperature by four probe method and to determine its band gap 17. To determine the Hall coefficient of a semiconductor sample 18. To study the photo electric effect by drawing photo current versus intensity curve and to determine the wavelength of light 19. To study the diffraction pattern of a single and double slit using laser source 20. To study Half adder, Full adder and 4-bit binary adder 21. Study of adder, subtractor using full adder IC 22. To minimize a given logic circuit

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: • Basic Electronics- A Text Lab Manual, P.B. Zbar, A.P. Malvino, M. A. Miller, 1994,Tata Mc Graw Hill • Electronics: Fundamentals and Applications, J. D. Ryder, 2004, Prentice Hall of India • Electronic Principles, A.P. Malvino,2008, Tata Mc Graw Hill • Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill. • Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill. • Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning. • Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning • Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011, Tata McGraw Hill • Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press. • Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd. • OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd. • e-Resources: https://link.springer.com https://web.pdx.edu https://yooktal.in https://www.bookfobia.com.av https://www.nhbs.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method: Maximum Marks: 50 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam. (UE): 50 Marks

DECLARATION

This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

01/ Dr.S.K.Gupta, Govt. E.R.R. P.G Science College, Bilaspur - Chairman

02/ Dr. Jagjeet Kaur Saluja, Govt. V Y T P.G. College, Durg - Member

03/ Dr.Meera Gupta, Govt. Dr. W.W.Patankar Girls P.G. College, Durg, - Member

04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member

08/ Dr.Smriti Agrawal, Govt. College ,Vaishali nagar, bhilai - Member

09/ Dr.S.K.Shrivastava, Govt.P.G. College, Ambikapur - Member

10/ Dr.Kamal K.Prasad Govt.N.E.S.College, Jaspur - Member

11/ Dr. A.P.Goswami, Govt.Bilasa Girls P.G. College, Bilaspur - Member

12/ Dr. V.K. Dubey, Govt.N.P.G. Science College, Raipur - Member

13/ Dr. Anil Kumar Panigrahi, Kirodimal Govt. Arts/Science College, Raigarh - Member

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member

16/ Dr.Shashi Kant Rathor,Dr. B.R. Ambedkar Govt.College,Baloda,Dist-Janjgir-Champa- Member

17/ Dr. Vikas Gulhare, Govt. G.N.A. P.G. College, Bhathapara - Member

Scheme of B. Sc. Chemistry

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	CHEM-1T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-2T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-1P	LAB 1 : General Chemistry-1	Practical	2	50	17
Second year	CHEM-3T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-4T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-2P	LAB 2 : General Chemistry-2	Practical	2	50	17
Third year	CHEM-5T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-6T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-3P	LAB 3 : General Chemistry-3	Practical	2	50	17

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern university and it is not mandatory.

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	**CHEM-5T**		
2.	Course Title	Inorganic & Physical Chemistry		
3.	Course Type	Core Course		
4.	Pre-requisite (if any)	To Study this course our students must have had the diploma in chemistry or equivalent		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to learn the following aspects of Chemistry : • Metal-ligand bonding and stability of the metal complexes. • Spectroscopic and magnetic properties of transition metal complexes. • Fundamentals and catalytic and industrial applications of organometallic compounds. • Applications of bioinorganic chemistry, acid-base principles and inorganic polymers. • Fundamentals and applications of electromagnetic spectrum, microwave' infrared. Raman and electronic spectroscopy' • Basic concepts and theories of photochemistry and learn about the various aspects of its applications. • Problems and principles/concepts in electric, magnetic and optical properties of molecules.		
6.	Credit Value	Theory: 4		
7.	Total Marks	**Max. Marks**: 50		**Min Passing Marks: 17**

Part B: Content of the Course		
Total No. of Lecturer (in hours per week):	Total Lecturer: **90**	
Unit	**Topics**	**No. of Lectures**
I	**Metal- Ligand Bonding in Transition Metal Complexes**-Limitation of Crystal Field Theory, Tetragonal distortions from octahedral geometry, Jahn–Teller distortion, square planar geometry. Qualitative aspect of Ligand field and MO Theory, MO diagrams of representative coordination complexes of octahedral geometry. **Thermodynamic and kinetic aspects of metal complexes**. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability. Substitution reactions of square planar complexes. Trans-effect, theories of trans-effect. Mechanism of substitution reactions of Square planar complexes.	**15**
II	**Magnetic Properties of Transition Metal Complexes:** Types of magnetic behavior, method of determining magnetic susceptibility by Gouy method, spin only formula, L-S coupling, correlation of μ_s (spin only) and μ_{eff}. Values, Orbital contribution to magnetic moments, Application of magnetic moment data for 3d metal complexes. **Electronic spectra of Transition Metal Complexes**:Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for d^1 and d^2 states,	**15**

	Discussion of the Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.	
III	**Organometallic chemistry:** Definition and classification of organometallic compounds based on nature of metal-carbon bond. Concept of hapticity of organic ligands. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behavior of CO (MO diagram of CO to be discussed), Zeise's salt: Preparation and structure of Metal carbonyls : 18 electron rule , Electron count of mononuclear, polynuclear and substituted metal carbonyls of 3*d* series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3dseries. **Catalysis by Organometallic Compounds**–Study of the following industrial processes and their mechanism: Alkene hydrogenation (Wilkinson'sCatalyst), Polymerization of ethane (Ziegler–Natta Catalyst)	15
IV	**Bioinorganic chemistry**: Classification of elements according to their action in biological system. Essential and trace elements in biological processes, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals, Metal ions present in biological systems, Toxicity of some metal ions (Hg, Pb, Cd and As), metalloporphyrins with special reference to hemoglobin and myoglobin and their structure and biological functions. Biological role of alkaline earth metals with special reference to $Ca^{2+}$and Mg^{2+}, nitrogen fixation. **Inorganic polymers:** Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Silicates, phosphazenes and polyphosphate	15
V	**Spectroscopy-I Introduction**: Characterization of Electromagnetic radiation, regions of the spectrum, interaction of radiation with matter, types of spectrums, types of spectroscopy studied in different regions of electromagnetic radiation. Born-Oppenheimer Approximation. Basic idea of instrumentation of simple photometer, atomic absorption and emission spectrophotometers. **Photochemistry:** Difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Lambert-Beer's law, Stark- Einstein law, quantum yield, examples of low and high quantum yields, Photochemical equilibrium and the differential rate of photochemical reactions, Quenching, Role of photochemical reaction in biochemical process. Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), photosensitized reactions, energy transfer processes (simple examples), photostationary states, Chemiluminescence. **Electronic Spectroscopy:** Basic principles, Electronic Spectra of diatomic molecule, Franck- Condon principle, types of electronic transition, application of electronic spectra.	15
VI	**Spectroscopy-II Rotational Spectroscopy**: Rotational Spectrum of Diatomic molecules. Energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotator, isotopic effect. **Vibrational Spectroscopy:** Theory of IR Spectroscopy, vibrating diatomic molecule, energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, rotational-vibrational Spectra, determination of force constant, anharmonic oscillator **Raman Spectroscopy:** Instrumentation of Raman spectrophotometer, Concept of polarizability, quantum theory of Raman spectra, stokes and	15

	antistokes lines, pure rotational and pure vibrational Raman spectra. selection rule, Applications of Raman Spectra.	

Keywords: Crystal field theory, transition metal complexes, magnetic properties, electronic spectra, organometallic compounds, carbonylation, inorganic polymers, electromagnetic radiations, photochemistry, rotational and vibrational spectroscopy, raman spectroscopy

Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Reading :

1. Lippard, S.J. & Berg, J.M. Principles of Bioinorganic Chemistry Panima Publishing Company 1994.
2. Cotton, F.A. & Wilkinson, G, Advanced Inorganic Chemistry Wiley-VCH, 1999.
3. Malik W.U. & et Al., Selected Topics in Inorganic Chemistry, S Chand Publication (2010). Puri, B.R. , Sharma, L.R., KaliaK.C. , Principles of Inorganic Chemistry, Vishal Publishing Co. (2021).
4. Gurtu, J.N., Gurtu, A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, Edition IV, 2017
5. Dogra, S.K.,Physical Chemistry through problems, Wiley Eastern.
6. Khera, H.C., Gurtu, J.N., Singh, J., Chemistry for B.Sc. Ist Year, Pragati Prakashan
7. Ball, D.W., Physical Chemistry, Thomson Press, India, 2007
8. Castellan, G.W., Physical Chemistry, 4th Edition, Narosa, 2004
9. Bariyar, A. & Goyal, S., B.Sc. Chemistry Combined (in Hindi), Krishna Educational Publishers Year 2019
10. Levine, I.N., Physical Chemistry, 6th Edition, Tata McGraw-Hill, 2010
11. Metz, C.R., 2000 Solved Problems in Chemistry, Sahaun Series, 2006
12. Puri, B.R., Pathania, M.S., Sharama, L.R., Principles of Physical Chemistry, Vishal Publishing Company 2020
13. Negi, A.S. & Anand, S.C., A Text Book of Physical Chemistry, 3rd Edition, New Age International Publication
14. Bajpai, D.N., Advanced Physical Chemistry, S. Chand, 2019
15. Bahal & Tuli, Essential of Physical Chemsitry, 2020
16. Greenwood, N.N. & Earnshaw A. Chemistry of the Elements, Butterworth-Heinemann, 1997.
17. Purcell, K.F & Kotz, J.C. Inorganic Chemistry W.B. Saunders Co, 1977.
18. Huheey, J.E., Inorganic Chemistry, Prentice Hall, 1993.
19. Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991
20. Atkins, P. W and Shriver D. N. Atkins' Inorganic Chemistry 5th Ed. Oxford University Press (2010).
21. Engel, T. and Reid, P., Physical Chemistry, 3rd Edition, Prentice Hall, 2012
22. Mortimer, R.G., Physical Chemistry, 3rd Edition, Elsevier, Noida, UP, 2009
23. Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014
24. Barrow, G.M., Physical Chemistry Tata McGraw-Hill, 2007
25. Physical Chemistry, A Modern Introduction, 2nd Edition, William M. Davis, CRC Press, 2018.
26. Chemical Kinetics, Stochastic Processes and irreversible Thermodynamics, Santillan Moises, Springer, 2014.
27. Physical Chemistry, Madan R.L., McGraw Hill, 2021.
28. Physical Chemistry, 3rd Edition, Robert G. Mortimer, Elsevier, 2021.

E-learning resources:

- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm
- https://nptel.ac.in/courses/104/103/104103071/#

• https://nptel.ac.in/courses **Fundamental Chemistry related topics on SWAYAM platform and E-pathshala**
Part D: Assessment and Evaluation
Maximum Marks: 50

DECLARATION

This is to certify that the syllabus is framed by the Central Board of Studies (Chemistry) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

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   Assistant Professor,
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   Assistant Professor,
   Govt. J.P. Verma P.G. College, Bilaspur (C.G.)
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   Assistant Professor,
   Govt. Lahiri P.G. College Chirimiri(C.G.)
4. Dr. Rajmani Patel, - Member
   Assistant Professor,
   Hemchand Yadav University, Durg (C.G.)
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7. Dr. P.K. Agnihotri, - Member
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   Govt. Yuganandam Chhattisgarh College Raipur(C.G.)
8. Dr. B.D. Diwan, - Member
   Professor,
   Govt. M.M.R. P.G. College Champa(C.G.)
9. Dr. Sandhya Patre, - Member
   Assistant Professor,
   Sant Shiromani Guru Ravidas Govt. College Sargaon,
   Mungeli(C.G.)
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    Govt. G.N.A. P.G. College Bhatapara, (C.G.)
11. Dr. Alka Shukla, - Member
    Assistant Professor,
    Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
    Bhilai(C.G.)
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17. Mr. Laxmi Chand Manwani, - Member
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Government Vivekand PG College Manendragarh(C.G.)

18. Dr. K. Indira - Member
Professor,
Government K. PG College Jagadalpur (C.G.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	CHEM-6T		
2.	Course Title	Organic & Physical Chemistry		
3.	Course Type	Core Course		
4.	Pre-requisite (if any)	To Study this course our students must have had the diploma in chemistry or equivalent		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to learn the following aspects of Chemistry • Fundamental theoretical knowledge about the heterocyclic chemistry. • Common organometallic reactions and draw reasonable reaction mechanisms. • Various synthetic dyes and their structures. • Chemical structure of proteins, amino acids and nucleic acids. 5: To acquire knowledge about different mechanisms involved in polymerization, useful polymers and their structures. • Basic principles of UV-Visible, IR and NMR spectra and their applications. • Fundamentals/concepts/principles/postulates of quantum mechanics and need for development of quantum mechanics. • Applications of quantum mechanics in the study of black body radiation, photoelectric effect, simple quantum mechanical models, bonding in molecules and molecular spectroscopy.		
6.	Credit Value	Theory: **4**		
7.	Total Marks	Max. Marks: **50**		Min Passing Marks: **17**

Part B: Content of the Course		
Total No. of Lecturer (in hours per week): **4**	Total Lecturer: **90**	
Unit	**Topics**	**No. of Lectures**
I	**Heterocyclic Compounds :** Classification and Nomenclature of Hetrocyclic Compounds, Five Membered Hetrocyclic Compounds, Furan or Furfuran C_4H_4O, Pyrrole (C_4H_5N), Thiophene (C_4H_4S), 1,4 dicarbonyl compound, Six membered Hetrocyclic Compounds Pyridine (C_5H_5N), Orientation in Pyridine and Substitution Reactions, Comparison of Basicity of Pyridine, Piperidine and Pyrrol, Condensed Five and Six Membered Hetrocyclic, Indole (2,3 Benzopyrrole) C_8H_7N, Quinoline or α, β - Benzopyridine; (C_9H_7N), Isoquinoline (C_9H_7N).	**15**
II	**Carbohydrates:** Classification of Carbohydrates, Biological Importance of Carbohydrates, Monosaccharides, Relative and Absolute Configuration of Glucose and Fructose, Epimers and Anomers, Mutarotation, Determination of Ring size of Glucose and Fructose, Haworth Projections and Conformational Structure, Mutual Transformations or Inter Conversion among Monosaccharides, Disaccharides, Polysaccharides.	**15**

	Biomolecules: Amino acids, Proteins and Nucleic acids: Amino Acids, Isoelectric Point, Proteins, Difference between Globular Proteins and Fibrous Proteins, Peptide and Peptide Bond, Nucleic acid, structure and functions of RNA and DNA.	
III	**Infra-red and Ultraviolet –Visible Spectroscopy:** **Infra-red Spectroscopy:** Basics of Infra-red Spectroscopy, Fundamental vibrations and their symmetry, Instrumentation, Measurement of IR Spectra, Regions and Interpretation of IR Spectra of organic molecules and its applications. **Ultra-violet and Visible Spectroscopy:** Absorption Laws and Molar Absorptivity, Presentation of *UV*- Spectra of conjugated enes, UV Spectra of conjugated enones, applications of Ultra-violet spectroscopy. Effect of conjugation on $\lambda_{max.}$	**15**
IV	**NMR and Mass Spectroscopy:** **NMR Spectroscopy:** Principle of NMR Spectroscopy, Instrumentation of NMR Spectroscopy, Nuclear Shielding and Deshielding, The Chemical Shift, Signal Splitting : Spin-Spin Coupling, Interpretation of PMR, Spectra, Structural Elucidation using UV, IR and NMR, Anisotropy and Anisotropic Effect, Coupling constant and signal resolution, ^{13}C-NMR Spectroscopy. **Mass Spectroscopy:** Principle of mass Spectroscopy, Instrumentation of mass Spectroscopy, fragmentation process. The m/z value of the molecular ion to calculate the molecular formula. Isotope Effect.	**15**
V	**Quantum Mechanics–I :** Historical background of quantum mechanics, Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect. Operator: Hamiltonian operator, angular momentum operator, Laplacian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of ψ & ψ^2, application of Schrodinger wave equation to particle in a one-dimensional box, hydrogen atom (separation into three equations) radial and angular wave functions.	**15**
VI	**Quantum Mechanics-II :** Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. from A.O., LCAO approximation, formation of H_2^+ ion, calculation of energy levels from wave functions, bonding and antibonding wave functions, Concept of σ, σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals-sp, sp^2, sp^3 Calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.	**15**

Part C: Learning Resource

Suggested Readings :

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Puri, B.R., Pathania, M.S., Sharama, L.R., Principles of Physical Chemistry, Vishal Publishing Company 2020
5. Gurtu, J.N., Gurtu, A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, Edition IV, 2017
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9. Castellan, G.W., Physical Chemistry, 4th Edition, Narosa, 2004
10. Bariyar, A. & Goyal, S., B.Sc. Chemistry Combined (in Hindi), Krishna Educational Publishers Year 2019
11. Levine, I.N., Physical Chemistry, 6th Edition, Tata McGraw-Hill, 2010
12. Metz, C.R., 2000 Solved Problems in Chemistry, Sahaun Series, 2006
13. Bahal & Tuli, Essential of Physical Chemsitry, 2020
14. Negi, A.S. & Anand, S.C., A Text Book of Physical Chemistry, 3rd Edition, New Age International Publication
15. Bajpai, D.N., Advanced Physical Chemistry, S. Chand, 2019
16. Engel, T. and Reid, P., Physical Chemistry, 3rd Edition, Prentice Hall, 2012
17. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994
18. Kalsi, P. S. Organic spectroscopy, New Age International, 2005.
19. Dyer, J.R., Introduction to spectroscopy, PHI
20. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
21. Mortimer, R.G., Physical Chemistry, 3rd Edition, Elsevier, Noida, UP, 2009
22. Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014
23. Barrow, G.M., Physical Chemistry Tata McGraw-Hill, 2007

E-learning resources:

1. http://heecontent.upsdc.gov.in/Home.aspx
2. https://nptel.ac.in/courses/104/106/104106096/
3. http://heecontent.upsdc.gov.in/Home.aspx
4. https://nptel.ac.in/courses/104/106/104106096/
5. https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm
6. https://nptel.ac.in/courses/104/103/104103071/#
7. https://nptel.ac.in/courses

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation
Maximum Marks: 50

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Professor,
Government K. PG College Jagadalpur (C.G.)

Part A: Introduction			
Program: **Degree Course**	Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-25**

1	Course Code	**CHEM-3P**	
2	Course Title	LAB. 3: GENERAL CHEMISTRY 3	
3	Course Type	Chemistry Practical	
4	Pre-requisite (if any)	To study this course our students must have had the diploma in chemistry or equivalent	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will learn the following aspects of laboratory exercises : • Preparation of inorganic complexes • Preparation of organic compounds • Explain /define different terms in conductometry • Explain/define different terms in colorimetry • Understand the theoretical principles with the help of practicals	
6	Credit Value	Practical : **02**	
7	Total Marks	**Max. Marks:** 50	**Min. Passing Marks:** 17

Part B: Content of the Course		
Total No. of Lectures: **30**		
LABORATORY COURSE		**No. of Lectures**
Tentative list of practical	**Inorganic Chemistry** Gravimetric analysis: Estimation of nickel (II) using dimethylglyoxime (DMG), estimation of copper as CuSCN, estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$, estimation of Al (III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminium oxinate), estimation of Barium as $BaSO_4$. Inorganic Preparations: •Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$ •Cis and trans $K[Cr(C_2O_4)_2.(H_2O)_2]$ Potassium dioxalatodiaquachromate(III) •Tetraamminecarbonatocobalt (III) ion •Potassium tris(oxalate)ferrate(III)/ Sodium tris(oxalate)ferrate(III) •Cu(I) thiourea complex, bis (2,4-pentanedionate) zinc hydrate; Double salts (Chrome alum/ Mohr's salt)	10
	Organic chemistry 1.Preparation of organic Compounds: Synthesis of oxalic acid from cane sugar. Acetylation of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-,m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) Benzolyation of one of the following amines (aniline, o-, m-, p-toluidines and o-, m-, panisidine) and one of the following phenols (β-naphthol, resorcinol, p cresol) by Schotten-Baumann reaction. Bromination of any one of the following: **a.** Acetanilide by conventional methods **b.** Acetanilide using green approach (Bromate-bromide method)	10

	• Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate). • Reduction of p-nitrobenzaldehyde by sodium borohydride. • Hydrolysis of amides and esters. • Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde. • Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid ,oxalic acid ,phenyl acetic acid and phthalic acid) • Aldol condensation using either conventional or green method. • Benzil-Benzilic acid rearrangement. • Preparation of sodium polyacrylate. • Preparation of urea formaldehyde. • Preparation of methyl orange. The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC. 1. Qualitative Analysis: Qualitative analysis of an organic mixture containing two solid components using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives. 2. Extraction of caffeine from tea leaves. 3. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars. 4. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy. (Spectra to be provided). 5. Estimation of glycine by Sorenson's formalin method. 6. Study of the titration curve of glycine. 7. Estimation of proteins by Lowry's method. 8. Study of the action of salivary amylase on starch at optimum conditions 9. Effect of temperature on the action of salivary amylase.	
	Physical chemistry Conductometry • Determination of cell constant • Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid. • Perform the following conductometric titrations: i.Strong acid vs. strong base ii.Weak acid vs. strong base iii.Mixture of strong acid and weak acid vs. strong base iv.Strong acid vs. weak base • To determine the strength of the given acid conductometrically using standard alkali solution. • To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically • To study the saponification of ethyl acetate conductometrically. Potentiometry/pH metry: • Perform the following potentio/pH metric titrations: i. Strong acid vs. strong base ii. Weak acid vs. strong base	10

iii. Dibasic acid vs. strong base
iv. Potassium dichromate vs. Mohr's salt
v. Determination of pKa of monobasic acid

UV/ Visible spectroscopy:

- Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration
- Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
- Study the kinetics of iodination of propanone in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenathroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acelaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine λmax values.

Note: Experiments may be added/deleted subject to availability of time and facilities

Keywords: Gravimetric analysis, Inorganic complex preparation, Organic compounds, Conductometry, Potentiometric, pH metry, Spectroscopy.

Part C : LEARNING RESOURCES

Suggested Readings:

1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. &Aggarwal, R. Comprehensive Practical Organic Chemistry:
5. Preparation and Quantitative Analysis, University Press (2000).
6. Ahluwalia, V.K. &Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000),
7. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi
8. Green Chemistry, ,Theory and Practice,P.T.AnastasandJ.C.Warner
9. Green Chemistry ,Environmental friendly alternatives ,R.S.Sanghli and M.M. Srivastava, Narosa Publications.
10. Gupta, A., Unified Chemistry Practical, Navbodh Publications.

E-Learning Resources:

1. http://vlab.amrita.edu/index.php
2. http://www.chemguide.co.uk/

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation
Maximum Marks: 50

Experiments	**08 hours / M.M. 50**
Five Experiments to be performed Inorganic chemistry – Two experiments to be performed . a) Gravimetric Estimation compulsory. b) Anyone experiment from synthesis and analysis. Organic chemistry – Two experiments to be performed. a) Qualitative analysis of organic mixture containing two solid components. b) One experiment from synthesis of organic compound Physical chemistry – one experiment from physical chemistry Sessional Viva [Note ; In case of Ex-student , one mark each will be added to gravimetric analysis and qualitative analysis of organic mixture and two marks in experiment in physical chemistry].	 08 marks 04 marks 08 marks (03 marks for each compound and 02 marks for separation) 04 marks 12 marks 04 marks 10 marks

DECLARATION

This is to certify that the syllabus is framed by the Central Board of Studies (Chemistry) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Alka Shrivastav, - Chairman
   Assistant Professor,
   Govt. E.V.P.G. College, Korba
2. Smt. Priyanka Tiwari, - Member
   Assistant Professor,
   Govt. J.P. Verma P.G. College, Bilaspur
3. Mr. Vijay Kumar Lahare, - Member
   Assistant Professor,
   Govt. Lahiri P.G. College Chirimiri(C.G.)

8/6/22

08/06/2022

4. Dr.Rajmani Patel, - Member
Assistant Professor,
Hemchand Yadav University, Durg
5. Dr. A.K. Singh, - Member
Professor,
Govt. V.Y.T. P.G. College Durg
6. Dr. P.K. Singh, - Member
Assistant Professor,
Govt. T.C.L. P.G. College Janjgir(C.G.)
7. DR. P.K. Agnihotri, - Member
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Govt. Yuganandam Chhattisgarh College Raipur(C.G.)
8. Dr. B.D. Diwan, - Member
Professor,
Govt. M.M.R. P.G. College Champa(C.G.)
9. Dr. Sandhya Patre, - Member
Assistant Professor,
Sant Shiromani Guru Ravidas Govt. College Sargaon,
Mungeli(C.G.)
10. Mrs. Mousami Lahare, - Member
Assistant Professor,
Govt. G.N.A. P.G. College
11. Dr. Alka Shukla, - Member
Assistant Professor,
Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
Bhilai(C.G.)
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13. Dr. Deepti Tikariha, - Member
Assistant Professor, APSGMNS Govt. P.G. College
Kawardha(C.G.)
14. Dr. Seema Negi, - Member
Assistant Professor, Govt. J.M.P. College, Takhatpur (C.G.)
15. Dr. Vikesh Kumar Jha, - Member
Assistant Professor, Govt. R.R.M. P.G. College Surajpur
(C.G.)
16. Dr. Ashish Tiwari, - Member
Assistant Professor,
Dr. Bhimrao Ambedkar Govt. College Pamgarh(C.G.)
17. Mr. Laxmi Chand Manwani, - Member
Assistant Professor,
Government Vivekand PG College Manedragarh(C.G.)
18. Dr. K. Indira - Member
Professor,
Government K. P. G. College Jagadalpur (C.G.)

Scheme of B. Sc. Mathematics

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	MATH-1T	Calculus	Theory	4	50	33
	MATH-2T	Algebra	Theory	4	50	
	MATH-1P **(Any One)**	Lab 1 : Calculus and Algebra	Practical	2	50	17
		Project 1 : History of Mathematicians	Project	2	50	17
Second year	MATH-3T	Differential Equations	Theory	4	50	33
	MATH-4T	Real Analysis	Theory	4	50	
	MATH-2P **(Any One)**	Lab 2 : Differential Equations and Real Analysis	Practical	2	50	17
		Project 2 : History of Mathematicians	Project	2	50	17
Third year	MATH-5T **Optional I (Any One)**	Mechanics	Theory	4	50	33
		Numerical Methods	Theory	4	50	
		Linear Algebra	Theory	4	50	
		Integral Transforms and Fourier Analysis	Theory	4	50	
	MATH-6T **Optional II (Any One)**	Discrete Mathematics	Theory	4	50	
		Tensors and Differential Geometry	Theory	4	50	
		Number Theory	Theory	4	50	
		Probability and Statistics	Theory	4	50	
	MATH-3P **(Any One)**	Lab 3 : Mathematics Paper 1 and Paper 2	Practical	2	50	17
		Project 3 : History of Mathematicians	Project	2	50	17

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.

Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 5T(I)		
2	Course Title	Mechanics		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Familiarize with subject matter, which has been the single centre, to which were drawn mathematicians, physicists, astronomers and engineers together. • Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a particle. • Determine the centre of gravity of materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight. • Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particle. • Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long beforethe mathematical theory given by Newton.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks : 17	

Part B: Content of the Course

Total Periods: 60

Unit	Topics	No. of Periods
I	**Statics:** Coplanar forces, Couples, Moment of force and a couple about a point and a line, Equilibrium of a particle and of a system of particles; Work and potential energy, Principle of virtual work for a system of coplanar forces acting on a particle, Forces which can be omitted in forming the equations of virtual work.	12
II	**Centre of Gravity and Common Catenary:** Concepts of Centre of mass and Centre of gravity, Centre of gravity of an uniform arc, plane area and solids of revolution; Common catenary, Approximations of a catenary.	12
III	**Rectilinear Motion:** Simple harmonic motion and its geometrical representation, Motion under inverse square law, Motion in resisting media, Concept of terminal velocity, Motion of varying mass.	12
IV	**Motion in a Plane:** Kinematics and kinetics of motion, Expressions for velocity and acceleration in cartesian, polar and intrinsic coordinates; Motion in a vertical circle, projectile and cycloidal motion.	12
V	**Central Orbits:** Equation of motion under a central force, Differential equation of an orbit, (p, r) equation of an orbit, Apses and apsidal distances, Areal velocity, Characteristics of central orbits, Kepler's laws of planetary motion.	12

Part C - Learning Resource

Text Books, Reference Books:

1. R. S. Varma (1962). *A Text Book of Statics*. Pothishala Pvt. Ltd.
2. P.L. Srivastava (1964). *Elementary Dynamics*. Ram Narain Lal, Beni PrasadPublishers Allahabad.
3. J. L. Synge & B. A. Griffith (1949). *Principles of Mechanics*. McGraw-Hill.
4. S.L. Loney (2006). *An Elementary Treatise on the Dynamics of a Particle and ofRigid Bodies*. Read Books.
5. A. S. Ramsey (2009). *Statics*. Cambridge University Press.
6. A. S. Ramsey (2009). *Dynamics*. Cambridge University Press.

E-Resources

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/playlist?list=PLwdnzlV3ogoXUbQmP-T2gPhYXeEcxP6U8

Part D: Assessment and Evaluation	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	50 Marks

Declaration

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1. Dr. Premlata Verma
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur - Chairman
2. Prof. R.R. Sahu
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    K. Govt. Arts & Science College, Raigarh - Member
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    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 5T(II)		
2	Course Title	Numerical Methods		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Obtain numerical solutions of algebraic and transcendental equations. • Find numerical solutions of system of linear equations and to check the accuracy ofthe solutions. • Learn about various interpolating and extrapolating methods to find numericalsolutions. • Solve initial and boundary value problems in differential equations using numericalmethods. • Apply various numerical methods in real life problems.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks : …	

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Periods
I	**Numerical methods for solving algebraic and transcendental equations:** Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, false position method, fixed point iteration method, Newton's method and secant method for solving equations.	12
II	**Numerical Methods for Solving Linear Systems:** Partial and scaled partial pivoting, LU decomposition and its applications, Thomas method for tridiagonal systems; Gauss-Jacobi, Gauss-Seidel and successive over-relaxation (SOR) methods.	12
III	**Interpolation**: Lagrange and Newton interpolations, Piecewise linear interpolation, Cubic spline interpolation, Finite difference	12

	operators, Gregory-Newton forward and backward difference interpolations.	
IV	**Numerical Differentiation and Integration:** First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rule and its error analysis, Bulirsch-Stoer extrapolation methods, Richardson extrapolation.	12
V	**Initial and Boundary Value Problems of Differential Equations:** Euler's method, Runge-Kuttamethods, Higher order one step method, Multi-step methods; Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.	12

Part C - Learning Resource

Text Books and Reference Books:

1. Brian Bradie , *A Friendly Introduction to Numerical Analysis.* Pearson. 2006
2. C. F. Gerald & P. O. Wheatley. *Applied Numerical Analysis* (7^{th} edition),Pearson Education, India. 2008
3. M.K. Jain, S. R. K. Iyengar & R. K. Jain. *Numerical Methods for Scientificand Engineering Computation* (6^{th} edition). New Age International Publishers. 2012
4. Robert J. Schilling & Sandra L. Harris. *Applied Numerical Methods forEngineers Using* MATLAB *and C*. Thomson-Brooks/Cole.1999

E- Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=pOtnzAXIXvI&list=PL3pGy4HtqwD0CWdFuygdF-gk0ORk5EFZg

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

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    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 5T(III)		
2	Course Title	Linear Algebra		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Learn about properties of linear transformation and isomorphism theorems. • Understand the concept of polynomials and their prime factorization. • Find canonical form of linear transformations. • Obtain various variants of diagonalisation of linear transformations. • Apply Cauchy-Schwarz inequality for deriving metric on inner product spaces and obtain orthonormal basis using Gram-Schmidt orthogonalisation.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Properties of Linear Transformation:** Vector spaces, Linearly independent and dependent sets, Bases and dimension, Linear transformation, Linear functional, Dual spaces and second dual space, Transpose of linear transformation, Algebra of linear transformations, Isomorphism theorems.	12

II	**Polynomials:** Algebras, The algebra of polynomials, Lagrange interpolation, Vandermonde matrix, Polynomial ideals, Taylor's formula, The prime factorization of a polynomial, Algebraically closed fields.	12
III	**Elementary Cannonical Forms:** Determinant functions, Characteristic values of a linear transformation, Cayley-Hamilton theorem for linear transformations, Annihilating polynomials, Invariant subspaces, Minimaland characteristic polynomials.	12
IV	**Diagonalisation and Jordan Cannonical Form:** Diagonalisability of linear transformations, Direct sum decomposition, Invariant direct sums, The primary decomposition theorem, Triangular form, Jordan canonical form, trace and transpose.	12
V	**Inner Product Spaces:** Definition and examples of inner product space, orthogonality, Cauchy-Schwarz inequality, Gram-Schmidt orthogonalisation, Diagonalisation of symmetric matrices, Hermitian, Unitaryand normal operators.	12

Part C - Learning Resource

Text Books, Reference Books,

1. I. M. Gel'fand. *Lectures on Linear Algebra*. Dover Publications. 1989
2. Kenneth Hoffman & Ray Kunze. *Linear Algebra* (2nd edition). Prentice-Hall. 2015
3. Nathan Jacobson. *Basic Algebra* I (2nd edition). Dover Publications. 2009
4. Nathan Jacobson *Basic Algebra* II (2nd edition). Dover Publications. 2009.
5. Serge Lang *Introduction to Linear Algebra* (2nd edition). Springer India. 2005.
6. Gilbert Strang. *Linear Algebra and its Applications* (2nd edition). Elsevier. 2014

E- Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=9h_Q-R6sXbM&list=PL7oBzLzHZ1wXQvQ938Wg1-soq09GywgOw

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

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    Govt. MLS College, Seepat

Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 5T(IV)		
2	Course Title	Integral Transforms and Fourier Analysis		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Know about piecewise continuous functions, Dirac delta function, Laplace transformsand its properties. • Solve ordinary differential equations using Laplace transforms. • Explain Parseval's identity, Plancherel's theorem and applications of Fourier transforms to boundary value problems. • Learn Fourier series, Bessel's inequality, term by term differentiation and integrationof Fourier series.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Laplace Transforms:** Integral transform, Kernel of an integral transform, Reduction of integral transform into Laplace transform, Linearity, Existence theorem, Laplace transforms of derivatives and integrals, Shifting theorems, Change of scale property, Laplace transforms of periodic functions, Dirac's delta function.	12
II	**Further Properties of Laplace Transforms and Applications:** Differentiation and integration of transforms, Convolution theorem, Integral equations, Inverse Laplace transform, Lerch's theorem, Linearity property of inverse Laplace transform, Translations theorems of inverse Laplace transform, Inverse	12

	transform of derivatives, Applications of Laplace transform in obtaining solutions of ordinary differential equations and integral equations.	
III	**Fourier Transforms:** Fourier and inverse Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier sine and cosine transforms, Linearity property, Change of scale property, Shifting property, Modulation theorem, Relation between Fourier and Laplace transforms.	12
IV	**Solution of Equations by Fourier Transforms :** Solution of integral equation by Fourier sine and cosine transforms, Convolution theorem for Fourier transform, Parseval's identity for Fourier transform, Plancherel's theorem, Fourier transform of derivatives, Applications of infinite Fourier transforms to boundary value problems, Finite Fourier transform, Inversion formula for finite Fourier transforms.	12
V	**Fourier Series:** Fourier cosine and sine series, Fourier series, Differentiation and integration of Fourier series, Absolute and uniform convergence of Fourier series, Bessel's inequality, The complex formof Fourier series.	**12**

Part C - Learning Resource
Text Books, Reference Books: 1. James Ward Brown & Ruel V. Churchill. *Fourier Series and Boundary ValueProblems*. McGraw-Hill Education. 2011 2. Charles K. Chui. *An Introduction to Wavelets*. Academic Press 1992 3. Erwin Kreyszig. *Advanced Engineering Mathematics* (10th edition). Wiley. 2011 4. Walter Rudin. *Fourier Analysis on Groups*. Dover Publications. 2017 5. A. Zygmund. *Trigonometric Series* (3rd edition). Cambridge University Press. 2002 **Other Resources:** 1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs 2. https://www.youtube.com/watch?v=FGjMZ1uMRrs&list=PLhSp9OSVmeyJ5N-JUEZj7uS6IAT9a79nD

Part D: Assessment and Evaluation	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	50 Marks

Declaration

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Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(I)		
2	Course Title	Discrete Mathematics		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Learn about partially ordered sets, lattices and their types. • Understand Boolean algebra and Boolean functions, logic gates, switching circuitsand their applications. • Solve real-life problems using finite-state and Turing machines. • Assimilate various graph theoretic concepts and familiarize with their applications.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Partially Ordered Sets:** Definitions, examples and basic properties of partially ordered sets (poset), Order isomorphism, Hasse diagrams, Dual of a poset, Duality principle, Maximal and minimal elements, Least upper bound and greatest upper bound, Building new poset, Maps between posets.	12
II	**Lattices:** Lattices as posets, Lattices as algebraic structures, Sublattices, Products and homomorphisms; Definitions, examples and properties of modular and distributive lattices; Complemented, relatively complemented and sectionally complemented lattices.	12
III	**Boolean Algebras and Switching Circuits:** Boolean algebras, De Morgan's laws, Boolean homomorphism, Representation theorem; Boolean polynomials, Boolean polynomial functions, Disjunctive	12

	and conjunctive normal forms, Minimal forms of Boolean polynomials, Quine-McCluskeymethod, Karnaugh diagrams, Switching circuits and applications.	
IV	**Finite-State and Turing Machines:** Finite-state machines with outputs, and with no output; Deterministic and nodeterministic finite-state automaton; Turing machines: Definition, examples, and computations.	12
V	**Graphs:** Definition, examples and basic properties of graphs, Königsberg bridge problem; Subgraphs, Pseudographs, Complete graphs, Bipartite graphs, Isomorphism of graphs, Paths and circuits, Eulerian circuits, Hamiltonian cycles, Adjacency matrix, Weighted graph, Travelling- salesman problem, Shortest path, Dijkstra's algorithm.	12

Part C - Learning Resource
Text Books and Reference Books:

1. B. A. Davey & H. A. Priestley . *Introduction to Lattices and Order* (2nd edition). Cambridge University Press. 2002
2. Edgar G. Goodaire& Michael M. Parmenter. *Discrete Mathematics withGraph Theory* (3rd edition). Pearson Education. 2018
3. Rudolf Lidl & Günter Pilz. *Applied Abstract Algebra* (2nd edition). Springer. 1998
4. Kenneth H. Rosen. *Discrete Mathematics and its Applications*: *With Combinatorics and Graph Theory* (7th edition). McGraw-Hill. 2012
5. C. L. Liu *Elements of Discrete Mathematics* (2nd edition). McGraw-Hill. 1985

E-Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=hklHg9oMkGA&list=PLwdnzlV3ogoVxVxCTll45pDVM1aoYoMHf

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks

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Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(II)		
2	Course Title	Tensors and Differential Geometry		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Explain the basic concepts of tensors. • Understand role of tensors in differential geometry. • Learn various properties of curves including Frenet - Serret formulae and theirapplications. • Know the Interpretation of the curvature tensor, Geodesic curvature, Gauss andWeingarten formulae. • Understand the role of Gauss's Theorema Egregium and its consequences. • Apply problem-solving with differential geometry to diverse situations in physics, engineering and in other mathematical contexts.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Periods
I	**Tensors:** Contravariant and covariant vectors, Transformation formulae, Tensor product of two vectorspaces, Tensor of type (r, s), Symmetric and skew-symmetric properties, Contraction of tensors, Quotient law, Inner product of vectors.	12
II	**Further Properties of Tensors:** Fundamental tensors, Associated covariant and contravariant vectors, Inclination of two vectors and orthogonal vectors, Christoffel symbols, Law of transformation of Christoffel symbols, Covariant derivatives of covariant and contravariant vectors, Covariant differentiat- ion of tensors, Curvature tensor, Ricci tensor, Curvature tensor identities.	12
III	**Curves in $\mathbb{R}^2$ and $\mathbb{R}^3$:** Basic definitions and examples, Arc length, Curvature and the Frenet□Serret formulae, Fundamental existence and uniqueness theorem for curves, Non-unit speed curves.	12

IV	**Surfaces in $\mathbb{R}^3$:** Basic definitions and examples, The first fundamental form, Arc length of curves on surfaces, Normal curvature, Geodesic curvature, Gauss and Weingarten formulae, Geodesics, Parallelvector fields along a curve and parallelism.	12
V	**Geometry of Surfaces:** The second fundamental form and the Weingarten map; Principal, Gauss and mean curvatures; Isometries of surfaces, Gauss's Theorema Egregium, The fundamental theorem of surfaces, Surfaces of constant Gauss curvature, Exponential map, Gauss lemma, Geodesic coordinates, The Gauss-Bonnet formula and theorem.	12

Part C - Learning Resource

Text Books, Reference Books:

1. Christian Bär. *Elementary Differential Geometry*. Cambridge University Press. 2010
2. Manfredo P. do Carmo. *Differential Geometry of Curves & Surfaces* (Revisedand updated 2nd edition). Dover Publications. 2016
3. Alferd Gray. *Modern Differential Geometry of Curves and Surfaces with Mathematica* (4th edition). Chapman & Hall/CRC Press, Taylor & Francis. 2018
4. Richard S. Millman & George D. Parkar. *Elements of Differential Geometry*.Prentice-Hall. 1977
5. R. S. Mishra. *A Course in Tensors with Applications to Riemannian Geometry*.Pothishala Pvt. Ltd. 1965
6. Sebastián Montiel & Antonio Ross. *Curves and Surfaces*. American Mathematical Society. 2009

E-Resources

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=OyQj-RWLuV4

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 50 Marks

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Part A: Introduction				
Program: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(III)		
2	Course Title	Number Theory		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Some of the open problems related to prime numbers, viz., Goldbach conjecture etc. • About number theoretic functions and modular arithmetic. • Public crypto systems, in particular, RSA.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks : 17	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Distribution of Primes and Theory of Congruencies:** Linear Diophantine equation, Prime counting function, Prime number theorem, Goldbach conjecture, Fermat and Mersenne primes, Congruence relation and its properties, Linear congruence and Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.	12
II	**Number Theoretic Functions:** Number theoretic functions for sum and number of divisors, Multiplicative function, The Mobius inversion formula, The greatest integer function. Euler's phi-function and properties,Euler's theorem.	12
III	**Primitive Roots:** The order of an integer modulo *n*, Primitive roots for primes, Composite numbers having primitive roots; Definition of quadratic residue of an odd prime, and Euler's criterion.	12

IV	**Quadratic Reciprocity Law and Public Key Encryption:** The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruencies withcomposite moduli.	12
V	**Applications:** Public key encryption, RSA encryption and decryption, Some important application.	12

Part C - Learning Resource

Text Books and Reference Books

1. David M. Burton. *Elementary Number Theory* (7th edition). McGraw-Hill. 2007
2. Gareth A. Jones & J. Mary Jones. *Elementary Number Theo*ry. Springer. 2005
3. Neville Robbins. *Beginning Number Theory* (2nd edition). Narosa. 2007

E- Resources

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=u7cBLb0b7pk&list=PLOzRYVm0a6 5fuj_5fuj1BLeQNULrM4Irj

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

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Part A: Introduction				
Program: Certificate Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(IV)		
2	Course Title	Probability and Statistics		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Understand the basic concepts of probability. • Appreciate the importance of probability distribution of random variables and to know the notion of central tendency. • Establish the joint distribution of two random variables in terms their correlation andregression. • Understand Correlation , Regression, Partial and Multiple correlation. • Study Attributes, Chi-square distribution and sampling. • Learn Curve Fitting , Interpolation, Extrapolation and Finite Differences		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Probability and Random Variables:** Axiomatic and empirical definitions of probability, Independent and dependent events, Conditional probability and Baye's theorem; Discrete and continuous random variables andtheir probability distributions, Cumulative distribution function, n^{th} Moments, Moment generating function, Characteristic function.	12

II	**Univariate Distributions:** Discrete distributions: Bernoulli trials and Bernoulli distribution, Binomial and Poisson distributions; Continuous distributions: Uniform, Geometric, Gamma, Exponential, Beta and normal distributions; Normal approximation to the binomial distribution, Central limit theorem.	12
III	**Curve Fitting , Interpolation, Extrapolation and Finite Differences:** Method of least squares, Normal equation, Fitting of the curve of the type $y = ab^x$ and $y = ax^b$. Methods of Interpolation , Newton's Binomial Method, Lagrange's Interpolation Formula, Gausses forwardand backward formula, Striling formula, Bessel's formula, Everett's formula, Divided difference table, Newton's divided difference formula.	12
IV	**Correlation, Regression, Partial and Multiple Correlation:** Correlation, Karl Pearson's Coefficient of correlation, Correlation of ranks, Correlation coefficient, Regression, Line of regression, Equations to the line of regression, Schwarz's Inequality, Moment of Bivariate Distribution. Multiple Correlation, Partial Correlation, Distribution of two, three and more variable, Regression Coefficient , Residuals, Standard deviation of the residuals, Multiple correlation and Partial correlation coefficient.	12
V	**Attributes, Chi-square distribution and sampling:** Attributes, Positive and Negative Attributes, Testing, Condition for consistence in attributes, Independence , Criterion of Independence, Association, complete association, coefficient of association, degree of association, Chi–square distribution, Origin of sampling, Essentials of sampling, Random sampling, Large samples, simple sampling, comparison of large sample, sample from different populations, level of significance, testing the significance of an observed coefficient of correlation and rank of correlation coefficient, Fisher's z-test, Small samples, t-distribution, Fisher's z-distribution, Snedecore's F-distribution.	12

Part C - Learning Resource

Text Books and Reference Books:

1. David Applebaum. *Probability and Information: An Integrated Approach.*Cambridge University Press. 1996
2. Robert V. Hogg, Joseph W. McKean & Allen T. Craig *Introduction to Mathematical Statistics* (7th edition), Pearson Education. 2013
3. Irwin Miller & Marylees Miller (2014). *John E. Freund's Mathematical Statistics with Applications* (8th edition). Pearson. Dorling Kindersley Pvt. Ltd. India.
4. Jim Pitman (1993). *Probability*, Springer-Verlag.
5. Sheldon M. Ross (2014). *Introduction to Probability Models* (11th edition). Elsevier.
6. A. M. Yaglom and I. M. Yaglom (1983). *Probability and Information*. D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi.

7. M. Ray and Sar Swarup Sharma, (1988);*Mathematical Statistics*, 8th edition Ram Prasad adb Sons Agra

Other Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE

Part D: Assessment and Evaluation	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	50 Marks

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Part A: Introduction				
Program: Degree Course		Class: **B.A. /B.Sc. III Year**	Year: **2022**	Session: **2024-2025**
1	Course Code	**MATH-3P (I)**		
2	Course Title	I - Lab 03 - Mathematics Paper 1 and Paper 2		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	This course will enable the students to • Learn Free and Open Source Software (FOSS) tools for computer programming • Solve problem on mathematical theory studied in Mathematics Paper 1 and 2 byusing FOSS software's. • Acquire knowledge of applications of Mathematics through FOSS.		
6	**Credit Value**	**2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	Mathematics practical with Free and open Source Software (FOSS) tools for computer programs, such as GeoGebra/Maxima/Scilab/ Octave /Phython/R. **List of Practical's**: (At least 10 practical's from Paper 1 and Paper 2) • **Note**: Additional practical may be included in the list at the college level as perchoice of optional papers **Mechanics: Suggested book:** Scilab Textbook Companion for Engineering Mechanics by A. K. Tayal 1. Using the Principle of Virtual Work find the force to hold the system ofpulleys in equilibrium. 2. Using the Principle of Virtual Work to determine vertical and horizontal components of reactions of end points of a frame made up with hinge joints. 3. Displacement time relationship for a traveling car. 4. Displacement time relationship for a stone dropped from top of a tower.

	5. Distance travelled by a particle in the nth second. **Numerical Methods: Suggested book:** Scilab Textbook Companion forNumerical Methods by B. Ram 1. Program to find solution of nonlinear equations using Bisection method. 2. Program to find smallest positive root of a cubic equation using Newton'smethod. 3. Program to find solution of linear systemof equations usingTriangularization Method. 4. Program to find solution of linear system of equations using Gauss JacobiMethod. 5. Program to find solution of linear system of equations using Gauss SeidelMethod. 6. Program for value of a function at given point using Newton forwarddifference interpolation. 7. Program for value of a function at given point using Newton backwarddifference interpolation. 8. Program to find first and second order approximation of first derivative ofa function. 9. Program to find integral approximation by Simpson three eight rule. 10. Program to solve initial value problem using Euler's method. **Linear Algebra: Suggested book:** Scilab Textbook Companion for LinearAlgebra by K. Hoffman and R. Kunze 1. Progam to find matrix of differential operator with respect to standard basis on the vector space of polynomial functions of degree three or less. 2. Progam to find GCD to two polynomials. 3. Program to find Characteristic Polynomial of a matrix of order 2. 4. Program to find Characteristic and minimal polynomial of a matrix.

5. Program to find Orthogonal projection in R3.

6. Program to find Unitary matrix.

Integral Transforms and Fourier analysis: Suggested book: Scilab Textbook Companion for Higher Engineering Mathematics by B. S. Grewal

1. Find Fourier sine integral.

2. Find Fourier transform of given function.

3. Find Fourier sine transform.

4. Find Fourier cosine transform.

Discrete Mathematics: Suggested book: Scilab Textbook Companion for Discrete Mathematics by S. Lipschutz, M. Lipson And V. H. Patil, Scilab Textbook Companion for Discrete Mathematics And Its Applications by K. H. Rosen

1. Use of Adjacency matrix

2. Use of Path matrix

Probability and Statistics: Suggested book: Scilab Textbook Companion for Probability And Statistics For Engineers And Scientists by S. M. Ross

1. Program for application of Bye's theorem.

2. Program to obtain probability of union of events.

3. Program for probability of equality likely events

4. Program for applications of Bionomial distribution.

5. Program to obtain probability using Poison distribution.

6. Program for probabilities of a uniform random variable.

7. Program to make scatter plot of two sets of data.

8. Program to fit a linear curve to a given set of data and to determine the sum of squares of the residuals.

Number Theory: Suggested book: Scilab Textbook Companion for Discrete Mathematics And Its Applications by K. H. Rosen

1. To find the quotient and reminder when an integer is divided by

	anotherinteger. 2. To find prime factorization of a given integer. 3. Test that a given integer is prime or not. 4. To find the greatest common divisor of two integers using recursion. 5. To find the greatest common divisor of two integers using Euclideanalgorithm.

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
SUPPORT FROMTHE GOVTFOR STUDENTS AND TEACHERS IN UNDERSTANDING AND LEARNING FOSS TOOLS: As a national level initiative towards learning FOSS tools, IIT Bombay for MHRD, government of India is giving free training to teachers interested in learningopen source software's like scilab, maxima, octave, geogebra and others. (Website: http://spoken-tutorial.org;)		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma - Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu - Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay - Member
   Asst. Prof.
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4. Ram Lakhan Pandey - Member
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   Govt. DT PG College, Utai
6. Dr. Shabnam Khan - Member
   Professor
   Govt. Digvijay PG College, Rajnandgaon
7. Dr. Padmavati - Member
   Professor
   Govt. VYT PG Auto. College, Durg
8. Dr. Anjali Chandravanshi - Member
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   Govt. J.Y. Chhattisgarh College, Raipur
9. Manisha Gupta - Member
   Asst. Prof.
   GNA Govt. PG College, Bhatapara, Raipur
10. Mrs. Sangeeta Pandey - Member
    Asst. Prof.
    R.G. Govt. PG College, Ambikapur
11. Dr. S.K. Bohre - Member
    Asst. Prof.
    I.G. Govt. PG College, Vaishalinagar, Bhilai
12. Dr. Samir Dashputre - Member
    Asst. Prof.
    Govt. College, Arjunda, Balod
13. Dr. Chandrajeet Singh Rathore - Member
    Asst. Prof.
    Govt. Jajwalyadev Naveen Girls PG College, Janjgir
14. Dr. Shri Nath Gupta - Member
    K. Govt. Arts & Science College, Raigarh
15. Dr. Raghu Nandan Patel - Member
    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: Degree Course		Class: **B.A./ B.Sc. III Year**	Year: **2022**	Session: **2024-2025**
1	Course Code	**MATH-3P (II)**		
2	Course Title	II - Project 03 - History of Mathematician		
3	Course Type	**Project**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	Studying history of mathematicians help students: • Develop a deeper understanding of the mathematics they hare already studied by seeing how it was developed over time and in various places. • Know the rich intellectual heritage of the country. • Develop an appreciation of mathematics and build positive attitude towards mathematics increasing student's motivation decreasing anxiety related the subject. • To acquire knowledge about development of mathematics in ancient , medieval and modern period of history.		
6	**Credit Value**	**2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Periods: 30	
Project List	**Course Objectives:** An elective course designed to acquire special / advance knowledge, such as supplement study / support study to a project work and a candidate study such a course on his own with an advisory support by a teacher / faculty member. **Project:** Contributions and biographies of Indian Mathematicians Swami Bharti Krishna Tirth and Ramanujan, Madhav and Neelkanth Somyaji and contribution involved in contents of the paper of opted by student. (Any 10 Mathematicians)

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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    Govt. MLS College, Seepat

B. Sc. Part III

ELECTRONICS

Paper I

ELB-301T: COMMUNICATION ELECTRONICS

Theory: **Max. Marks : 50**

Aims & Objectives

To demonstrate the electronic communication system, related modulation techniques, satellite and mobile communication.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. The different modulation and demodulation techniques used in analog and digital communication.
2. Explain the basics of satellite communication.
3. Understand GSM, CDMA, TDMA and FDMA concepts.
4. Study of evolution of mobile communication generations 2G, 3G and 4G with their characteristics and limitations.

Unit- 1

Electronic Communication: Block diagram of an electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation, concept of channels and base-band signals. Concept of Noise, Types of Noise, Signal to noise ratio, Noise Figure, Noise Temperature, Friss formula.

Unit-2

Analog Modulation: Amplitude Modulation, modulation index and frequency spectrum.Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector),Qualitative idea of Super heterodyne receiver

Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

Unit-3

Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation,Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude

Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying(PSK), and Binary Phase Shift Keying (BPSK).

Optical Communication: Introduction of Optical Fiber, Block Diagram of optical communication system.

Unit-4

Satellite Communication– Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station, Uplink and downlink.

Brief idea of frequency allocation for radio communication system in India (TRAI), Electromagnetic communication spectrum, band designations and usage, Channels and base-band signals.

Unit-5

Mobile Telephony System – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only).GPS navigation system (qualitative idea only)

Reference Books:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
3. Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.
4. Electronic Communication systems, G. Kennedy, 3rdEdn., 1999, Tata McGraw Hill.
5. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
6. Communication Systems, S. Haykin, 2006, Wiley India
7. Electronic Communication system, Blake, Cengage, 5th edition.
8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

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Paper II
ELB-302T: MICROPROCESSOR AND MICROCONTROLLER

Theory: **Max. Marks: 50**

Aims & Objectives

To introduce the IC technologies, microcomputer organization, microprocessor and microcontroller, assembly language programming and interfacing circuits.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. Develop an assembly language program in 8086 microprocessor using the internal organization for the given specification.
2. Describe the architecture and functional block of 8051 microcontroller.
3. Develop an embedded C and assembly language program in 8051 microcontroller using the internal functional blocks for the given specification.

Unit-1

Introduction to IC Technology, Basic fabrication steps, Environment for IC Technology (Basics Requirements), Impurity Incorporation: Solid State Diffusion Modeling and Technology, Ion implantation modeling.

Oxidation: Kinetics of Silicon Dioxide Growth for both thick and ultra thin films, oxidation technology in VLSI and ULSI, characterization of oxide films Lirthography: Photolithography, Modern Lithography techniques(Basic Knowledge) Chemical Vapour Deposition techniques : CVD techniques, Epitaxial Growth of Silicon, Basic understanding of Metal film Deposition and Rapid Thermal Processing

Unit-2

Microcomputer Organization: Input/output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.
Basic Microprocessor Architecture

Architecture of 8086: Block diagram of 8086, Overview of 8086 Microprocessor Family, Architecture and Pin Configuration of 8086, System Bus Structure: Basic 8086/8088 system bus architecture, Minimum Mode Configuration, Maximum Mode configuration; System Bus Timings, Bus Standards. 8087 Numeric Data Processor& 8089 I/O Processor: Architecture only (no Programming)

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Unit-3

Instruction Set and Assembly Language Programming of 8086: Instruction Format; Addressing modes, Data Transfer Instruction, Arithmetic Instructions, Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions, Logical, Shift and Rotate Instruction. Byte and String Manipulation: String Instructions; REP Prefix, Table Translation, Number Format conversions. Assembler Directives and Operators, Translation of Assembler Instructions. Programming of Microprocessor 8086, Interrupts of Microprocessor 8086.

Unit-4

8051 Microcontroller: Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

8051 I/O Port Programming: Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.

Unit -5

Interfacing with 8086: Architecture and Interfacing of 8-bit ADC (0808/0809) and DAC (0800) with 8086 using PPI 8255. Interfacing of Stepper motor, 8279 (Keyboard & Display Driver) and LCD interface with 8086.

Architecture of 32 Bit Microprocessors: Intel 80386Architecture, Special 80386 Registers, Memory Management, Interrupts and Exceptions, Management of T asks–Real, Protected and Virtual 8086mode, Architectural Differences Between 80486 and 80386 Microprocessor.

Reference Books:

1. VLSI Technology, S.M. Sze (2nd Edition) , McGraw Hill Companies Inc.
2. ULSI Technology, C.Y. Chang and S.M. Sze, McGraw Hill Companies Inc.
3. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
4. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
5. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
6. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
7. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
8. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

ELECTRONICS LABORATORY

ELB-303P: Communication Electronics, Microprocessor and Microcontroller Lab

The scheme of practical examination will be as follows-

Experiment & Project Work	--	**30 (20+10)**
Viva (Practical + Project)	--	**10 (5+5)**
Sessional	--	**10**
Total	--	**50**

Min.Marks :17 **Max. Marks 50**

A student is required to do at least 10 experiments and project work in an academic year. The scheme of practical examination will be as follows-

(i) One experiment and working and demonstration of project works-

Marks

Experiment	20
Viva-voce	05
Sessional	10
Project work & viva	15 (10+5)
Total	**50**

List of Experiments:

1. Study of AM generation and detection.
2. Radio receiver measurements.
3. Study of low pass, band pass and high pass filters.
4. Study of FM using voltage controlled oscillator.
5. Study of Choppers.
6. Study of pulse code modulation.
7. Addition of two binary numbers with microprocessor (8086).
8. Subtraction of two binary numbers with microprocessor (8086).
9. Multiplication of two binary numbers with microprocessor (8086).
10. Division of two binary numbers with microprocessor (8086).
11. Data transfer from memory to register and vice versa using 8086 microprocessor.
12. Interfacing of 8255 with 8086 microprocessor.
13. Subtraction of two binary numbers with 8051 microcontroller.
14. Multiplication of two binary numbers with 8051 microcontroller.
15. Division of two binary numbers with 8051 microcontroller.
16. I/O programming in 8051 microcontroller.

Note:

1. Out of above mentioned sixteen experiments at least ten experiments should be done..
2. Other experiments of equal standard may also be set.

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22-2-2023

Scheme of B.Sc. Botany

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BOT-1T	Microbial Diversity and Plant Pathology	Theory	4	50	17
	BOT--2T	Archegoniateae and Plant Architecture	Theory	4	50	17
	BOT--1P	LAB 1 : Microbial Techniques and Archegoniate identification	Practical	2	50	17
Second year	BOT--3T	Plant Systematics, Economic Botany and Ethnobotany	Theory	4	50	17
	BOT--4T	Plant Anatomy, Embryology and Plant Breeding	Theory	4	50	17
	BOT--2P	LAB 2 : Plant Identification and Embryology	Practical	2	50	17
Third year	BOT -5T	Plant Physiology and Ecology	Theory	4	50	17
	BOT -6T	Cytogenetics, plant tissue culture and biometry	Theory	4	50	17
	BOT -3P	LAB 3 : Experiments in Physiology, Biochemistry & Molecular biology	Practical	2	50	17

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern university and it is not mandatory.

Part A: Introduction				
Program: **B.Sc.**		Class: B.Sc. **III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	**BOT-5T**		
2.	Course Title	**Plant Physiology and Ecology**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	NO		
5.	Course Learning. Outcomes (CLO)	After the completion of the course the students will be able to: 1. Understand the role of Physiological and metabolic processes for plant growth and development. 2. Learn the symptoms of Mineral Deficiency in crops and their management. 3. Assimilate Knowledge about Biochemical constitution of plant diversity 4. acquaint the students with complex interrelationship between organisms and environment; 5. make them understand methods for studying vegetation, community patterns and processes,ecosystem functions, and principles of phytogeography. 6. This knowledge is critical in evolving strategies for sustainable natural resource managementand biodiversity conservation.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Period**
I	**Plant water relation, Mineral Nutrition, Transpiration and translocation in phloem:** Importance of water, water potential and its components; Osmosis, Diffusion, Diffusion Pressure Deficit, Plasmolysis, Imbibition, Mechanism of water absorption, Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.Criteria of essentiality of elements; Role of essential elements- micro and macro elements; Symptoms of mineral deficiency in major crops, Minerals absorption and their transport across the cell membrane, Ascent of sap, Phloem transport	12
II	**Carbon metabolism:** **Enzymes:** Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; mechanism of action (activation energy, lock and key hypothesis, induced- fit theory), enzyme inhibition and factors affecting enzyme activity, Allosteric enzymes & Abzymes. **Photosynthesis**: structure of chloroplast, Pigments, Absorption and Action spectra, Emerson's Enhancement effect, Photosystems, Electron transport system (Z-Scheme) and Photophosphorylation. Carbon fixation- the Calvin cycle, Photorespiration, C4 and CAM cycle. **Respiration**-structure of mitochondria, aerobic and anaerobic respiration and fermentation, glycolysis, Krebs cycle, and electron transport system.ATP-synthase, RQ, Factors affecting respiration, Pentose phosphate pathway	12

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III	**Nitrogen and Lipid Metabolism:** Physical and biological nitrogen fixation (examples of legumes and non-legumes), Physiology and biochemistry of nitrogen fixation, Nitrate and ammonia assimilation, reductive amination and transamination, amino acid synthesis. **Lipid Metabolism:** Synthesis and breakdown of triglycerides, alfa and beta - oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilization of lipids during seed germination **Plant Development, Movements, Dormancy & Responses:** Plant growth curve, developmental roles of phytohormones (auxins, gibberellins, cytokinins, ABA, ethylene), Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery,structure and functions), Seed and bud Dormancy, Vernalization &Senescence, Plant movements	12
IV	**Natural resources & Sustainable utilization: Ecology & Ecosystem:** Definition of Ecology, Ecological Factors, Positive and negative interactions. Ecosystem– Concept of structure and function of an ecosystem- trophic levels, food chain, food web, Ecological pyramids Abiotic and biotic components,-Energy flow in an ecosystem Ecological Succession-Definition & types. Processes and types (autogenic, allogenic,autotrophic, heterotrophic, primary & secondary), Hydrosere and Xerosere. Ecological Adaptations – Hydrophytes, Xerophytes	12
V	**Biodiversity**: alfa, beta and gamma diversity, social, ethical and aesthetic values; hotspots of biodiversity, threats to biodiversity, biotic communities and populations and their characteristics and dynamics. Endemic and endangered species of plants in India. Ecological niche, ecotypes, Ecotone , ecological indicators. **Conservation of Biodiversity:** Ex-situ and in-situ conservation, Red data book, botanical gardens, National park,Sanctuaries, hot & hottest spots and Bioreserves.	12
Keywords: Mineral nutrition, Carbon assimilation, Nitrogen and lipid metabolism, Natural resource management, Ecological succession, biodiversity conservation		

Part C -Learning Resources

Text Books, Reference Books, Other Resources

1. Plant Physiology and Biochemistry ISBN #:81-301-0035-5Sunil D Purohit, K. Ahmed & Gotam K Kukda Edition: 2013Pages: 368 + VIII Text Book (Hindi)
2. Hopkins, W.G. &Hiiner, N.P. Introduction to Plant Physiology (3rd ed.) 2004, John Wiley & Sons.
3. A Handbook On Mineral Nutrition And Diagnostic Techniques For Nutritional Disorders of Crops (pb)ISBN :9788177543377Edition : 01Year : 2011Author : Pathmanabhan G , Vanangamudi M , Chandrasekaran CN ,Sathyamoorthi K , Babu CR , Babu RC , BoopathiPNPublisher : Agrobios (India)
4. Jain, V.K. Fundamental of Plant Physiology (7th ed.) 2004. S. Chand and Company.
5. Salisbury, F.B. & Ross, C.W. Plant Physiology (4th ed.), 19992, Wadsoworth Publishing Company.
6. Panday, S.N. & Sinha, B.K. Plant Physiology (4th ed.), 2006, Vikas Publishing House Pvt. Ltd.
7. Mukherjee, S. & Ghosh, A. Plant Physiology (2nd ed.), 2005, New Central Book Agency.
8. Chaudhuri, D., Kar, D.K., and Halder, S.A. Handbook of Plant Biosynthetic Pthways 2008, New CentralBook. Agencies.

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9. Voet, D. and Voet, J.G., Bio-Chemistry (3rd ed.), 2005, John Wiley & Sons.
10. Mathews, C.K., Van Holder, K.E. &Ahren, K.G. Bio-Chemistry (3rd ed.), 2000, Pearson Education.
11. Lehninger Principles of Biochemistry. Sixth Edition. 2013. David L. Nelson, Michael M. Cox. Freeman, Macmillan.
12. Srivastava, HN. 2006. Pradeep's Botany Vol. V. Pradeep Publications, Jalandhar.
13. Verma, SK. Plant Physiology and Biochemistry. S. Chand & Sons, New Delhi.
14. Buchanon, Gruissen and Jones. Plant Physiology & Biochemistry: Biochemistry and Molecular Biology of plants, 2000,I.K. International.
15. Chapman and Riss. Ecology: Principles and Applications, Latest Ed., Cambridge University Press
16. Shukla, R.S. & Chandel, P.S. Plant Ecology, Latest Ed., S. Chandel and Co.
17. Kumar, H.D. Modern Concept of Ecology, Latest Ed. Vikas Publishing House
18. Begon, M., Herper, J.L. and Townsend, C.R. Ecology- Individuals, Populations and Communities (3rd ed.), Oxford Blackwell Science
19. Verma, P.S. & Agarwal, U.K. Concept of Ecology, Latest Ed., S. Chand & Company
20. Odum, F.P. Fundamentals of Ecology, Latest Ed., Saunders
21. Sharma, P.D. Elements of Ecology, Latest Ed., Rastogi Publications
22. Ambasht, R.S. &Ambasht, N.K. A Text Book of Plant Ecology, Latest Ed., CBS Publication & Distributors
23. Mani, M.S. Bio-Geography of India, Latest Ed., Springer-Verlag.
24. Mackenzie et al. Ecology, Latest Ed., Viva Books.
25. Gurevitch, J. (et al.)., The Ecology of plants, 2002, Sinauer Associates
26. . Kimar, U. &Asija, M.J. Bio-diversity: Principles & Conservation, 2005, Student Edition, Agrobios (India)
27. Krishnamurthy, K.V. An Advanced Text Book on Biodiversity, 2003, Oxford & IBH Publishing Co. Ltd.
28. Mitra, D., Guha, J.K., Chowdhury, S.K. Studies in Botany, Vol. II (7th ed.) Moulik Library.
29. Primack, R.B. Essentials of Conservation Biology, 1993, Sinauer Associates.
30. Lo, C.P. & Yeung, A.K.W. Concepts and Techniques of Geographic Information Systems, 2002, Printice-Hallof India.
31. Cain, Bowman, Hacker. Ecology. 2014. 3rd Ed. Sinauer Associates
32. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
33. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. AnamayaPublications, New Delhi.
34. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall ofIndia Private Limited, New Delhi.
35. Abbasi, S. A. (1998). Environmental Pollution and its Control. Cogent International, Pondicherry.
36. Abbasi, S. A. and Ramasamy, E. V. (1999). Biotechnological Methods of Pollution Control. Universities Press(India) Limited, Hyderabad.
37. Peavy, H. S., Rowe, D. R. and Tchobanoglaus, G. (1985). Environmental Engineering, Mc Graw Hill BookCompany, Singapore.
38. Rand, M. C., Greenberg, A. E. and Taras, M. J. (Ed.) (1995). Standard methods for the examination of water andwastewater: 19th edition, American Public Health association (APHA), Washington, D.C.
39. Scragg, A. (1999). Environmental Biotechnology, Addison Wesley Longman, Singapore.
40. Tchobanoglaus, G. (1988). Wastewater Engineering: Treatment, Disposal, Reuse. Tata Mc Graw Hill, NewDelhi.
41. Aarve, V. P., William, A. W. and Debra, R. R. (2002). Solid waste engineering. Cengage reading, USA.
42. George, T., Hilary, T. and Samuel, A. V. (1993). Integrated solid Waste Management, Engineering Principlesand Management Issues, Mc Graw Hills.

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43. George, T. and Frank, K. (2002). Handbook of solid waste management: (Second edition). Mc Graw Hills.
44. Kanthi, L. S. (2000). Basics of Solids and hazardous waste management Technologies. Prentice Hall.
45. Anonymous. 1997. National Gene Bank: Indian Heritage on Plant Genetic Resources (Booklet). National Bureauof Plant Genetic Resources, New York.
46. Gillespie, A. 2006. Climate Change, Ozone Depletion and Air Pollution: Legal Commentarieswith Policy and Science Considerations. MartinusNijhoff Publishers.
47. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.
48. Harvey, D. 2000. Climate and Global Climate Change. Prentice Hall.
49. Manahan, S.E. 2010. Environmental Chemistry. CRC Press, Taylor and Francis Group.
50. Maslin, M. 2014. Climate Change: A Very Short Introduction. Oxford Publications.
51. Mathez, E.A. 2009. Climate Change: The Science of Global Warming and our Energy Future.Columbia UniversityPress.
52. Mitra, A.P., Sharma, S., Bhattacharya, S., Garg, A., Devotta, S. &Sen, K. 2004. Climate Change and India.Universities Press, India.
53. Philander, S.G. 2012. Encyclopedia of Global Warming and Climate Change (2nd edition).Sage Publications.
54. Demers, M.N. 2005. Fundamentals of Geographic Information System. Wiley & Sons.
55. Richards, J. A. & Jia, X. 1999. Remote Sensing and Digital Image Processing. Springer.
56. Sabins, F. F. 1996. Remote Sensing: Principles an Interpretation. W. H. Freeman.
57. Gaston, K J. & Spicer, J.I. 1998. Biodiversity: An Introduction. Blackwell Science, London.
58. Singh, J. S. & Singh, S. P. 1987. Forest vegetation of the Himalaya. The Botanical Review 53:80-192.
59. Sodhi, N.S. & Ehrlich, P.R. (Eds). 2010. Conservation Biology for All. Oxford University Press.
60. Sodhi, N.S., Gibson, L. & Raven, P.H. 2013. Conservation Biology: Voices from the Tropics. Wiley-Blackwell, Oxford, UK.

Suggested equivalent online courses:

1. https://www.classcentral.com/course/swayam-plant-physiology-and-metabolism-17732
2. https://www.wiziq.com/course/3249-plant-physiology-in-10-live-online-classes
3. https://www.easybiologyclass.com/plant-physiology-free-lecture-notes-online-tutorials-lecture-notes-ppts-mcqs/
4. https://onlinecourses.swayam2.ac.in/cec19_bt09/preview
5. https://community.plantae.org/tags/moocuturelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
6. https://www.coursera.org/courses?query=plants
   http://egyankosh.ac.in/handle/123456789/53530

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

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Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Shri Prabhat Pandey
   Asst. Prof.
   Gramya Bharti Vidyapith, Hardibazar - Chairman
2. Dr. A.N. Bahadur - Member
   Professor
   Govt. E.R.R. P.G. Science College, Bilaspur
3. Dr. Prashant Kumar Singh - Member
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4. Dr. Awadhesh Kumar Shrivastava - Member
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   Kirodimal Govt. Arts & Science College, Raigarh
6. Dr. Smriti Chakravarty - Member
   Professor
   Govt. J.Y. Chhattisgarh College, Raipur
7. Dr. Rupinder Diwan - Member
   Professor
   Govt. Nagarjun P.G. College of Science, Raipur
8. Dr. Usha Chandel - Member
   Asst. Prof.
   Govt. Dr. W.W. Patankar Girls P.G. College, Durg
9. Mr. Kaushal Kishor - Member
   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur
10. ~~Manisha Gupta~~ - ~~Member~~ Member

for 13.6.22

Part A: Introduction				
Program: **B.Sc.**		Class: B.Sc. **III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	**BOT-6T**		
2.	Course Title	**Cytogenetics, plant tissue culture and biometry**		
3.	Course Type	**Theory**		
4.	Pre-requisite (ifany)	NO		
5.	Course Learning. Outcomes (CLO)	After the completion of the course the students will be able to: • Acquire knowledge on cell ultrastructure. • Understand the structure and chemical composition of chromatin and concept of cell division. • Interpret the Mendel's principles, acquire knowledge on cytoplasmic inheritance and sex-linked inheritance • Understand the concept of 'one gene one enzyme hypothesis' along with the molecular mechanism of mutation. • students will be familiar with data handling.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: **Content of the Course**		
Total Periods: 60		
Unit	**Topics**	**No. ofPeriod**
I	**Cell biology:** Structure and function of cell wall, plasma membrane, ribosomes, Endoplasmic reticulum, Golgi apparatus, mitochondria, chloroplast, lysosomes, peroxisomes and cell inclusions. Organization of nucleus: nuclear envelope, nucleoplasm and nucleolus. Chromosomal nomenclature- chromatids, centromere, telomere, satellite, secondaryconstriction.Organization of chromosomes- Nucleic acid and histones-types andclassification. Lampbrush chromosomes and polytene chromosomes-Karyotype andidiogram.Cell cycle: G0, G1, S and G2 phases –mitosis: open and closed mitosis –amitosis and meiosis. Chromosomal aberrations (Structural and Numerical)	12
II	**Genetics:** History of Genetics and Mendelian inheritance, Chromosome theory of inheritance, crossing over and linkage; Incomplete dominance andcodominance; Interaction of Genes; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy,Polygenic inheritance; Extra-nuclear Inheritance, Linkage, crossing over, Concept of sexdetermination and Sex chromosomes; Patterns of Sex determination in plants Sex linked inheritance.	12
III	**Genetic material:** Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments, Hershey-Chase, bacteriophage experiment, DNA structure, types of DNA, types of genetic material. DNA replication (Prokaryotes and eukaryotes): semi– conservative. DNA replication (Prokaryotes and eukaryotes): bidirectional replication, semi– conservative, semi discontinuous RNA priming, Ø (theta) mode of replication, replication of linear, dsDNA, replicating the 5 end of linear chromosome including replication enzymes.	12

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IV	**Gene mutation and mutagens –** substitution- transition and transversion, DNA damage and repairs, physical (ionizing and non- ionising) and chemical mutagens **Transcription & Regulation of gene expression** Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation, (Prokaryotes and eukaryotes), genetic code-. deciphering and properties. Regulation of gene expression inProkaryotes: Lac operon **Plant tissue culture:** Principles, components and techniques (preparation of culture media: liquid and solid medium, basal and supplemented media) and culturing of protoplast- principle and application, regeneration of protoplasts, protoplast fusion and somatic hybridization- selection of hybrid cells, Somaclonal variation, Plant secondary metabolites production. Artificial seeds	12
V	**Biostatistics:** Definition, statistical methods, basic principles, variables-measurements, functions,limitations and uses of statistics. Biometry: Data, Sample, Population, random sampling,Frequency distribution- definition only, Central tendency–Arithmetic Mean, Mode andMedian; Measurement of dispersion–Coefficient of variation, Standard Deviation, Standarderror of Mean; Test of significance: chi- square test for goodness of fit. Computer applicationin biostatistics - MS Excel and SPSS	12
Keywords: Mineral nutrition, Carbon assimilation, Nitrogen and lipid metabolism, Natural resource management, Ecological succession, biodiversity conservation		

Part C -Learning Resources

for Members 13.6.22

Suggested Readings:

1. Cell Biology And Genetics (Hindi) 2/e PB....Gupta P K (Hindi) Rastogi Publications
2. PLANT BIOTECHNOLOGY (HINDI) October 2019 Publisher: Kindle DirectPublishingISBN: ISBN: 9781698665283 Authors:H. R. Dagla Jai Narain Vyas University
3. Biotechnology: Fundamentals And Application (hindi) (hb) ISBN : 9788177544732Edition :03Year : 2018Author : Dr. Purohit SS , Mathur S
4. Biotechnology (Hindi) (Hindi, Paperback, B.D.Singh) Hindi Publisher: Kalyani PubishersISBN: 9789327246070, 9327246071
5. Cytogenetics, Plant Breeding, Evolution and Biostatistics ISBN #: 978-81-301-0066-1SunilD Purohit &Gotam K Kukda, Apex Publishing House
6. Genetics and Biotechnology Sunil D Purohit, K. Ahmed &Gotam K KukdaApexPublishing House
7. PadapPrajanan (Hindi)
8. G.M. Cooper. (2015). The cell: A Molecular Approach. 7th Edition. Sinauer Associates.
9. Alberts, B., Johnson, A.D., Lewis, J., Morgan, D., Raff, M., Roberts, K., Walter, P. (2014). Molecular Biology ofCell. 6th Edition. WW. Norton & Co.
10. Campbell, M.K. (2012) Biochemistry, 7th ed., Published by Cengage Learning.
11. Campbell, P.N. and Smith, A.D. (2011). Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
12. Tymoczko, J.L., Berg, J.M. and Stryer, L. (2012). Biochemistry: A short course, 2nd ed., W.H.Freeman.
13. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2011) Biochemistry, W.H.Freeman and Company
14. Nelson, D.L. and Cox, M.M. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.
15. . Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
16. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell. 8th edition.Pearson Education Inc.U.S.A.)
17. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons, India. 8th e
18. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India.5th edition.
19. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings, U.S.A..
20. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freemanand Co., U.S.A. 10th edition.
21. M K Raxdan An Introduction to Plant Tissue Culture –; Oxfird& IBH Publishing Co.Pvt. Ltd.,New Delhi
22. Aggarwal SK (2009) Foundation Course in Biology, 2nd Edition, Ane Books Pvt. Ltd
23. Allard RW (1960) Principles of Plant Breeding. John willey and Sons. Inc. New York
24. BD Singh (2003) Plant Breeding. Kalyani Publishers
25. Cohn, N.S. (1964) Elements of Cytology. Brace and World Inc, New Delhi
26. Darnel, J.Lodish, Hand Baltimore, D. (1991) Cell and molecular biology. Lea and Fibiger, Washington.
27. De Robertis, E.D.P and Robertis, E.M.P (1991) Cell and molecular biology Scientific American books.
28. Dobzhansky, B (1961) Genetic and origin of species, Columbia university Press New Yor
29. Durbin (2007) Biological Sequence Analysis. Cambridge University Press India Pvt. Ltd
30. Gerald Karp (1985) Cell biology, Mc Graw Hill company..
31. Lewin, B, (1994) Genes, Oxford University Press, New York.
32. Lewis, W.H (1980) Polyploidy. Plenum Press, New York.
33. Nicholl T (2007) An Introduction to Genetic Engineering, Cambridge University Press India Pvt. Ltd
34. Roy S.C. and Kalayan Kumar De (1997) Cell biology. New central Books,Calcutta

13.6.22

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE):As per rule University Exam(UE): 50Marks

for Members 13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Shri Prabhat Pandey
   Asst. Prof.
   Gramya Bharti Vidyapith, Hardibazar - Chairman
2. Dr. A.N. Bahadur
   Professor
   Govt. E.R.R. P.G. Science College, Bilaspur - Member
3. Dr. Prashant Kumar Singh
   Asst. Prof.
   Govt. V.B. Singh Dev Girls College, Jashpur - Member
4. Dr. Awadhesh Kumar Shrivastava
   Asst. Prof.
   Govt. D.T. P.G. College, Utai, Durg - Member
5. Dr. Ashok Kumar Bharti
   Asst. Prof.
   Kirodimal Govt. Arts & Science College, Raigarh - Member
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9. Mr. Kaushal Kishor
   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur - Member
10. Manisha Gupta - Member

13.6.22

Part A : Introduction				
Programme: Certificate		**Class B.Sc.-III**	**Year: 2022**	**Session: 2022-23**
1.	Course Code	**BOT-3P**		
2.	Course Title	**Experiments in physiology, Biochemistry & molecular biology**		
3.	Course Type	**Practical**		
4.	Pre-requisite (if any)	No		
5.	Course outcomes:	• **Course outcomes:** • After the completion of the course the students will be able to: • Know and authentic the physiological processes undergoing in plants along with • their metabolism • Identify Mineral deficiencies based on visual symptoms • Understand and develop skill for conducting molecular experiments for genetic • engineering		
6.	Credit Value	**2**		
7.	Total Marks	Max. Marks: 50	Min. Passing Marks:17	

Part B : Content of the Course	
Total No. of Periods - 30	
Tentative Practical List	**Topic*** ***(Topic * (Minimum Any three from each unit depending on facilities and syllabus.** **20% for spotting, 10% each for viva and sessional and rest 60 % marks equally in each unit.))**
	Plant water relation, Mineral Nutrition and translocation in phloem 1. Determination of osmotic potential of plant cell sap by plasmolytic method using leaves of *Rhoeo / Tradescantia.* 2. Osmosis – by potato osmoscope experiment 3. Effect of temperature on absorption of water by storage tissue and determination of Q10. 4. Experiment to demonstrate the transpiration phenomenon with the bell jar method 5. Structure of stomata (dicot & monocot) 6. Experiment to measure the rate of transpiration by using Ganong's/

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	Farmer's potometer 7. Study of mineral deficiency symptoms using plant material/photographs. **Cell biology** 1. Study of plant cell structure with the help of epidermal peal mount of *Onion/Rhoeo/Crinum/ etc.* 2. Measurement of cell size by the technique of micrometry (Ocular and stage micrometer). 3. Determination of mitotic index/ meiotic index and frequency of different mitotic / meiotic stages in pre-fixed root tips and flower buds respectively.
	Nitrogen Metabolism, Photosynthesis & Respiration : 1. A basic idea of chromatography: Principle, paper chromatography , column chromatography and TLC; demonstration of chromatography. 2. Separation of photosynthetic pigments by paper chromatography. 3. Effect of quality of light/concentration of Carbon dioxide on photosynthetic rate in aquatic plant 4.Determination of the RQ starchy/ proteinaceous/ oily germinating seeds. **Genetics:** 1. Monohybrid cross (Dominance, codominance and incomplete dominance) 2. Dihybrid cross (Dominance and incomplete dominance) 3. Gene interactions (All types of gene interactions mentioned in the syllabus) a. Recessive epistasis 9: 3: 1. b. Dominant epistasis 12: 3: 1 c. Complementary genes 9: 7 d. Duplicate genes with cumulative effect 9: 6: 1 e. Inhibitory genes 13: 3 4. Observe the genetic variations among inter and intra specific plants. 5. Demonstration of Breeding techniques-Hybridization, emasculation/ bagging/ tagging experiment.
	Genetic material: 1. Instruments and equipments used in molecular biology. 2. Isolation of DNA from plants
	Techniques for biochemical analysis: 1. Weighing and Preparation of solutions -percentage, molar & normal solutions, dilution from stock solution etc. 2. Separation of amino acids by paper chromatography. 3. Detection of organic acids: citric, tartaric, oxalic and malic from laboratory samples., 4. Qualitative Analysis of carbohydrates, 5. Estimation of reducing sugar by anthrone method, 6. Qualitative Analysis of Lipids 7. Qualitative analysis of Amino acids and Proteins
	Biostatistics: 1.Univariate analysis of statistical data: Statistical tables, Central

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	tendency - mean, mode, median, standard deviation and standard error (using seedling population /leaflet size). 2.Calculation of correlation coefficient values and finding out the probability. 3.Determination of goodness of fit in Mendelian and modified mono-anddihybrid ratios (3:1, 1:1, 9:3:3:1, 1:1:1:1, 9:7, 13:3, 15:1) by Chi-squareanalysis and comment on the nature of inheritance. 3. Computer application in biostatistics - MS Excel and SPSS

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. A Laboratory Manual Of Plant, Physiology, Biochemistry And Ecology ISBN: 9788177544589Edition: 01Year: 2012Author: Akhtar InamPublisher : Agrobios (India).
2. Wilson and Walker. Practical Biochemistry: Principles and Techniques. Cambridge University Press.U.K.
3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
4. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.

E-learning Resources:

1. https://www.edx.org/learn/molecular-biology
2. https://krishikosh.egranth.ac.in/handle/1/5810039999
3. https://www.classcentral.com/course/swayam-genetic-engineering-theory-and-application-14090
4. https://www.coursera.org/courses?query=genetics
5. https://www.coursera.org/courses?query=molecular%20biology
6. https://www.edx.org/learn/genetic-engineering
7. https://www.mooc-list.com/tags/genetic-engineering
8. https://www.classcentral.com/course/edx-molecular-biology-part-1-dna-replication-and-repair-2907

for Members
13.6.22

Part D – Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

for Members 13.6.22

Declaration

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10. Manisha Gupta - Member

13.6.22

Scheme of B.Sc.
Zoology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	ZOOL-1T	Animal Diversity:Non-Chordata and Chordata , Comparative Anatomy and Physiology of Non-chordates	Theory	4	50	17
	ZOOL-2T	Cell Biology , Histology and Comparative Anatomy & Physiology Of Chordates	Theory	4	50	17
	ZOOL-1P	Practical	Practical	2	50	17
Second year	ZOOL-3T	Genetics , Developmental Biology and Evolution	Theory	4	50	17
	ZOOL-4T	Biochemistry and Molecular Biology	Theory	4	50	17
	ZOOL-2P	Practical	Practical	2	50	17
Third year	ZOOL-5T	Animal Behavior , Chronobiology and Ecology	Theory	4	50	17
	ZOOL-6T	Microbiology , Parasitology , Immunology and Applied Zoology	Theory	4	50	17
	ZOOL-3P	Practical	Practical	2	50	17
Total				**30**	**450**	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the university concern.

Part A: Introduction				
Program: **Certificate course**		Class: **B.Sc. III rd. Year**	Year: **2024**	Session **2024:2025**
1	Course code	**ZOOL: 5T**		
2	Course Title	Animal Behaviour, Chronobiology and Ecology		
3	Course type	Theory		
4	Pre requisite	NO		
5	Course learning Out comes (CLO)	After successfully completing this course, the students will be able to: • Learn a wide range of theoretical and practical techniques used to study animal behaviour. • Develop skills, concepts and experience to understand all aspects of animal behaviour. • Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. • Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. • Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment. • Know the evolutionary and functional basis of animal ecology. • Understand what makes the scientific study of animal ecology a crucial and exciting endeavour. • Analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice. • Solve the environmental problems involving interaction of humans and natural systems at local or global level.		
6	Credit value	4		
7	Total Marks	Max. Marks: 50	Minimum. Passing Marks: 17	

13.6.2024

Part B : Content of Course		
Total Periods: 60		
Unit	**Topics**	No. of Period
I	**Concept and pattern and control of behaviour** Animal behaviour: Scope and importance of study. Concept of behaviour : Motivation, Fixed action of pattern, sign stimulus, Innate releasing mechanism, Action specific energy, Physiological Basis, Learning, Imprinting, Behavioural Genetics, and Evolution of Behaviour. Patterns of behaviour : Kinds of behaviour: foraging behaviour, Territorial behaviour. Mate selection and courtship behaviour. Parental care, Defensive behaviour. Stereotyped Behaviours : Orientation: Kinesis and taxes and Simple Reflex. Neural control And Hormonal Control of Behaviour.	12
II	**Innate; Learning behaviour and socio:biology** Innate behaviour: communication by sound (cricket vocalizations), Bird song, Echolocation in Bat. Chemical Signalling: Pheromones (types of pheromones) and bee Dance. Schooling behaviour in fish and Flocking Behaviour in Birds. Types of learning: Habituation, Imprinting and types of imprinting :filial and sexual, Classical conditioning, Instrumental learning, Latent learning and Trial and error learning, insight learning. Social behaviour : aggregation, group selection, kin selection, altruism.	14
III	**Chronobiology :** Biological clocks, biological rhythms: Circadian and circannual rhythms. Tidal, solar and lunar rhythms, entrainments. Biological oscillation. The concept of Average, amplitude, phase and period. Role of melatonin. Applications of Chronobiology: Chrono pharmacology, Chrono medicine, Chronotherapy. Migratory behaviour in birds and fishes.	11
IV	**An overview of ecology, ecosystems and population ecology** Structure and function of ecosystem: Major ecosystems of the world. Law of limiting factors. Ecological succession. Energy flow in ecosystem, food chain and food web. Recycling of nutrients: C, N, P & S cycle. Ecology of populations: Density, natality, mortality, Fertility and fecundity, survivorship curves. Unique and group attributes of population: mortality, age ratio and age pyramid, sex ratio, dispersal. Factors regulating population dispersal and growth: Exponential and logistic growth. Population regulation: Density:dependent and independent factors; r and K strategies.	12

V	**Biotic community, environmental degradation:** Community characteristics: stratification; dominance, diversity, species richness, abundance, evenness, similarity. diversity and food:web indices. ecotone and edge effect. Types of interaction: Positive interactions: commensalism, proto:cooperation, and mutualism. Negative interactions: parasitism and allelopathy; predation and predator:prey dynamics; herbivory. Interspecific competition and coexistence. Environmental ethics; Pollution: Air, water and noise pollution and their control. Natural resources, Mineral, water and forest, their significance and conservation. Types of biodiversity, Hotspots, benefit and threat of conservation strategies.	11
Key words – Innate and Learning Behaviour, Sociobiology, Biological clock, Circadian rhytham, Population, Community, Succession, Pollution, Biological interaction, Biodiversity.		

Part : C Learning Resource

Text books, Reference Books, Other Resources:

1. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
2. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
3. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
4. Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition) Sinauer Associate Inc., Massachusetts, USA.
5. Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009)Chronobiology Biological Timekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
6. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
7. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
8. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
9. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
10. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
11. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
12. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
13. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.

14. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
15. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
16. Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition) Sinauer Associate Inc., Massachusetts, USA.
17. Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009)Chronobiology Biological Timekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
18. Kumar, V. (2002).Biological Rhythms: Narosa Publishing House, Delhi/ Springer : Verlag, Germany. mbridge, University Press, UK
19. Colinvaux, P. A. (1993) Ecology (2nd edition) Wiley, John and Sons, Inc.
20. Krebs, C. J. (2001) Ecology (6th edition) Benjamin Cummings. 57
21. Odum, E.P., (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
22. Ricklefs, R.E. (2000) Ecology (5th edition) Chiron Press.
23. Southwood, T.R.E. and Henderson, P.A. (2000) Ecologial Methods (3rd edition) Blackwell Sci.
24. Kendeigh, F C. (1984) Ecology with Special Reference to Animal and Man. Prentice Hall Inc.
25. Stiling, P. D. (2012) Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.

E:Resources:

1. SWAYAM: .https://swayam.gov.in/explorer?searchText=
2. https://academic.oup.com
3. https://medineplus.gov
4. https://ncin.nlon.nih.gov
5. https://zoologylearningpoint.woodpress.com
6. https://zoologyresources.com
7. National digital library – https://ndl.iitkgp.ac.in
8. e:PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in
9. Science Direct Open Access Content
10. https://www.sciencedirect.com/book/9781843342038/ open Access
11. https://egyankosh.ac.in
12. https://Sciencedirect .com
13. https://Britannica.com> science > animal :behaviour
14. https://www nontesonzoology . com>animal behaviour
15. https://www biologyonline.com
16. https://www sciencing.com> Science > Biology > Ecology
17. https://www2 . hcmuf.edu.vn
18. https://wwwresearchgate . net

Part D: **Assessment and Evaluation**
University Exam(UE): Maximum Marks: 50 Marks

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre College, Pendra Road

2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur

3. Dr. Prem Prakash Singh - Member -
   Professor, Govt. College, Kusmi, Balrampur

4. Dr. Shubhada Rahalkar - Member -
   Professor, Govt. Bilasa Girls P. G. College, Bilaspur

5. Dr. Anil Kumar Shrivastava - Member -
   Professor, Govt. V. Y. T. P. G. Autonomous College, Durg

6. Dr. R. K. Tamboli - Member -
   Assistant Professor, Kirodimal Govt. Arts & Science College, Raigarh

7. Dr. Parmita Dubey - Member -
   Assistant Professor, Govt. J. Y. Chhattisgarh College, Raipur

8. Dr. Shashi Gupta - Member -
   Assistant Professor, Govt. Nagarjuna P. G. College of Science, Raipur

9. Dr. L. P. Miri - Member -
   Assistant Professor, Govt. J.P. Verma P. G. Arts & Commerce College, Bilaspur

10. Dr. Rajesh Kumar Rai - Member -
    Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur

11. Dr. Hema Kulkarni - Member -
    Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon R. Dist -Durg

Date : 13.06.2022.

Part A: Introduction				
Program: **Certificate Course**		**Class:** B.Sc. III rd Year	**Year:** 2024	**Session:** 2024-2025
1	**Course Code**	**ZOOL – 6 T**		
2	**Course Title**	**Microbiology, Parasitology, Immunology and Applied Zoology**		
3	**Course Type**	Theory		
4	**Pre-requisite (if any)**	No		
5	**Course Learning Outcomes (CLO)**	After completing this course, the students will be able to - • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.		
6	**Credit Value**	4		
7	**Total Marks**	Max. Marks: 50	Min Passing Marks : 17	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Period**
I	**Microbiology and Parasitology :** Bacterial diseases – Caused by *Salmonella typhi, Helicobactor pyloriand, Mycobacterium tuberculosis* with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Viral diseases – Hepatitis, influenza, AIDS, with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Protozoan diseases – Amoebiasis, Malaria, Trypanosomiasis, and Leishmaniasis with the life cycle of pathogen and possible treatments. Helminthic diseases – Schistosomiasis, Taeniasis, Ascariasis, and Filariasis with the life cycle of pathogen and possible treatment.	12
II	Immunology : Cells and organelles of the immune system. Characteristics of antigen, Antigenicity, Immunogenicity, Epitopes, Haptens, Adjuvant. Immunoglobulin : Classification, properties, and function of immunoglobulin. Antigen, and Antibody interaction. Humoral and cell:mediated immune response. The role of B and T cells in immunity. MHC complex, Hypersensitivity. Autoimmune disorders: Thyroid problem, Rheumetoid Arthritis . Monoclonal antibodies. Concept of vaccine.	12
III	**Aquaculture :** Prawn culture – Prawn culture in freshwater, its preservation, and processing. Pearl culture – Biology and technology followed (Fresh & Marine). Fish culture –Maintainance of fresh water fish farm and Breeding, Composite fish farming.	12
IV	**Apiculture, Sericulture, Lac culture :** Apiculture – types of the honey bee and culture technology. Lac culture – cultivation process with the life cycle of lac insect. Sericulture – types of silkworm and technology for mulberry silk worm culture. Economic values of Apiculture, Sericulture and Lac culture.	11
V	**Dairy Management, Poultry farming, and Vermicomposting :** Dairy Management : Techniques for dairy management; Cattle disease. Poultry – Types of breeds, rearing methods and diseases. Biology and rearing method of earthworm *Eisenia foetida/ Pharitima Posthuma.* The technology of Vermicompost production.	13
Keywords: Micro organism, Parasites, Immune System, Economic Zoology, Dairy Management, Poultry Management, Vermicomposting.		

13.6.2022

Part C :Learning Resource
Text Books, Reference Books, Other Resources – 1. Jawetz, M., and Adelberg (2015) Medical Microbiology (27 th edition). 2. Chatterjee, K.D. (2015) Parasitology (13 th edition). 3. Goldsby, R.A.; Kindt, T.J. and Kuby, J. (2006) Immunology (6th edition). 4. Roitt, I.; Brostoff, J. and Male, D. (2012) Immunology (8th edition). 5. Shukla, G.S. and Upadhyaya, V.B. (1999:2000). Economic Zoology (Rastogi Publishers). 6. Mani, M.S. (2006). Insects, NBT, India. 7. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
E: Resources – 1. SWAYAM: .https://swayam.gov.in/explorer?searchText 2. https://academic.oup.com 3. https://medineplus.gov 4. https://ncin.nlon.nih.gov 5. https://zoologylearningpoint.woodpress.com 6. https://zoologyresources.com 7. National digital library – https://ndl.iitkgp.ac.in 8. e:PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in 9. Science Direct Open Access Content – https://www.sciencedirect.com/book/9781843342038/ open Access 10.https://egyankosh.ac.in

Part D: Assessment andEvaluation
Maximum Marks, University exam. (UE) : : **50**

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre College, Pendra Road

2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur

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Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur

11. Dr. Hema Kulkarni - Member -
Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon R. Dist -Durg

Date : 13.06.2022.

Part A: Introduction				
Program : Degree course		**Class: B.Sc.III Year**	**Year -2024**	**Session :-2024-2025**
1	**Course code**	**ZOOL-3P**		
2	**Course Title**	**Lab course - 3**		
3	**Course Type**	**Practical**		
4	**Pre-Requisite(If Any)**	No		
5	**Course Learning Outcome (CLO)**	At The end of Course Students will be able to - • Learn a wide range of practical techniques used to study animal behaviour. • Develop skills, concepts and experience to understand all aspects of animal behaviour. • Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. • Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. • Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment. • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.		
6	Credit Value	2		
7	Total marks	Maximum marks : 50 Minimum marks: 17		

13.6.2022

Part : B Content of course	
Total lecture-30	
Tentative Practical List	**Note :This is tentative list .The teacher concern can add per requirement** 1. Orientation of an animal to light. 2. Chemical communication in ants. 3. Predatory behaviour of a carnivorous animal. 4. Nests and nesting habits of the birds and social insects 5. To study geotaxis behaviour in earthworm. 6. To study the phototaxis behaviour in insect larvae. 7. Study of circadian functions in humans (daily eating, sleep and temperature patterns). 8. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of 9. Making an ecosystem in a wide-mouthed bottle. 10. Constructing a food web by observing and collecting organisms from a given area. 11. Studying the impact of herbivore on plant species (planted in pots under specific conditions) 12. Estimation of the ratio of the producers and consumers. 13. Studying insect diversity in a habitat. 14. Study of permanent slides and specimens of parasitic protozoans and helminthes. 15. Pathological examination of sputum, blood, urine and stool. 16. Staining and identification of Gram positive and Gram negative bacteria. 17. RBC and WBC counting. 18. Identification of Blood group. 19. Demonstration of antigen-antibody interaction in gel. 20. Morphological characterization of common fish species. 21. Identification of two major carps – Labeo *rohita* and Catla *catla* and their life cycles. 22. Through charts/specimens- study of bees. 23. Worker honey bee with emphasis on leg modifications (through specimens/charts). 24. Life cycle of mulberry silkworm, Bombyx mori and tasar silkworm (model/chart/specimens). 25. External morphology and nomenclature of dairy animals. 26. Determination of the specific gravity of milk by using a mercury lactometer. 27. Test for good quality eggs (Floating test, cracking test) and for fertilized and unfertilized eggs (Light test, Cracking test). 28. External morphology of poultry birds (model). 29. Project report on visit to dairy farm and visit to Poultry farm (Poultry management).

Part-C Learning Resource
Text books, References, Books Other Resource :
1. Practical Ecology, Anmol Publications. 2. Practical Methods in Ecology and Environmental Science,R. K. Trivedy, P. K. Goel, C. L. Trisal Enviro Media Publications, 1987. 3. Ethology practical Vilmos Altbäcker Márta Gácsi András Kosztolányi Ákos Pogány Gabriella Lakatos Péter Pongrácz. 4. Animal Behaviour Reena Mathur Rastogi publication. 5. ANIMAL BEHAVIOUR Practical work and data response exercises for sixth form students Michael D. 6. Animal Cell Culture and Technology Michel butcher Publisher : .Taylor & Francis 7. Our Animal Resources: Animals and Their Economic Importance Hardcover. 8. Publisher Holt, Rinehart, and Winston : 9. Practical Microbiology D.K. Maheshwari. 10. practical microbiology R.C. Dubey. 11. microbiology textbook. Dr Arora. 12. Microbiology: A Laboratory Manual - Book by James G. Cappuccino and Natalie Sherman. 13. Micro extremely Lecturio and sketchy rock's. 14. Lehninger – Biochemistry. 15. Kuby – immunology. 16. Ananthnarayan- medical Microbiology. 17. Tortora- for studying diseases caused by the normal flora and antibiotic classes. 18. Stanbury and Whittekar -fermentation Microbiology. 19. Genes by Lewis- for Genetics/ molecular biology and genetic engineering 20. Watson- Molecular biology. 21. Kooper - Cell biology.

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: University exam (UE) : Maximum Marks: 50		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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Date : 13.06.2022.

Scheme of Examination
B.Sc.
Geology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
First Year	GEOL- 1 T	Geodynamics and Geomorphology	Theory	4	50	17
	GEOL- 2 T	Mineralogy and Crystallography	Theory	4	50	17
	GEOL-1 P	Geodynamics and Geomorphology Mineralogy and Crystallography	Practical	2	50	17
Second Year	GEOL- 3 T	Petrology	Theory	4	50	17
	GEOL - 4 T	Structural Geology	Theory	4	50	17
	GEOL – 2P	Petrology Structural Geology	Practical	2	50	17
Third Year	GEOL- 5 T	Palaeontology and Stratigraphy	Theory	4	50	17
	GEOL – 6T	Earth Resources and Applied Geology	Theory	4	50	17
	GEOL – 3P	Palaeontology and Stratigraphy Earth Resources and Applied Geology	Practical	2	50	17

Note : There shall be four extra credits in all the years of under graduation for internship/ apprenticeship/ skill based course. The certificate of extra credits would be provided by the concern university and is not mandatory.

(MAHFOOZ ARIF)

Part A Introduction				
Program: **DegreeCourse**		Class: **B.Sc. IIIYear**	Year: **2022**	Session:**2024-2025**
S.No.				
1	Course Code	GEOL- 5T		
2	Course Title	(Palaeontology& Stratigraphy) Paper I		
3	Course Type	Theory		
4	Pre-requisite- (if any)	To study in this class, students must have passed B.Sc. Part 2 class with Geology subject.		
5	Course Learning Outcomes (CLO)	At the end of the course, the students will be able to – • Understand modes of fossilization and uses of fossils. • Identify Gondwana plant fossils. • Describe morphology, geological distribution of Brachiopods, Lamellibranches, • Describe morphology, geological distribution of Trilobites, Gastropods, Graptolites and Echinoids. • Understand the principles of Stratigraphy and details of Geological Time scale • Understand Indian stratigraphic systems of Archean, Dharwar, Cuddapah, and VindhyanSupergroups • Describe the Geological Time events of The Paleozoic, Gondwana, Triassic, Jurassic and Cretaceous and the Tertiary rocks		
6	Credit Value	04		
7	Total Marks	Maximum Marks: 50	Min. Marks 17	

Part B Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Palaeontology:** Palaeontology:Fossils- definition, essentials and modes of fossilization.Uses of fossils, Derived fossils, Index fossils & their significance, Use of Palaeontology in Stratigraphy,Palaeoecology&Palaeogeography, Brief idea about Micropalaeontology and its significance, Introduction to Gondwana plant fossils.	12
II	**Palaeontology:** Morphology and Geological distribution of Foraminifera &Anthozoa fossils, Morphology and Geological distribution of Gastropoda and Lamellibranchiafossils, Morphology and Geological distribution of Cephalopoda, Morphology and Geological distribution of Echinoidea&Brachiopoda fossils, Morphology and Geological distribution of Trilobite and Graptolite fossils.	12

III	**Stratigraphy :** Principles of Stratigraphy, Geological Time Scale: Various divisions of Geological Time Scale, their nomenclature and type area, Basic concepts of Lithostratigraphic, Chronostratigraphic&BiostratigraphicUnits,Tectonic& Physical Subdivisions of Indian subcontinent,Distribution, classification and Economic importance ofArchaeozic rocks of India (Dharwar), Stratigraphy & Economic Importance of Archaeozic rocks of Bastar (Chhattisgarh).	12
IV	**Stratigraphy :** Distribution, stratigraphy and Economic importance of Vindhyan& Chhattisgarh Supergroup of rocks, Stratigraphy, Palaeoclimate, Geographical, Geological distribution & economic importance of GondwanaSupergroup, Stratigraphy, distribution and age of Deccan-traps, Stratigraphy, distribution and fossil contents of intertrappean and infratrappean(Bagh&Lameta) Beds, Distribution, Stratigraphy and Palaeontology of Palaeozoic rocks of Salt Range.	12
V	**Stratigraphy :** Distribution, Stratigraphy and Economic importance of Palaeozoic rocks of Spiti Valley, Stratigraphy, Distribution, Fossil content of Cretaceous rocks of Trichonopoly, Stratigraphy, distribution, Fossil content &Economic importance of Jurassic rocks of Kutchh-Region, Distribution, Stratigraphy, economic importance of Tertiary rocks of Assam-Region, Distribution, Stratigraphy and Palaeontological importance of Siwalik group of rocks.	12

Part C
Learning Resources

Suggested Readings

1) जीवाश्मविज्ञान के सिद्धांत–डॉ. अंबिकाप्रसादअग्रवाल
(2) जीवाश्मविज्ञान–डॉ. आर.पी. मिश्रा
(3) अकशेरूकी एवंकशेरूकीय जीवाश्मविज्ञान–डॉ. दीपकराजतिवारी
(4) भारतवर्षकाभूविज्ञान–डॉ.अंबिकाप्रसादअग्रवाल
(5) प्रायोगिकभूविज्ञान भाग–3–डॉ. गुप्ता, पुनवटकर, रघुवंशी
(6) Invertebrate Palaeontology- H.Woods.
(7) Introduction to Palaentology- A.N. Davis.
(8) An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S.Anantharaman
(9) Historical Geology of India- Ravindra Kumar
(10) Geology of India- R.Vaidyanadhan&M.Ramkrishnan (Geol. Soc. Ind. Publication)

E-resources
1. https://epgp.inflibnet.ac.in/Home
2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up
3. https://egyankosh.ac.in/
4. https://sites.google.com/ignou.ac.in/bscgeology
5. SWAYAM – https://swayam.gov.in/explorer?searchtext
6. National digital library – https://ndl.iitkgp.ac.in
7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD AssessmentandEvaluation		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies in Geology as per the guidelines of the Department of Higher Education, Chhattisgarh. This meeting was held at AtalBihariBajpai University Bilaspur on 3rd June 2022.

S.No.	Name	College	Designation	Signature
1	Prof. MahfoozArif	Govt.E.RaghvendraRao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	BhanuPratapDeoGovt.PG.College, Kanker(C.G.)	Member	
4	Dr.Shailendra Singh Bhadauria	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	
5	Dr.S.D.Deshmukh	Govt.V.Y.T PG Autonomous College,Durg (C.G.)	Member	
6	Prof.AmitanshuShekharJha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.SunilA.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. NinadBodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. SandeepVansutre	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	Present online
10	Pro A.K.Sandilaya	Prof., Department of Applied Geology, Dr. HS Gour University Sagar, M.P.	Member	Present online
11	Dr. BhargavaAyangar	Department of Applied Geology,NIT Raipur	Member	Present online

Part A Introduction				
Program:**DegreeCourse**		Class: **B.Sc. III Year**	Year: **2022**	Session:**2024-2025**
S.No.				
1	Course Code	GEOL- 6T		
2	Course Title	Earth Resources & Applied Geology (Paper II)		
3	Course Type	Theory		
4	Pre-requisite (if any)	To study in this class, students must have passed B.Sc. Part 2 class with Geology subject.		
5	Course Learning Outcomes (CLO)	• This course of B.Sc. Geology enables the students to understand origin, occurrence, formation process and distribution in the Indian Subcontinent of various economic minerals. • Knowledge about engineering properties of rocks and soils, soil groups, geological considerations in construction of damsand tunnels, Mineral exploration and mining.		
6	Credit Value	Theory : 4		
7	Total Marks	Maximum Marks: 50	Minimum Passing Marks : 17	

Part B Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Processes of mineral deposit formation :** Economic Geology: Definition and scope. Introductory idea about Ore, ore mineral, gangue mineral, tenor, grade, assay, Concept of distribution of mineral deposits in time & space in Indian context, Brief idea about classification of mineral deposits, Igneous processes of mineralization (a) Magmatic process and its Indian examples. (b)Hydrothermal processes and its Indian examples, Sedimentary processes of mineral formation. (a) Mechanical and residual concentration (b) Precipitation (c)Evaporites, Oxidation & supergene sulphideenrichment processes	12
II	**Metallic and non-metallic mineral deposits :** Geological, Geographical distribution, mode of occurrence, mineralogy & economic importance of following metallic & nonmetallic deposits of India, Iron, Manganese, Chromium, Copper, Lead, Zinc, Gold, Aluminium, Refractory and Fertilizer minerals, Minerals used in cement & chemical industries.	12

III	**Natural fuels :** Coal deposit: Origin, & stratigraphy, Types of coal: Peat, Lignite, Bituminous & Anthracite Coal deposits of Chhattisgarh, Origin of Natural-hydrocarbon, its migration & accumulation. Types of oil traps; Structural, stratigraphic and composite. Offshore & onshore oil fields of India, Radioactive minerals : Mineralogy, Geological & Geographical distribution in India, Introduction to Reconnaissance Permit(RP), Prospecting License(PL) and Mining Lease(ML).	12
IV	**Applied Geology :** Engineering geology & its importance, Engineering properties of rocks, Geological consideration for site selection of Dam and Tunnels, Elementary study of Photogeology and use of Aerial photographs in geological studies, Hydrologic cycle. Mode of occurrence of ground water, Hydrologic properties of rocks. Porosity and permeability. Brief idea about aquifer, aquiclude, aquitard and aquifuge.	12
V	**Applied Geology :** Introduction to mineral exploration. Principles and instruments of Gravity and Electrical methods of geophysical exploration, Principles and instruments of Magnetic and Seismic methods of geophysical exploration, Elementary idea about Remote Sensing and GIS and its applications, Sampling, principles of ore reserve estimation, Environmental impact of mining.	12

Part C

Learning Resources

Suggested Readings

(1) आर्थिकभूविज्ञान–कृष्णगोपालव्यास
(2) आर्थिक एवंव्यावहारिकभूविज्ञान–आर.पी. मांजरेकर
(3) भौमजलविज्ञान– एल.के. रिछारिया
(4) प्रारंभिक खनिकी–बी.के. सिंह
(5) प्रायोगिकभूविज्ञान भाग–3–गुप्ता, पुनवटकर एवंरघुवंशी
(6) Economic mineral deposits of India- Umeshwar Prasad.
(7) Economic mineral deposits- A.Bateman
(8) Ore-deposit of India- Gokhale&Rao
(9) India's Mineral Resource- S. Krishnaswami
(10) Principle of Engineering Geology &Geotechniques- Krynine& Judd.
(11) Ground-water Hydrology- D.K. Todd
(12) Courses in mining Geology- R.N.P. Arogyaswami
(13) Principle & Application of photogeology- S.N. Pandey.
(14) Ground water- Assessment, Development & Management- K.R. Karanth
(15) Geophysical methods in Geology- P.V. Sharma.
(16) Environmental Geology- K.S. Valdiya (1987)

E-resources
1. https://epgp.inflibnet.ac.in/Home 2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up 3. https://egyankosh.ac.in/ 4. https://sites.google.com/ignou.ac.in/bscgeology 5. SWAYAM – https://swayam.gov.in/explorer?searchtext 6. National digital library – https://ndl.iitkgp.ac.in 7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD AssessmentandEvaluation		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

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Part A Introduction				
Program: **DegreeCourse**		Class: **B.Sc. III Year**	Year: **2022**	Session:**2024-2025**
S.No.				
1	Course Code	GEOL - 3P		
	Course Title	Palaeontology, Stratigraphy, Earth Resources & Applied Geology (Paper Practical)		
	Course Type	Practical		
	Pre-requisite (if any)	This practical course is related to theory course Geology Paper I& II.		
	Course Learning Outcomes (CLO)	On completion of course, the students will be able - • Identify ore forming minerals in hand specimen. • Demarcate ore deposits and economic mineral deposits in Outline map of India. • Estimate the ore reserves from the given data. Interpret aerial photographs with the help of stereoscope. • Visually interpret satellite Imageries. • Construct and interpret water table maps on the basis of given data. • Identify various invertebrate and plant fossils on the basis of their morphological characters.		
	Credit Value	Practical : 2		
	Total Marks	Maximum Marks: 50		Minimum Passing Marks : 17

Part B1 Content of the Course	
Palaeontology& Stratigraphy	
Topics	**No. of Periods**
Study of morpholgy of fossils belonging to various phyla.	3
Study of Important plant fossils	3
Representation of Litho units & Stratigraphic Units in outline map of India.	3
Sketching of physiographic division of India.	3
Palaeoecological studies of plant Fossils	3

Part B2 Content of the Course	
Earth Resources & Applied Geology	
Topics	**No. of Periods**
Study of important metallic/nonmetallic minerals on the basis of physical & optical properties &Magascopic studies of coal & its varieties.	3
Distribution of main metallic/nonmetallic deposits within outline map of India.	3
Study of hydrologic properties of rocks, Preparation of hydrological maps.	3
Exercises related with mineral exploration; Reserve calculation, Tonnage factor calculation,Exercises related with drilling.	3
Study of Aerial photographs with the help of stereoscopes. & Study of satellite imageries.	3
Field work of seven days is compulsory for the students.	

Part C
Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings

(1) जीवाश्मविज्ञान के सिद्धांत–डॉ.अंबिकाप्रसादअग्रवाल
(2) जीवाश्मविज्ञान–डॉ. आर.पी. मिश्रा
(3) अकशेरूकी एवंकशेरूकीय जीवाश्मविज्ञान–डॉ. दीपकराजतिवारी
(4) भारतवर्षकाभूविज्ञान–डॉ.अंबिकाप्रसादअग्रवाल
(5) प्रायोगिकभूविज्ञान भाग–3–डॉ. गुप्ता, पुनवटकर, रघुवंशी
(6) Invertebrate Palaeontology- H.Woods.
(7) Introduction to Palaentology- A.N. Davis.
(8) An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S.Anantharaman
(9) Historical Geology of India- Ravindra Kumar
(10) Geology of India- R.Vidhyanathan&M.Ramkrishna (GSI Publication)
(11) Geology of India & Burma- M.S. Krishnan.
(12) आर्थिकभूविज्ञान–कृष्णगोपालव्यास
(13) आर्थिक एवंव्यावहारिकभूविज्ञान–आर.पी. मांजरेकर
(14) भौमजलविज्ञान– एल.के. रिछारिया
(15) प्रारंभिक खनिकी–बी.के. सिंह
(16) प्रायोगिकभूविज्ञान भाग–3–गुप्ता, पुनवटकर एवंरघुवंशी
(17) Economic mineral deposits of India- Umeshwar Prasad.
(18) Economic mineral deposits- A.Bateman
(19) Ore-deposit of India- Gokhale&Rao
(20) India's Mineral Resource- S. Krishnaswami
(21) Principle of Engineering Geology &Geotechniques- Krynine& Judd.
(22) Ground-water Hydrology- D.K. Todd
(23) Courses in mining Geology- R.N.P. Arogyaswami
(24) Principle & Application of photogeology- S.N. Pandey.
(25) Ground water- Assessment, Development & Management- K.R. Karanth
(26) Geophysical methods in Geology- P.V. Sharma.
(27) Environmental Geology- K.S. Valdiya (1987)

E-resources

1. https://epgp.inflibnet.ac.in/Home
2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up
3. https://egyankosh.ac.in/
4. https://sites.google.com/ignou.ac.in/bscgeology
5. SWAYAM – https://swayam.gov.in/explorer?searchtext
6. National digital library – https://ndl.iitkgp.ac.in
7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD AssessmentandEvaluation		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies in Geology as per the guidelines of the Department of Higher Education, Chhattisgarh. This meeting was held at AtalBihariBajpai University Bilaspur on 3rd June 2022.

S.No.	Name	College	Designation	Signature
1	Prof. MahfoozArif	Govt.E.RaghvendraRao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	BhanuPratapDeoGovt.PG.College, Kanker(C.G.)	Member	
4	Dr.Shailendra Singh Bhadauria	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	
5	Dr.S.D.Deshmukh	Govt.V.Y.T PG Autonomous College,Durg (C.G.)	Member	
6	Prof.AmitanshuShekharJha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.SunilA.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. NinadBodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. SandeepVansutre	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	Present online
10	Pro A.K.Sandilaya	Prof., Department of Applied Geology, Dr. HS Gour University Sagar, M.P.	Member	Present online
11	Dr. BhargavaAyangar	Department of Applied Geology,NIT Raipur	Member	Present online

Nonparametric tests: Sign, Run, Median, Wilcoxon, Mann-Whitney tests.

5. प्रतिदर्श का चयन और प्रतिदर्श के आकार का निर्धारण । सामान्य यादृच्छिक प्रतिचयन, स्तरीकृत और व्यवस्थित प्रतिचयन स्तरीकृत प्रतिचयन मे प्रतिदर्शो के बंटन की समस्या। आकलन के अनुपातीक और समाश्रयण विधियॉ।

Selection of samples and determination of sample size. Simple random sampling, Stratified and systematic sampling. Allocation problem in stratified sampling. Ratio and regression methods of estimation.

6. एक आयामी और द्वि–आयामी वर्गीकरणों के लिए, प्रसरण का विश्लेषण। पूर्ण यादृच्छिक अभिकल्पना, यादृच्छिक ब्लॉक अभिकल्पना और, लैटिन वर्ग अभिकल्पनाओं का विश्लेषण 2^2 और 2^3 प्रयोगों का विश्लेषण।

Analysis of variance for one way and two way classifications. Analysis of CRD, RBD and LSD. Analysis of 2^2 and 2^3 experiments.

B.A. /B.Sc. III Year
Subject: Statistics

Paper I
अनुप्रयुक्त सांख्यिकी
Applied Statistics

उद्देश्य: छात्र प्राप्त करेगें
(अ) विभिन्न विधियों द्वारा सूचकांक संख्या की गणना ।
(ब) समय श्रृंखला आंकड़े, अनेक क्षेत्रों मे इनके अनुप्रयोग और इनके अवयव
(स) अनेक वृद्धि वक्रों का आसंजन और आरेखन
(द) अनेक विधियों द्वारा रूझान और मौसमी अवयवों का असंजन ।
(य) चरों के अवयव विधि द्वारा यदृच्छिक अवयव के प्रसरण की गणना ।
(र) वास्तविक जीवन अवस्था का आय बंटन और इनके आसंजन।

Outcome: the students will know about
(a) Computation of Index Numbers by various methods.
(b) time series data, its applications to various fields and components of time series,
(c) fitting and plotting of various growth curves.
(d) fitting of trend and seasonal component by various methods.
(e) calculation of variance of random component by variate component method
(f) income distributions and their fitting in real life situations,

Unit I

भारतीय अनुप्रयुक्त सांख्यिकी प्रणाली : भारत मे वर्तमान अधिकरिक सांख्यिकीय प्रणाली, अधिकारीक सांख्यिकी के आंकडों के संग्रहण की विधियॉ, उनके विश्वासनियता और सीमायें, और प्रमुख प्रकाशनों और संचार , बैकिंग और वित जैसे विषयों पर ऐसे आकंडे है।

Indian Applied Statistics System: Present official statistical System in India, Methods of collection of Official Statistics, their reliability and limitations, and the principal publications containing such statistics on the topics-population agriculture, industry, trade, price, labour and employment, transport and communications, Banking and Finance.

Unit II

जनांकिकी ऑकडों का स्त्रोत : जनगणना , रजिस्टर और तंदर्थ सर्वेक्षण अस्पताल का अभिलेख, भारतीय जनगणना का जनांकिकी रूपरेखा, मृत्यु दर का मापन, और जीवन तालिकाः संशोधित मृत्यु दर, सामान्यीकृत मृत्यु दर, सामान्यीकृत मृत्यु दर का प्रत्यक्ष और अप्रत्यक्ष विधि , पूर्ण जीवन तालीका –उनके मुख्य गुणधर्म , मृत्यु की प्रायिकता, उत्तरजीविता तालिका का उपयोग । प्रजनन क्षमता का मापनः अशोधित जन्मदर, सामान्य जन्म दर आयु विशिष्ट जन्य दर, सम्पूर्ण जन्म दर, सकल प्रजनन दर निवल प्रजनन दर ।

Demographic Methods: Sources of demographic data: Census, register and-hoc surveys, hospital records, demographic profiles of the Indian Census, Measurement of mortality, and life table,: crude death rate, age specific death rates, infant mortality rates, infant death rate, death rate by cause, standardized death rate, direct & indirect method of standardized death rate, Complete life tables- its main features, mortality rate and probability of dying , uses of survival tables. Measurement of fertility,: crude birth rate,, general fertility rate, age specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate.

Unit III

वित्तिय सांख्यिकी : सुचकांक संख्या – परिभाषा और अनुप्रयोग मूल्य सापेक्ष और परिमाण या आयतन सापेक्ष, लिंक सापेक्ष और श्रृखला सापेक्ष , सुचकांक संख्याओं के गणना मे सामाहित समस्याऍं। औसत, सामान्य योगात्मक और भति औसत विधिया। लेस्पीयर, पासी, मॉर्शल – एडगेवर्थ और फिशर का सुचकांक संख्या। समय और कारक व्युत्क्रम परीक्षण। श्रृखला आधारित सुचकांक संख्या उपभोक्ता मूल्य सुचकांक संख्या ।

Economic Statistics: Index number- definition, application of index numbers. Price relatives and quantity or volume relatives. Link and chain relatives, problems involved in computation of index numbers, uses of averages, simple aggregative and weighted average methods, Laspeyre's, Paasche's, Marchal- Edgeworth's and Fisher's index numbers, Time and Factor reversal tests. Chain base index number, Consumer price –index numbers.

Unit IV

समय श्रखला विश्लेषण – वित्तिय समय श्रृखला विधिन्न अव्यय चित्रण ,योगात्मक और गुणात्तम, प्रतिमान, रूझान का निर्धारण वृद्धिवक्र, मौसमी चंचलता का विश्लेषण, मौसमी सूचकांको का निर्माण ।

Time series analysis- economic time series, different components, illustrations, additive and multiplicative models, determination of trend, growth curves, analysis of seasonal fluctuations, construction of seasonal indices.

UNIT V

चार संक्षिप्त टिप्पणी, प्रत्येक इकाई से एक पूछा जाएगा। छात्रों को किन्हीं दो का उत्तर देना है।

Four short notes one from each Unit will be asked. Students have to answer any two.

REFERENCES

1. Croxton F.E. and Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.

2.Chatfield, C.(1980):The Analysis of Time Series-An Introduction ,Second Edition Chapman and Hall.
3.Goon A.M.;Gupta,M.K. and Dasgupta ,B(1986):Fundamentals of Statistics, Volume-Two,World Press,Calcutta
4. Guide to Current Indian Official Statistics: Central Statistical Organization, Govt. of India, New Delhi.
5. Mukhopadhyay ,P.(1999) : Applied Statistics, New Central Book agency Pvt. Ltd.,Calcutta.
6. Srivastava O.S. (1983): A Text Book of Demography, Vikas Publishing.

ADDITIONAL REFERENCES

1.Cox,P.R.(1970):Demography,Cambridge University Press.
2. Pressat R. (1978): Statistical Demography, Methuen and Co. Ltd.

Paper II
सांख्यिकीय गुणवत्ता नियंत्रण और अभिकलनी तकनीक
Statistical Quality Control and Computational Techniques

उद्देश्य : छात्र प्राप्त करेंगे :

(अ) विभिन्न नियंत्रण चार्ट, ओंसी और ए आर एल वक्रों का निर्माण।

(ब) गतिशील माध्य और घातीय भारित गतिशील माध्य चार्ट्स का निर्माण : कुसुम चार्ट।

(स) विभिन्न क्षमता सूचकांको की गणना।

(द) स्वीकृति प्रतिचयन विधि द्वारा गुणों का निष्कर्ष निकालना।

(य) स्वीकृति प्रतिचयन विधि द्वारा चरों का निष्कर्ष निकालना।

Outcome: Students will aquired with

(a) construction of various control charts, OC and ARL curves.
(b) Construction of moving average and exponentially weighted moving average charts; Cu-sum charts.
(c) Computation of various capability indices.
(d) Drawing conclusion through acceptance sampling plan by attributes.
(e) Drawing conclusion through acceptance sampling plan by variables.

Unit I

औद्योगिक अनुसंधान में सांख्यिकीय विधियों का महत्व, दश्य गंजिंग के अनुरूप वस्तुओं और लाटॅ गुणों का विनिर्देष, गिनती और मापन, निरिक्षण के प्रकार , सहय सिमा का निर्धारण । नियंत्रण आरेख का समान्य प्रमेप, गुणवन्ता में रिवर्तन का कारण, नियंत्रण सीम उप समहिकरण, नियंत्रण से बाहर मानदंड का सारांश । गुणों का आरेखण, np चार्ट, p- चार्ट, c- चार्ट, u- चार्ट, चरों का आरेख $\bar{X}$ और R चार्ट का अभिकल्पना के साथ p चार्ट, अध्ययन की प्रक्रिया क्षमता ।

Importance of statistical methods in industrial research and practice, specification of items and lot qualities corresponding to visual gauging, count and measurements, types of inspection, determination of tolerance limits. General theory of control charts, causes of variation in quality, control limits, sub-grouping, summary of out of control criteria. Charts for attributes, np chart, p-chart, c-chart, u- chart. Charts for variables, $\bar{X}$ and R charts, design of $\bar{X}$ and R charts, versues p chrts, process capability of studies.

Unit II

समह स्विकार्यता का स्विकार्य प्रतिचयन समास्या की अवधारणा, अच्छे और बुरे समुह का निर्धारण , उत्पादक और उपभोक्ता का जोखिम, सभी गणों के लिए एकल और द्वि प्रतिचयन की योजनाएँ , उनके ocफलन ,AQL,LTPD,AOQL की अवधारणा , निरिक्षण की औसत मात्रा औरASN फलन , निरिक्षण योजनाओं में सुधार, चरों के लिए प्रतिदर्श निरिक्षण योजना , भारतिय प्रसामान्य तालिका भाग – I (अनुप्रयोगों के साथ) IS2500 भाग I

Principle of acceptance sampling-problem of lot acceptance, stipulation of good and bad lots, Producer's and consumers risks, single and double sampling plans for all attributes , their OC functions, concepts of AQL, LTPD, AOQL, Average amount of inspection and ASN function, rectifying inspection plans, sampling inspection plans for variables, Indian Standard Tables Part-I(including applications),IS 2500 Part I.

Unit III

गणनात्मक तकनीक : अंतर सारणी और अंतरगणन की विधियॉ : न्यूटन की अग्र एवं पश्च अंतरगणन सूत्र ,लैग्रांज का अंतरगण सूत्र विभाजित अंतर अंतरगणन सूत्र. संख्यात्मक अवकलन और समाकलन दृ ट्रेपेजॉइडल ,सिम्पसान का एक तीन सूत्र,गैर रेखीय समीकरणों के पुररावृत्त समाधान ।

Computational Techniques: Difference tables and methods of interpolation: Newton's forward and backward interpolation formula, Lagrange's method of interpolation, divided difference interpolation formula. Numerical differentiation and integration. Trapezoidal, Simpson's one – third formulae, iterative solutions of non-linear equations.

Unit IV

रेखिय प्रोग्रमिंग: उत्तल समुच्चय का प्रारंभिक सिद्धांत , सामान्य रेखिय प्रोग्रामिंग का परिभाषा , एल पी पी का समीकरण ल पी पी के उदाहरण, विभिन्न क्षेत्रों में आने वाली समास्याएँ, ग्राफिकल और सिम्प्लेक्स विधि द्वारा एल पी पी का हल । कृत्रिम चर । एल पी पी मे द्वंद्व समस्या , परिवहन समस्या (गैर अपभ्रष्ट और संतुलित मामलों के लिए), असाइनमेंट समस्या।

Linear Programming: Elementary theory of convex sets, definition of general linear programming problems (LPP), formulation problems of LPP, examples of LPP. Problems occurring in varios fields, Graphical and Simplex methods of solving an LPP, artificial variables, duality of LPP, Transportation Problem (non-degenerate and balanced cases only), Assignment Problems.

UnitV

चार संक्षिप्त टिप्पणी, प्रत्येक इकाई से एक पूछा जाएगा। छात्रों को किन्हीं दो का उत्तर देना है।

Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES

1.Brownless K.A. (1960): Statistical Theory and Methodology in Science and Engineering, John Wiley and Sons.
2.Grant E.L. (1964): Statistical Quality Control, McGraw Hill.
3. Ducan A.J. (1974): Quality Control and Industrial Statistics, Traporewala and Sons.
4. Gauss S.I. (1975) : Linear Programming Methods and Applications, McGraw Hill.
5. Montgomery, D.C. (1985): Introduction to Statistical Quality Control; Wiley.
6. Rajaraman, V. (1981) : Computer Oriented Numerical Methods, Prentice Hall.
7.Shanti Narayan (1993). Mathematical Analysis, S. Chand and Co.
8. Sastry S.S. (1987): Introductory Methods of Numerical Analysis, Prentice Hall
9. Taha H.A.(1982) Operational research :An Introduction ;Macmillan

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2. Browker H.A. and Liberman G.T. (1962): Engineering Statistics, Prentece Hall.
3. Despande J.V. (1981). Text Book of Mathematical Analysis, Tata McGraw Hill.
4. Crowden, D.J. (1960): statistical Methods in Quality Control, Asia publishing Society
5. Garwin W.W. (1960): Introduction to Linear Programming, McGraw Hill.
6. Kanti Swarup,Gupta,P.K. and Singh,M.M. (1985):Operations Research;Sultan chand & sons.
7. Mahajan M. (2001) Statistical Quality Control, Dhanpat Rai & Co. (P. Ltd.).
8. Rao S.S. (1984) : Optimization Theory and Applications, Wiley Eastern.
9. Somasundaram, D. and Choudhari, B.(1996). A First Course in Mathematical Analysis, Narosa Publishing House.
10. Wagner H.M. (1973) Principle of O.R. with Applications to Managerial Decisions; Prentice Hall.

11. Wetherill ,G.B (1977) Sampling Inspection and Quality Control; Halsted Press.

Paper III
प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित)
Practical (Based on papers I and II)

1. मृत्यू एवं जन्म के मापों की गणना की गणना, जीवन तालिकाओं का निर्माण , गोम्पर्ट्स वक्र द्वारा मृत्यु दर का ग्रेजुएशन

   Computing measures of mortality and fertility, construction of life tables, graduation of mortality rates by Gompertz curve, fitting of Logistic curve.

2. लास्पेयर्स , पांशी , मार्शल –एडवर्थ और फिशर विधि द्वारा सूचकांक संख्या का निर्माण ।

   Construction of index numbers by Laspeyre's, Paasche's, Marshell,-Edgeworth and Fisher method.

3. समय श्रृंखला मे रूझान का निर्धारण, मौसमी सूचकांकों का निर्माण ।

   Determination of trend in a time series, construction of seasonal indices.

4. $\bar{X}$, R, np, p और c –चार्ट का आरेखण ,एकल एवं द्वि प्रतिचयन विधि द्वारा OC वक्र का निर्माण ।

   Drawing of $\bar{X}$ -R, np, p and c –charts. Drawing of OC curve for single and double sampling plans.

5 अंतर तालिकाओं का निर्माण , न्यूटन के अग्र एवं पश्च अंतरगणन, विभाजित अंतर अंतरगणन एवं लैग्रांज का अंतरगणन विधि द्वारा मानों की गणना करना , ट्रैपेज्वाइडल और सिम्पसन एक –तिहाई सूत्र द्वारा समाकलन का संख्यात्मक गणना करना ।

Construction of difference tables. Use of Newton's, Lagrange's methods of interpolation and divided difference formulae, numerical evaluation of integrals using Trapezoidal and Simpson's one-third formulae, solution to non-linear equation by Newton-Raphson iterative method.

6 LPP एवं इसके ड्यूअल का निर्माण, LPP कर अरेखन एवं सिम्पलेक्स विधि द्वारा गणना, परिवहन एवं कार्यभार की समस्या ।

Formulation of LPPs and their duals. Solving LPPs by graphical and simplex methods, transportation and assignment problems.

PROFESSOR & HEAD
School of Studies in Statistics
Pt.Ravishankar Shukla University
RAIPUR (C. G.)

Part A : Introduction

Programme Degree Course	Class B.A./B.Sc. 3rd Year	Year 2023	Session

1. Course Code : **ANTH-05T**
2. Course Title : **APPLIED BIOLOGICAL ANTHROPOLOGY**
3. Course Type : **THEORY**
4. Course Objective : Applied Biological Anthropology is a branch of Anthropology which deals with application of principles of Biological Anthropology. This help in to understand the basic principles of human genetics, to learn the methods/techniques used in genetic research. It is helpful to understand the pattern of inheritance of genetic disorders and the mechanism of genetic abnormalities, to realize the importance of genetic testing and counseling for people suffering from genetic disorders. This course helps in acquaint the students with the importance of demography in Anthropology & explore various dimensions of health and issues related to illness and disease.
5. Course Learning Outcome :
   - Student will acquire basic understanding of genetics, inheritance pattern of human traits, diseases and types of chromosomal abnormalities.
   - Helpful for understanding the importance of genetic counseling, prenatal diagnosis and newborn screening.
   - Students will learn the basic Anthropological approaches of studying demography and the biosocial determinants of demographic processes in human populations.
   - Student should be able to understand, analyze and interpret health, illness, disease related issues and develop critical understanding.
   - The student will learn about identification of human and non human skeletal remains

1. Credit Value : Theory-04
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units : 05
2. Total Lectures : 60

Unit	Topics	No. of Lectures
Units I, II, III, IV & V	Syllabus	12 Lectures Each Unit

UNIT – I

- Meaning and scope of Applied Biological Anthropology
- Forensic Anthropology
- Ageing
- Public health

- Sports Anthropology
- Epidemiology

Unit – II

- Dermatoglyphics : History and its scope.
- Ridge characteristics.
- Classification of finger pattern.
- Basic of finger print comparison.
- Conventional and modern methods for development of latent finger prints.
- Dermatoglyphics and abnormal chromosome.
- Application of dermatoglyphics.

Unit – III

- Human Chromosome : Morphology and types, Classification of normal chromosomes
- Chromosomal aberration
- Genetics of colour blindness and PTC
- Eugenics, Genetic Counseling and Genetic Screening
- Genetic Engineering and Population Genetics

Unit – IV

- Nutrition : Function, Types of nutrients, Nutritional Disorders
- Nutritional Status : Under nutrition, Over nutrition
- Assessment of Nutritional Status :
  - (i) Clinical Method
  - (ii) Anthropometric approaches to nutritional assessment
    a. BMI b. Waist/Hip Ratio
  - (iii) Biochemical Methods

Unit – V

- Human Blood Groups : Inheritance of ABO, MN and Rhesus blood group
- Human Skeletal biology
  - (i) Identification of human and non human skeletal remains
  - (ii) Age, sex and stature estimation from human bones
- Identification through somatometric measurements and somatoscopic observation
- Estimates of different demographic rates and ratios

Part C : Learning Resources

13. Bass, W.M.1991. Human Osteology : A Laboratory and field manual as the Human Skeleton;

Columbia : Special Publication Missoun Archacological Society
14. Brooker.R.J.2012. Genetics; analysis & Principles. He McGraw-Hill Companies, in 4th ed.
15. Byers, S.N. 2008. Forensic Anthropology. Boston : Pearson Eduction Ltd.
16. Cavalli-Sforga, L.L. and Bodmer, W.f. 1971. The Genetics of Human Population . San Francisco Freeman.
17. Christensen, A.M.etal2014. Forensic Anthropology : Current methods and practices. Elsevier, New work.
18. Cumming.S.M.R. 2011. Humun Heredity : Principles and Issues. Borks/cole, Cengage Learnily.
19. Cummins, H & Midlo,c.1961. Finger Prints, Palms and Soles: An introduction to dermatophyphics Vol. 319. Neww York Dover Publication.
20. Daniel.EBrain 2009. Human Biolgical Diverty Routlege; I Editon, Cameron Noel and Barry Bogin 2012. – Human Growth and development 2nd Editon. Academic Prees Elsevier.
21. Gordis. C 2004. Epidemiology. Third Edition.Philadelphics: Elsevier Saunders.
22. Hahn, Robert. A 1999. Anthropology in Public Health Bridging Differences in culture and society. Newyork : Oxford University Press.
23. Harrison, G.A. and Weiner, Hm: Tanner.JM, Barnikott, NA. An Introduction to Human Evolution, Variation, Growth and Ecology : Human Biology. 320-328.
24. Henny.C Lee and REGaensslen (Ed) 2001. Advances in Finter Print Technology. CRC Press London.
25. Khanna, K.Gupta.S.Passi, SJ .Seth.R and Puri, RM 2016. Text book of Nutrition and Dietetics. 2nd Ed. Elite Publishing hours. New Delhi.
26. Klug.W.S.2012. Concept of Genetics, Pearson.
27. Lewis, R.2009. Human Genetics and concept of Application, The Mc.Grow-Hill Campanies Inc.
28. Malhotra, K.C. And B. Balakrishnan1996 . Human Population Genetics in India
29. Malina, R.M. Bouchard, C. Oded, B.2004. Growth, Maturation and physical activity, Human Kinetics
30. Montagu; M.F.A.1964. An introduction to Physical Anthroplogy
31. Patch, C.2005.Applied Genetics in Health care. Taylor & Francis Group.
32. Relenth Ford, J.H. 2012. Human Population Genetics. Wiley Black well, USA.
33. Stern, C.Principles of Human Genetics.
34. Ulijasek, S.J. and Strickland.S.S. 1993. Introctuion. In Nutritional Anthropology : Prospects and Perspectives. 1-5. Smith Gardon London.
35. Vogel.F and Motu sky, AG.1996. Human Genetics, Sprinegs, 3rd revised edition.
36. Zubrow, E.B.W. 1976. Demographi anthropology, Quantitative approaches. University of New Mexico Albuquerque.

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Part A : Introduction

Programme Degree Course	Class B.A./B.Sc. 3rd Year	Year 2023	Session

1. Course Code : **ANTH-06T**
2. Course Title : **THEORIES AND METHODS IN SOCIAL-CULTURAL ANTHROPOLOGY**
3. Course Type : **THEORY**
4. Course Objective : This is an introductory foundation course on the main theoretical approaches which historically and traditionally guided anthropological research and understanding of society and culture. The course would involve theory as well as practical. The practical will skill the students to apply the approaches critically to study of actual social issues and problems.
5. Course Learning Outcome :
   - The students will be able to explain the major theoretical paradigms in anthropology and link.
   - It with the social, political and economic contexts in which they have emerged.
   - They should also be able to explain clearly how these ideas have contributed to the process, structure, pattern and search for meanings by human beings.

1. Credit Value : Theory-04
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units : 05
2. Total Lectures : 60

Unit	Topics	No. of Lectures
Units I, II, III, IV & V	Syllabus	12 Lectures Each Unit

UNIT – I

- The contributions made by the following Anthropologists to Social-Cultural Anthropology : E. Durkheim, F. Boas., R. Redfield, A. L. Kroeber., S.C. Dube, M.N. Shrinivas, L.P. Vidyarthi.

UNIT – II

- Evolution: Biological and cultural evolution
- Evolutionism : Classical Evolutionists - E.B. Tylor & L.H. Morgan
- Neo–Evolutionists - Leslie White & Gordon Childe.
- Diffusionism : British Diffusinists , German-Austrian Diffusinists and American Diffusinists (Cultural traits, Culture Complex, Culture Area, Culture focus)

UNIT – III

- Functionalism : Malinowski & Merton
- Structure Functionalism : Radcliff Brown & Raymond firth.
- Structuralism : Levi – Strauss & Leach.

UNIT – IV

- Basic personality and Model Personality : Cora-du-bois, Abraham Kardinar
- Culture pattern & Configurationalism : Ruth Benedict.
- Anthropological study of National character
- Contributions of Margret Mead in Anthropological study.

UNIT – V

- Field work tradition in Anthropology.
- Tools and techniques of Research: Schedule, Questionnaire, observation, interview, case study & Genealogical Study.
- Types of Anthropological Methods: Historical Method, Comparative Method and Functional Method.

Part C : Learning Resources

1. Bidney, David, Theoretical Anthropology, New York, Colombia University press.
2. Erickson, Paul, Anthropological Lives: Biographies of Eminent Anthropologists, New Delhi, Reliance.
3. Evans-Pritchard. A History of Anthropological Thought.
4. Harris, M. Rise of Anthropological Theory. Routlege and Kegan Paul, London.
5. Harskovitz, M.J. Sanskriti ki pristhabhumi (in Hindi).
6. Jha, M. Manavshastriya vichardhara- Ek Parichaya. (in Hindi).
7. Malinowski, B. Scientific theory of culture and other essays.
8. Muthal, S. Samajik Manav Vigyan- Saidthantik Vyavahar (in Hindi).
9. Redfield, R., Human Nature and the Study of Society.
10. Shrivastava, A.R.N. Sanskritik Manav vigyan – Siddhanta aur Uplabdhiyan ((in Hindi).
11. Upadhyay and Pandey. History of Anthropological thought
12. Upadhyay and Pandey. Tribal Development in India.

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Part A : Introduction

Programme Degree Course	Class B.A./B.Sc. 3rd Year	Year 2023	Session

1. Course Code : **ANTH-03P**
2. Course Title : **PRACTICAL IN APPLIED BIOLOGICAL ANTHROPOLOGY**
3. Course Type : **PRACTICAL**
4. Course Objective : The objective of this practical course is to introduce the student about the tools and Method, analysis & statistical methods used in Human Biology. Laboratory procedures in Anthropometry dermatoglyphics would give confidence in dealing with all the applied dimensions.
5. Course Learning Outcome :

1. Credit Value : Practical-02
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units :
2. Total Lectures : 30

Unit	Topics	No. of Lectures
-	Syllabus	30 Lectures

Part – I : Estimation of Nutritional status :

- BMI.
- Waist/ Hip Ratio.
- Weight for Age.
- Height for Age.

Part – II : Somatometry:

- Measurements on body : Height vertex, Height tragus, Suprasternale height, Biacromial Breadth, Height dactylion, Bi-illiocristal breadth, Tibiale height, Upper extremity length, Sitting height, Body weight.
- Head and Face Measurement : Morphological upper facial length, Physiognomic upper facial length, Morphological, facial length, Bizygomatic breadth, Maximum head length, Maximum head breadth, Nasal length, Nasal breadth.
- Somatometric indices : Cephalic index, Nasal index, Facial index.

Part – III : Genetics Traits

- Dermatoglyphics : finger pattern type.
- Finger ridge counts. Indices: Furuhata's index, poll's index, Dankmeijer's index, pattern intensity index.

- Palmar dermatoglyphics : Palmar formula, atd angle and ridge counts.
- Colour blindness, PTC taste sensitivity.

Part – IV : Statistics: Mean, mode,Median, Standard deviation, X2test.

Part C : Learning Resources

1. Basin M.K. and I.P. Singh : Anthropometry
2. Cummins H. and Midlo C. : An Introduction of Dermatoglyphics
3. Fisher R.S. : Statistical method's of Research Worker's
4. Mitashree mitra : Prayogik manovigyan bhag -02
5. Olivi : Practical Anthropolog

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Scheme of B. Sc./ B.Sc. (Hons.) Microbiology

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	MICRO -1T	Microbial World and Microbial Techniques	Theory	4	50	17
	MICRO -2T	Bacteriology, Virology & Proto-zoology	Theory	4	50	17
	MICRO -1P	LAB 1: BASIC MICROBIOLOGY	Practical	2	50	17
Second year	MICRO -3T	Cell Biology, Biochemistry and Bioinstrumentation	Theory	4	50	17
	MICRO -4T	Microbial Genetics, Molecular Biology & Genetic Engineering	Theory	4	50	17
	MICRO -2P	LAB 2: Bacterial cell, Biochemistry & Molecular Biology	Practical	2	50	17
Third year	MICRO -5T	Environmental, Agriculture, Industrial Microbiology & Biostatistics	Theory	4	50	17
	MICRO -6T	Immunology and Medical Microbiology	Theory	4	50	17
	MICRO -3P	LAB 3: Applied Microbiology	Practical	2	50	17
			Total (I+II+III years)	**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern University and is not mandatory.

Part A: Introduction

Program: *Advance Diploma*		Class: **B. Sc. Part - III**	Year: **2024**	Session: 2024-2025
1	Course Code	**MICRO -5T**		
2	Course Title	**Environmental, Agriculture, Industrial Microbiology and Biostatistics**		
3	Course Type	**Core course**		
4	Pre-requisite (if, any)	As per Govt. norms		
5	Course Learning. Outcomes (**CLO**)	At the end of this course, the students will be able to • ***- describe and comprehend basic concepts of Environmental and Agriculture Microbiology*** • ***- develop critical thinking and understanding of Environmental and Agriculture Microbiology, which will also contribute to conservation and life improvement skills.*** • ***- learn about Microbial Interaction, Soil Microbes, Air and Water micro-flora and their impact on human life and Environment.*** • ***- impart commercial exploitation of microbial world to improve quality of life.*** • ***- enrich students with Systematic evaluation, presentation and interpretation of data collected and prove and process the given information***		
6	Credit Value	**04**		
7	Total Marks	Max. Marks: **50**	Min Passing Marks : **17**	

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods -60		
Unit	**Topics (Course contents)**	No. of Period Ho...
I	**Air and water Microbiology:** Layers of Atmosphere and distribution of Microorganisms. Droplet nuclei and fomite infection. Methods of assessment of air quality. Aero allergy. Hydrological cycle, water zonation (fresh water and marine), Upwelling, Eutrophication, Hydrothermal vent and its microbial biodiversity, coral reef and its microbial biodiversity. Potability of water and its purification. Waste water reclamation.	12 / 08
II	**Microbial Interaction:** Microbe-Microbe interaction, Plant-Microbe interaction (Rhizosphere, Rhizoplane, Phyllosphere, Mycorrhiza), Animal-Microbe (Rumen Microbiology). Extremophiles. Xenobiotic compounds, Biodeterioration and Biomagnification.	12 / 08
III	**Soil and Agriculture Microbiology:** Soil profile, Litter degradation and Humus formation, Biogeochemical cycle- Nitrogen Cycle with special reference to microbial contribution (ammonifiers, symbiotic and non- symbiotic N- fixation, nitrifiers and denitrifiers) Nodulation and mechanism of biological nitrogen fixation. Phosphorous cycle and Phosphate Solubilizing Microorganisms, Sulphur cycle. Siderophores.	12 / 08

IV	**Industrial Microbiology:** History of Industrial Microbiology, Fermenter design and Principal Types of Fermenters, Production Media and Raw Material, Scale up, Industrial Sterilization. Isolation, Screening and Strain Improvement. Types of fermentation processes-Solid State, Liquid State, Batch, fed-batch and continuous fermentation. Industrial Production of Citric Acid, Ethanol, Amylases, Penicillin, Mushroom Production, Single Cell Protein	12 / 08
V	**Biostatistics:** Collection, Classification, and presentation of data. Sampling, **Measures of central tendency:** Mean, Median, Mode. **Measures of dispersion:** Standard deviation and Standard Error. Concept of Probability	12 / 08
Keywords	*Air microbiology, Water microbiology, Industrial microbiology, Biometary*	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.
3. Madigan MT, Martinko JM and Parker J. (2014).Brock Biology of Microorganisms. 14th edition. Pearson Benjamin Cummings.
4. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press.
5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Company, New Delhi.
6. Patel AH. (1996). Industrial Microbiology. 1st edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India.
7. Gregory P.H. Microbiology of the atmosphere. 2nd edition. Leonard Hill.
8. Agricultural Microbiology by Bhagyaraj and Rangaswami
9. Biostatistics by Veerbala Rastogi Kalyani Publication
10. Statistical Methods by S.P Gupta
11. Biostatistics by Sunder Rao.

Online Resources –

https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB2203.pdf
https://microbenotes.com/microbial-interaction-and-its-types-with-examples/
https://microbenotes.com/category/agricultural-microbiology/
https://sites.google.com/site/soilagrlmicrobiol/
https://bookarchive.net/pdf/industrial-microbiology-by-l-e-casida-jr/
https://www.researchgate.net/publication/280733465_A_TEXT_BOOK_OF_BIOSTATISTICS

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Comprehensive Evaluation (CCE): NA Annual /University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

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Part A: Introduction

Program: *Advance Diploma*	Class: **B. Sc. Part - III**	Year: **2024**	Session: 2024-2025

1	Course Code	**MICRO - 6T**	
2	Course Title	**Immunology and Medical Microbiology**	
3	Course Type	Core course	
4	Pre-requisite (if any)	As per Govt. norms	
5	Course Learning. Outcomes (**CLO**)	At the end of this course, the students will be able to • *- understand about immunological process within the human system.* • *- learn about the immune reactions and their applications* • *- understand about the mechanism of diseases and their diagnosis* • *-know about the concepts of medical microbiology and the pathogenesis* • *-understand the concepts of clinical bacteriology and clinical mycology*	
6	Credit Value	**04**	
7	Total Marks	Max. Marks: **50**	Min Passing Marks : 17

PART B: Content of the Course

Total No. of Teaching Hours - 40 / Periods -60

Unit	Topics (Course contents)	No. of Period/Hour
I	**History and development of Immunology and Immune system:** Concept of Innate and adaptive immunity, Immune cells- Stem cells, T cells, B cells NK cells Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell. Immune organs- Bone marrow, Thymus, Lymph node, Spleen, GALT, MALT, CALT, Antigens; Characteristics, Haptens. Antibodies; Structure, types and properties of antibodies.	12 / 08
II	**Immunological Reactions:** Immunological techniques: Agglutination, precipitation, Compliment fixation test, ELISA and their applications. Hypersensitivity and its types- Type I. II, III, IV and diseases mediated by them. **Compliment system:** Classical and alternative pathway.	12 / 08
III	**Historical development in Medical Microbiology** History and contribution of scientists in development of medical microbiology. Koch and River's postulates, normal microbial flora of human body and role of resident flora **Pathogenesis:** Host parasite relationship, Portal of entry of pathogens, De-polymerizing enzymes	12 / 08

IV	**Clinical Bacteriology:** Pathogenic bacteria- morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of pathogenic bacteria; *Staphylococcus aureus, group A Streptococcus, Pneumococci, E. coli, Salmonella, Corynebacterium Mycobacterium* and drug resistance.	12 / 08
V	**Clinical Mycology:** Superficial subcutaneous cuteness and systemic mycosis. Morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of following pathogenic fungi; *Trichophyton, Histoplasma capsulatum and Candida albicans.*	12 / 08
Keywords	***Immune system, Immunological reactions, Compliment system, Medical Microbiology, Pathogenesis, Clinical Bacteriology, Clinical Mycology***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway'sImmunobiology. 7th edition Garland Science Publishers, New York.
5. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
6. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
7. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
8. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education
9. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition
10. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition Pearson/ Benjamin Cummings

Online Resources –

https://docs.google.com/file/d/0B0lzh6GcIA_DdUxuWFhMWDNOSFE/edit?pli=1&resourcekey=0-Gxm4B8zdfp683ID7LbysmA

https://www.academia.edu/23738538/Immunology_Lecture_Notes_Immune_Responses

https://www.libraryofbook.com/books/lecture-notes-medical-microbiology-and-infection

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: Continuous Comprehensive Evaluation (CCE): Annual /University Exam(UE):		50 Marks NA 50 Marks
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

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Part A: Introduction

Program: *Advance Diploma*	Class: **B. Sc. Part - III**	Year: **2024**	Session: 2024-2025

1	Course Code	**MICRO - 3P**	
2	Course Title	**Applied Microbiology**	
3	Course Type	**Laboratory course**	
4	Pre-requisite (if any)	**As per Govt. norms**	
5	Course Learning. Outcomes **(CLO)**	At the end of this course, the students will be able to • ***- conduct experiments and evaluate results in microbial isolations from environment.*** • ***- demonstrate several aspects in industrial microbes and their products*** • ***- perform and analyze statistical models in biology*** • ***- understand about the immune system.*** • ***- perform basic diagnostic tests for pathogenic microbes***	
6	Credit Value	**02**	
7	Total Marks	Max. Marks: **50**	Min Passing Marks. 17

PART B: Content of the Course

Total No. of Teaching Hours – 20 / Periods -30

Group	Topics (Course contents)	No. of Period/ Hour
A	1. Isolation of Bacterial Microflora from Air by Settle Plate Technique 2.Isolation of Bacterial Microflora from Agriculture Soil, Rhizosphere, Phyllosphere, 3. Isolation of Fungi Microflora fromAir by Settle PlateTechnique 4.Isolation of Fungi Microflora fromAgriculture Soil, Rhizosphere, Phyllosphere. 5. Isolation, Identification and preservation of any five fungal strains. 6. Isolation of rhizobium from root nodules. 7. Qualitative assaying of Microbial Enzymes- Catalase, Proteases, Cellulase, Amylase, Gelatinase. 8. Bacterial Analysis of Water- Presumptive, Confirmed andCompleted test. 9. Composting of vegetable and fruit peels and using it on garden plants. 10. Demonstration of Bacterial Antagonism 11. Demonstration of fermentation. 12.Demonstration of Acetic Acid production in lab. 13.Demontration of Wine Production from Grapes. 14. Cultivation of edible mushroom. 15. Calculation of Mean Median and Mode.	15 / 10

B	1. Identification of human blood groups. 2. Perform Total Leukocyte Count of the given blood sample. 3. Perform Differential Leukocyte Count of the given blood sample. 4. Separate serum from the blood sample (demonstration). 5. Perform immune diffusion by Ouchterlony method. 6. Identify bacteria (any three of *E. coli, Salmonella, Pseudomonas, Staphylococcus, Bacillus*) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests 7. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS 8. Study of bacterial flora of skin by swab method 9. Perform antibacterial sensitivity by Kirby-Bauer method 10. Determination of minimal inhibitory concentration (MIC) of an antibiotic. 11. Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action. 12. Isolation of microbes (bacteria & fungi) from soil (28°C & 45°C). 13. MBRT of milk samples and their standard plate count. 14. Microbial fermentation for the production and estimation of ethanol	15 / 10
Keywords	***Isolation, Identification, Immunity, Disease, Diagnosis, Fermentation***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Company, New Delhi.
6. Patel AH. (1996). Industrial Microbiology. 1st edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India.
7. Gregory P.H. Microbiology of the atmosphere. 2nd edition. Leonard Hill.
8. Agricultural Microbiology by Bhagyaraj and Rangaswami
9. Biostatistics by Veerbala Rastogi Kalyani Publication
!0.Statistical Methods by S.P Gupta
11.Biostatistics by Sunder Rao.
12. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
13. Murphy K, Travers P, Walport M. (2008). Janeway'sImmunobiology. 7th edition Garland Science Publishers, New York.
14. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
15. Aneja K. R., Laboratory Manual Of Microbiology And Biotechnology, Medtech; 1st edition, 2017

Online Resources –

https://thebookee.net/

http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf

http://site.iugaza.edu.ps/ydahdouh/files/General-Microbiology-Laboratory-pdf.pdf

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: Continuous Comprehensive Evaluation (CCE): Annual /University Exam(UE):		50 Marks NA 50 Marks
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

DR. K.K. Patel
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Rashmi
Dr. Rashmi Parihar
Subject expert
Dept. of Microbiology
Govt. E.R.R.P.G. Science
College, Bilaspur.

Dr. Shubhraja Pandey
Chancellor Nominee
Chairperson
HOD, Microbiology
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Dr. Seema Anil Belorkar
Subject Expert,
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Dr. Sweta Nagal
HOD Microbiology
Govt. M.K.G College
Mahasamund

Dr. Rachana Choudhary
H.O.D Microbiology
Subject Expert-
S.S.M.V. Junwani, Bhilai

Prof DS Vaidyanathan
CBOS Chairperson
Head Microbiology & Biotechnology
DTD ABVV, Bilaspur

Scheme of B.Sc. Computer Science

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First	COMP-1T	Computer Fundamental and Operating System	Theory	4	50	17
	COMP-2T	Programming with C and C++	Theory	4	50	17
	COMP-1P	LAB 1: Programming with C and C++	Practical	2	50	17
Second	COMP-3T	Data Structure	Theory	4	50	17
	COMP-4T	Web technology and Java	Theory	4	50	17
	COMP-2P	LAB 2: Web technology and Java	Practical	2	50	17
Third	COMP-5T	Data Communication and Networking	Theory	4	50	17
	COMP-6T	Relational Database Management System	Theory	4	50	17
	COMP-3P	LAB 3: Relational Database Management System	Practical	2	50	17
Total				**30**	**450**	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-CS III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**COMP-5T**		
2.	Course Title	**Data Communication and Networking**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the basic computer network technology • Understand and explain the data communication system and its components. • Identify the different types of network topologies and protocols. • Understand the layers of the OSI model and TCP/IP. • Expose wireless and wired LANs.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: **Content of the Course**		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Overview of Data Communication and Networking:** Data Communications: components, data representation, direction of data flow (simplex , half duplex , full duplex; Networks : distributed processing, network criteria , physical structure (type of connection , topology), categories of network (LAN, MAN, WAN), Protocol and standards; Reference Models: OSI & TCP/IP reference model comparative study.	12
II	**Physical layer:** Analog and Digital Transmission: Transmission Impairments, Data Rates Limits, Digital to Digital Conversion, Digital to Analog conversion, Analog To Digital Conversion: Modulation, Transmission Modes, Parallel, Serials Asynchronous and Synchronous communication; Constellation Diagram, Analog to Analog conversion, Bandwidth Utilization, Transmission Media: Multiplexing: FDM, WDM AND TDM, Guided Media: Twisted Pair, Coaxial and Fiber Optic, Unguided Media : Wireless , Radio Waves, Microwaves and Infrared.	12
III	**Data Link Layer:** Flow control: Protocols: Stop & wait ARQ, Go-Back-N ARQ, Selective repeat ARQ, HDLC; Medium Access Sub-layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA,TDMA,CDMA; Traditional Ethernet, Fast Ethernet.	12
IV.	**Network Layer:** Internetworking Devices: Repeaters , Hubs , Bridges, Switches, Router , Gateway; Addressing: Internet address, classful address, subnetting, classless address; Routing: Techniques, static vs dynamic routing, and routing table for classful address; Routing Algorithms: Shortest path algorithm, flooding , distance vector routing , link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols;	12

V.	**Transport Layer and Application Layer:** UDP, TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos; DNS,SMTP, SNMP,FTP, HTTP, Firewalls; Modern Topics: Wireless LAN: IEEE 802.11;Introduction to Bluetooth,VLAN's, Cellular telephony & Satellite network.	12
Keywords: Networking Model, Communication Protocol, Transmission Media, Internetworking Devices.		

Part C: Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Data Communications and Networking, B.A. Forouzan, TMH, (Latest Edition)
2. Computer Networks, A.S. Tanenbaum, 4th Edition, Pearson Education/PHI
3. Data and Computer Communication, W. Stallings, 5th Edition, PHI/Pearson Education
4. Computer Networking – A top down approach featuring the internet, Kurose and Rose, Pearson Education.
5. Communication Networks, Walrand, TMH (Latest Edition)

E Resources:

1. NPTEL URL link for Data Communication:
   https://nptel.ac.in/courses/106105082
   Topics From SWAYAM Portal
2. Introduction to Data Communication
   https://www.youtube.com/watch?v=swtH_okidQc&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1
3. Layered Architecture
   https://www.youtube.com/watch?v=xHO6LjSHeo0&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=2
4. Data and Signal
   https://www.youtube.com/watch?v=6ZGVZ7gUccE&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=3
5. Guided Transmission Media
   https://www.youtube.com/watch?v=y7v3EAJsWXA&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=5
6. Unguided Transmission Media
   https://www.youtube.com/watch?v=hKq1tYlVxdQ&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=6
7. Computer Networking
   https://www.tutorialspoint.com/data_communication_computer_network/index.htm

Part D: Assessment and Evaluation

Maximum Marks: 50

Declaration

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13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date : 03.06.2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-CS III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**COMP-6T**		
2.	Course Title	**Relational Database Management System**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which help them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.		
6.	**Credit Value**	**Theory : 4**		
7.	**Total Marks**	**Max Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Overview of Database Management**: Data, Information and Knowledge, Data Processing versus Data Management, File Oriented Approach verses Database Oriented Approach, Data Independence, Database Administration Roles, Overview of Database, DBMS Architecture, Different kinds of DBMS users, Introduction to Data Dictionary. Data Models: Network Model, Relational Model, Hierarchical Model. Database Languages: DDL, DML, DCL, And TCL. Structured Query Language: Basic Data Types, Commands : Create, Insert, Select, Delete, Truncate , Drop, Alter, Grant ,Revoke, Commit, Rollback, Queries on Multiple Relation, Join Operation, String Operation, Set Operation, Grouping, Nested Subqueries.	12
II	**Concepts of Database Management System :** Definition of Tables, Cardinality relationships in a Database, Constraints in a Database, Entity, Attributes, Strong and weak entities, ER-Diagram, Symbols and Implementation, Concept of keys: Candidate key, Primary key, Alternate key, Foreign key, Case studies of ER modeling Generalization, Specialization and Aggregation. Converting an ER model into relational Schema. Extended ER features.	12
III	**Relational Database Design:** Normalization concept in logical model, Pitfalls in database design, Functional dependencies, Join dependencies, Natural Join, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design: Concepts of indexes, File organization for relational tables, De-normalization. Relational Database: Structure of Relational Database, Schema, Relational Operation:	12

	Database: Structure of Relational Database, Schema, Relational Operation: Selection, Projection, Cartesian Production, Union, Intersection and Minus operation. Relational Algebra: Select operation, Project operation, Union operation, Cartesian Product operation, Intersection operation, Join operation, Different types of joins (Inner join, Outer join, Self join).	
IV.	**SQL Server Basics:** Microsoft SQL Server 2019, Overview of SQL Server 2019, Versions of SQL Server, Installation of SQL Server 2019, SQL Server Management Studio(SSMS), Azure Data Studio(ADS), Features of SQL Server Express, SQL Server Support Life Cycle, Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Stored Procedure, Function .	12
V.	**Oracle Basics:** Oracle Corporation, Versions of Oracle, Oracle Products, Oracle Installation, Oracle Client and Server Products, Online Transaction Processing, Hybrid cloud Installation, Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Introduction to PL/SQL Programming, Data Types, Looping Statements, Cursors, Stored Procedure, Function .	12
Keywords: Data Models, Keys, SQL Commands, DBMS, RDBMS, Oracle, SQL Server.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Database system concept, H. Korth and A. Silberschatz, TMH Publications.
2. Data Base Management System, Alexies & Mathews,Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System By James Matin.
5. Principles of Database System By Ullman.
6. Program Design, Peter Juliff, PHI Publications.
7. The Complete Reference, Kevin Loney, Oracle Press.
8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication.
9. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS: https://youtu.be/f6LGtJutWyA
2. SWAYAM URL link for DBMS and RDBM: https://youtu.be/loL9Ve2SRwQ
3. SWAYAM URL link for DBMS and RDBMS: https://**swayam**.gov.in/courses/4434-data-base-management-system.
4. Introduction of DBMS: https://onlinecourses.swayam2.ac.in/cec19_cs05/preview
5. Introduction of RDBMS: https://onlinecourses.nptel.ac.in/noc19_cs46/preview
6. DMBS Contents from W3SHOOL: https://www.w3schools.in/dbms/intro
7. Data independence from W3SHOOL: https://www.w3schools.in/dbms/data-independence
8. Generalization and Aggregation: https://www.w3schools.in/dbms/generalization-aggregation
9. DMBS Contents from Javatpoint: https://www.javatpoint.com/dbms-tutorial

Part D: Assessment and Evaluation
Maximum Marks: 50

Declaration

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13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 03-06-2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-CS III Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**COMP-3P**		
2	Course Title	**LAB 3: Relational Database Management System**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Basic Knowledge of SQL		
5	Course Learning. Outcomes (CLO)	At the end of course, Students will be able to: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which helps them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Design an employee table in Oracle/SQL Server having eid(primary key) ename, edesignation, edoj, edob, eaddress, salary, econtact as fields and answer the following questions : a) Insert five records in above created table. b) Display all five records. c) Delete the fourth record. d) Update the third record of field ename as 'hari'. e) Add one new field in the table. 2. Design a salary table Oracle/SQL Server with one primary key and foreign key(employee table) having following fields :

Month, working days, deptid, gross, incentive, deduction and net salary.

a) Insert five records in above created table.
b) Display all five records.
c) Use foreign key relation and display records.
d) Update the second record of field deptid as 'Sales '.
e) Add one new field in the table.

3. Create a new user in Oracle/SQL Server.
4. Create a view in Oracle/SQL Server.
5. Create a new table in Oracle/SQL Server and practice for join operation.
6. Create a new user in Oracle/SQL Server and practice for commit and rollback command.
7. Create a new database in Oracle/SQL Server having atleast five tables for Hotel Management System.
8. Create a new database in Oracle/SQL Server having atleast four tables for Covid Vaccination Management System.
9. Create a new database in Oracle/SQL Server having atleast five tables for Library Management System.
10. Create a new table in Oracle/SQL Server and practice for Group by and Order by Clause.
11. Create a new table in Oracle/SQL Server and practice for max(), min(), avg() and count() functions.
12. Create a new table in Oracle/SQL Server and practice for lower(), substr(),trim() and upper() functions.
13. Create a new table in Oracle/SQL Server and practice for unique and check constraint.
14. Create a new table in Oracle/SQL Server and practice for any two date formats.
15. Create a new table in Oracle/SQL Server and practice for using clause.
16. Create a new table in Oracle/SQL Server and practice for having clause with sub queries.
17. Create a new table in Oracle/SQL Server and practice for alias in any table.
18. Create a new table in Oracle/SQL Server and practice for inner and outer join.
19. Create a new table in Oracle/SQL Server and practice for Drop command.
20. Write a PL/SQL program for addition of two numbers .
21. Write a PL/SQL program to find the factorial value of any entered number.
22. Write a PL/SQL program for swapping of two numbers.

	23) Write a PL/SQL program to print first ten Natural Numbers. 24) Write a PL/SQL program to generate even series upto five digits starting from 2 and sum all the terms. 25) Write a PL/SQL program to practice for implicit and explicit cursor.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Database system concept , H. Korth and A. Silberschatz, TMH Publications .
2. Data Base Management System, Alexies & Mathews,Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System by James Matin.
5. Principles of Database System by Ullman.
6. Program Design, Peter Juliff, PHI Publications.
7. The Complete Reference, Kevin Loney, Oracle Press.
8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication.
9. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS:
   https://youtu.be/f6LGtJutWyA
2. SWAYAM URL link for DBMS and RDBM:
   https://youtu.be/IoL9Ve2SRwQ
3. SWAYAM URL link for DBMS and RDBMS :
   https://**swayam**.gov.in/courses/4434-data-base-management-system

Part D: **Assessment and Evaluation**

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

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Date: 03.06.2022

Scheme of B.Sc.-IT (Information Technology)

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First	BSCIT-1T	Computer Fundamental and Operating System	Theory	4	50	17
	BSCIT-2T	Programming with C and C++	Theory	4	50	17
	BSCIT-1P	LAB 1: Programming with C and C++	Practical	2	50	17
Second	BSCIT-3T	Data Communication and Networking	Theory	4	50	17
	BSCIT-4T	Web Technology and Java	Theory	4	50	17
	BSCIT-2P	LAB 2: Web Technology and Java	Practical	2	50	17
Third	BSCIT-5T	Data Structure	Theory	4	50	17
	BSCIT-6T	Python Programming	Theory	4	50	17
	BSCIT-3P	LAB 3: Python Programming	Practical	2	50	17
Total				**30**	**450**	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.- IT III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BSCIT-5T**		
2.	Course Title	**Data Structure**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Use different types of data structures, operations and algorithms. • Implement appropriate sorting/searching technique for any given problem. • Use stack, Queue, Lists, Trees and Graphs in problem solving. • Find suitable data structure during application development/Problem Solving.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Introduction and Basic Concepts of Data Structure:** Data types: primitive, non-primitive data types, ADT, Linear and nonlinear data structure. **Linear Data Structures**: Arrays: One dimensional, Multidimensional array, allocation methods, address calculations, sparse arrays. Linked List: Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these lists. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list)	12
II	**Stack:** Definition, Operations PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack. **Queue:** Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications	12
III	**Non-linear Data Structure:** Trees: Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees.	12
IV.	**Graph:** Definition of Graph and their types, adjacency and incident (matrix & linked list) representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Kruskal's and prim's algorithms. Static Hashing: Introduction, Hash table, Hash function.	12

V.	**Sorting Methods:** Types of sorting, Sequential Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort. **Searching**: Linear search, Binary search, Hashing, collision resolution methods, Comparison of Search trees.	12
Keywords: Linear Data Structure, Non-linear Data Structure, Searching, Sorting, Graph.		

Part C -Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. "Data Structures and Algorithms in C++", Michael T. Goodrich, Wiley, 2007
2. "Fundamentals of Data Structures", Horowitz and Sahani, Computer Science Press, 1978
3. "Data structures and Algorithms", Aefred V. Aho, Jhon E. Joperoft and J.E. Ullman.
4. "An Introduction to Data Structures with Applications", Jean Paul Trembley and Paul Sorenson, TMH, International Student Edition, 1985
5. "Data Structures and Program Design in C", R. Kurse, Leung &Tondo, 2nd Edition, PHI publication

E- Resources:

1. Introduction to Data Structure
https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F&index=1
https://www.w3schools.in/data-structures/tutorials/
2. Stacks
https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2
3. Queues and linked list
https://www.youtube.com/watch?v=PGWZUgzDMY1&list=PLBF3763AF2E1C572F&index=3
4. Trees
https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6
5. Graphs
https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24

Part D: Assessment and Evaluation

Maximum Marks: 50

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
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2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur

03.06.2022
03-06-2022
3/6/22

4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
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   Asst. Prof. and Head, Christ College, Jagdalpur
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    Pt. Ravishankar Shukla University, Raipur
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12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member
    Prof. and Head, Dept. of Computer Science (Present Online)
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-IT III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BSCIT-6T**		
2.	Course Title	**Python Programming**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Determine the need for scraping websites and working with CSV, JSON and other file formats. • Interpret the concepts of Object-Oriented Programming as used in Python.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max Marks: 50**	**Min Passing Marks :17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Introduction to Python:** Installing Python, basic syntax, interactive shell, editing, saving, and running a script, the concept of data types; variables, assignments; immutable variables; numerical types, Operators (Arithmetic Operator, Relational Operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise Operator, Increment or Decrement operator) and Expressions, comments in the program, understanding error messages.	12
II	**Creating Python Programs:** Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, exit function, Difference between break, continue and pass.) **Function:** Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	12
III	**Strings and text files**: manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). **String manipulations:** subscript operator, indexing, slicing a string; **strings and number system**: converting strings to numbers and vice- versa. Binary, Octal, Hexadecimal numbers.	12

IV.	**Lists, Tuples, and Dictionaries;** Basic list Operators, replacing, inserting, removing an element, searching and sorting lists, Accessing tuples, Operations, Working, Functions and Methods, dictionary literals, adding and removing keys, accessing and replacing values, Traversing Dictionaries.	12
V.	**Exception Handling:** Exception, Exception Handling, except clause, try, finally, clause, User defined exceptions. **Python Libraries:** Exploring python libraries like Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy etc.	12
Keywords: List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.		

Part C -Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth,Freelyavailableonline.2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies,Wiley, 2ed,2019
4. Think Python: How to Think Like a Computer Scientist, 2nd edition by Allen B. Downey, O'Reilly, 2015
5. Learn Python 3 the Hard Way by Zed A. Shaw (Addison-Wesley, 2016)

E-Resources:

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy
   https://www.w3schools.com/python/scipy/index.php
6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp
10. Topics related Python from SWAYAM/NPTEL
    https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA

https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw

11. Introduction to Python Programming from Coursera:
    https://www.coursera.org/learn/python-programming-intro
12. Crash Course on Python:
    https://www.coursera.org/learn/python-crash-course
13. Python for everybody:
    https://www.coursera.org/specializations/python
14. Introduction to Scripting in Python Specialization
    https://www.coursera.org/specializations/introduction-scripting-in-python
15. Topics related to Python from Tutorials
    https://www.javatpoint.com/python-tutorial
    http://docs.python.org/3/tutorial/index.html
    http://interactivepython.org/courselib/static/pythonds
    http://www.ibiblio.org/g2swap/byteofpython/read/

Part D: Assessment and Evaluation
Maximum Marks: 50

Declaration

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Prof. and Head, Dept. of Computer Science (Present Online)
Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-IT III Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BSCIT-3P**		
2	Course Title	**LAB 3: Python Programming**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of python.		
5	Course Learning Outcomes (CLO)	At the end of course, Students will be able to • Learn the Numbers, Math functions, Strings, List in Python. • Learn the tuples and dictionaries in Python. • Demonstrate proficiency in handling of loops and creation of functions. • Identify the methods to create and manipulate lists, tuples and dictionaries. • Express different Decision-Making statements and Functions.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Python program to find the union of two lists. 2. Python program to find the intersection of two lists. 3. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature. 4. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x). 5. Write a program that reads an integer value and prints —leap yearl or —not a leap yearll. 6. Write a program that takes a positive integer n and then produces n lines of output shown as follows. For example, enter a size: 5 * ** *** **** ***** 7. Write a function that takes an integer _n'as input and calculates the

	1 + 1/1! + 1/2! + 1/3! + … + 1/n 8. Write a function that takes an integer input and calculates the factorial of that number. 9. Write a function that takes a string input and checks if it's a palindrome or not. 10. Write a list function to convert a string into a list, as in list (_abc') gives [a, b, c]. 11. Write a program to generate Fibonacci series. 12. Write a program to check whether the input number is even or odd. 13. Write a program to compare three numbers and print the largest one. 14. Write a program to print factors of a given number. 15. Write a method to calculate GCD of two numbers. 16. Write a program to create Stack Class and implement all its methods. (Use Lists). 17. Write a program to create Queue Class and implement all its methods. (Use Lists) 18. Write a program to implement linear and binary search on lists. 19. Write a program to sort a list using insertion sort and bubble sort. 20. Python program to remove the "i" th occurrence of the given word in a list where words repeat. 21. Python program to count the occurrences of each word in a given string sentence. 22. Python program to check if a substring is present in a given string. 23. Python program to map two lists into a dictionary. 24. Python program to count the frequency of words appearing in a string using a dictionary. 25. Python program to create a dictionary with key as first character and value as words starting with that character. 26. Python program to find the length of a list using recursion. 27. Python program to read a file and capitalize the first letter of every word in the file. 28. Python program to read the contents of a file in reverse order. 29. Python program to create a class in which one method accepts a string from the user and another prints it. 30. Study and Implementation of Database, Structured Query Language and database connectivity.

Part C - **Learning Resources**
Text Books, Reference Books, Other Resources
Suggested Readings: 1. T. Budd, Exploring Python, TMH, 1st Ed, 2011

2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth,Freelyavailableonline.2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
4. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition by O'Reilly, 2015
5. Zed A. Shaw, Learn Python 3 the Hard Way (Addison-Wesley, 2016)

E-Resources:

Topics related Python from W3Shool

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy
   https://www.w3schools.com/python/scipy/index.php
6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp

Topics related Python from SWAYAM/NPTEL

10. https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA
11. https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw

Topics related Python from Tutorials

12. https://www.javatpoint.com/python-tutorial
13. http://docs.python.org/3/tutorial/index.html
14. http://interactivepython.org/courselib/static/pythonds
15. http://www.ibiblio.org/g2swap/byteofpython/read/

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

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Date: 03.06.2022

Scheme of B. Sc./ B.Sc. (Hons.) Biochemistry

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	BIOC -1T	Chemistry of Biomolecules	Theory	4	50	17
	BIOC -2T	Biochemical Techniques	Theory	4	50	17
	BIOC -1P	LAB 1: Biomolecules and Biochemical Techniques Lab	Practical	2	50	17
Second year	BIOC -3T	Enzymology	Theory	4	50	17
	BIOC -4T	Metabolism of Biomolecules	Theory	4	50	17
	BIOC -2P	LAB 2: Enzymology and Metabolism of Biomolecules Lab	Practical	2	50	17
Third year	BIOC -5T	Cellular and Molecular Biochemistry	Theory	4	50	17
	BIOC -6T	Applied Biochemistry	Theory	4	50	17
	BIOC -3P	LAB 3: Molecular Cell Biology and Applied Biochemistry Lab	Practical	2	50	17
Total (I+II+III years)				**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern University and is not mandatory.

Part A: Introduction				
Program: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOC-5T		
2	Course Title	**Cellular and Molecular Biochemistry**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Distinguish the process of replication in prokaryotes as well as eukaryotes. • Distinguish the process of transcription in prokaryotes as well as eukaryotes. • Explain the process of DNA damage and various DNA repair mechanisms. • Explain the process of DNA damage and various DNA repair mechanisms. • Explain to understand of cell transport, cell division and cell cycle.		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period / Hour
1	Prokaryotic (archaea and eubacteria) and eukaryotic cell (animal and plant cells), cells as experimental models. **DNA Replication:** DNA replication in prokaryotes-conservative, semiconservative and Dispersive types, experimental evidence for semiconservative replication. DNA polymerases, other enzymes and protein factors involved in replication. **Transcription:** Transcription in prokaryotes. RNA polymerase, promoters, initiation, Elongation and termination of RNA synthesis, inhibitors of transcription. Reverse transcriptase, post-transcriptional processing of RNA in eukaryotes. DNA Repair : UV repair system in E. coli, significance of thymine in DNA	12 Periods / 08 Hours
2	**Translation and Regulation of Gene Expression** Genetic code: Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes. Mechanisms of translation: Ribosome structure, A and P sites, charged tRNA f-met-tRNA , inititor codon, Shine-Dalgarno consensus sequence (AGGA) , formation of 70S initiation complex, role of EF-Ts, EF-G and GTP , non –sense codons and release factors, RF1 and RF2. Regulation of Gene Expression in prokaryotes: Enzyme induction and repression , operon concept, Lac operon, Try operon.	12 Periods / 08 Hours
3	Asymmetrical organization of lipid, proteins and carbohydrates in membrane, Active and passive transport across the membrane. **Protein trafficking**: Selective transport of proteins to and from the nucleus. Regulation of nuclear protein import and export. Targeting proteins to ER, smooth ER and lipid synthesis. Export of proteins and lipids from ER and into ER. Lipid and polysaccharide metabolism in Golgi. Protein sorting and export from Golgi. Mechanism of vesicular transport, cargo selection, coat proteins and vesicle budding, vesicle fusion. Protein import and mitochondrial assembly, protein export from mitochondrial matrix. Import and sorting of chloroplast proteins	12 Periods / 08 Hours

4	**Cytoskeletal proteins:** Structure and organization of actin filaments. Treadmilling and role of ATP in microfilament polymerization, organization of actin filaments. Non-muscle myosin. Intermediate filament proteins, assembly and intracellular organization. Assembly, organization and movement of cilia and flagella	12 Periods / 08 Hours
5	**Cell wall and extracellular matrix:** Prokaryotic and eukaryotic cell wall, cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherence junctions, tight junctions, gap junctions, desmosomes, hemidesmosomes, focal adhesions and plasmodesmata. **Cell cycle, cell death and cell renewal**: Eukaryotic cell cycle, restriction point, and checkpoints. Cell division. Apoptosis and necrosis - brief outline. Salient features of a transformed cell.	12 Periods / 08 Hours

Keywords: Cell, Molecules, protein trafficking, molecular process, proteins, cell cycle

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Cell: A Molecular Approach (2009) 5th ed., Cooper, G.M. and Hausman, R.E., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN:978-0-87893- 300-6.
2. Molecular Cell Biology (2012) 7th ed., Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell. J., W.H. Freeman & Company (New York), ISBN:13:978- 1-4641-0981-2 / ISBN:10: 1-4641-0981-8.
3. Molecular Biology of the Cell (2008) 5th ed., Alberts, B., Johnson,A., Lewis, J., and Enlarge, M., Garland Science (Princeton), ISBN:0-8153-1619-4 / ISBN:0-8153-1620-8.

E-learning Resources

https://swayam.gov.in/
https://www.edx.org/search?q=biomolecules&tab=course
https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)		
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr: DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Part A: Introduction				
Program: B.Sc. **Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOC-6T		
2	Course Title	**Applied Biochemistry**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand fundamentals and skilled for clinical laboratory works. • Understand basis phenomenon of disease occurrence and its cause. • Understand fundamentals and skilled with recombinant DNA technology. • Understand basic factors of nutrition and immunity and can help to others for improvement of nutrition and immune system.		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period / Hour
1	**Clinical Biochemistry:** Organization of clinical laboratory, Introduction to instrumentation and automation in clinical biochemistry laboratories safety regulations and first aid. General comments on specimen collection, types of specimen for biochemical analysis. Precision, accuracy, quality control, precautions and limitations. **Evaluation of biochemical changes in diseases:** Basic hepatic, renal and cardiovascular physiology. Biochemical symptoms associated with disease and their evaluation. Diagnostic biochemical profile	12 Periods / 08 Hours
2	**Structure of genes and chromosomes**: Definition of a gene, chromosomal organization of genes in viruses, bacteria and eukaryotes. Supercoiling of DNA. **Replication of genomes:** General features of DNA replication, properties of prokaryotic and eukaryotic DNA polymerases. Replication of DNA and teleomeres in linear chromosomes. Replication of RNA genomes.	12 Periods / 08 Hours
3	**RECOMBINANT DNA TECHNOLOGY:** Overview of recombinant DNA technology. Plasmids and bacteriophage DNA as cloning vectors, pBR322, pUC8. Purification of plasmid and bacteriophage DNA. Enzymes used in manipulating DNA, separation by electrophoresis., **Cloning of a gene in a vector and functional analysis:** Polymerases chain reaction (parametric optimization, primer designing), ligation, introduction of DNA construct into host cells, selection of recombinants.	12 Periods / 08 Hours
4	**Nutritional Biochemistry and disorders**: Overview of major and minor nutrient components in the diet. Balanced diet and the concept of RDA. Nutrient deficiencies; Kwashiorkor and Marasmus, Scurvy, beri beri, pellagra and B12 deficiency, Xerophthalmia and Night blindness, Vitamin D deficiency, Vitamin K deficiency. Discuss with relation to biochemical basis for symptoms, Metabolic and Lifestyle disorders, Multifactorial complex disorders and Cancer, Diseases due to misfolded proteins, Monogenic diseases.	12 Periods / 08 Hours
5	**Immune system** Self-versus nonself. Humoral and cellular immunity. Innate and adaptive immunity. Cells of the immune system, primary and secondary lymphoid	12 Periods / 08 Hours

	tissues and organs. Cellular and humoral responses. Defensins. Non-immunological barriers. Cells and soluble mediators of innate immunity. Acute phase proteins. Cytokines. Complement system. **Humoral B cell response:** Structure of antibodies, types of immunoglobulins, generation of antibody diversity, B cell activation, theory of clonal selection, formation of plasma and memory cells; T-independent B-response; antigens, haptens carriers and adjuvants. **Cell mediated immunity:** T-cell development, MHC locus. Structure, function and distribution of MHC glycoproteins. Antigen processing and presentation. Cell mediated immune responses by different T-cell sub populations. Hypersensitive reactions. Concept of autoimmunity.	

Keywords: Clinical biochemistry, replication, rDNA, nutrition, disorders, Immunity

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York), ISBN:0-321-50781 / ISBN: 978-0-321-50781-5.
2. Gene Cloning and DNA Analysis (2010) 6th ed., Brown, T.A., Wiley-Blackwell Publishing (Oxford, UK), ISBN: 978-1-4051-8173-0.
3. Principles of Gene Manipulation and Genomics (2006) 7th ed., Primrose, S. B., and Twyman, R. M., Blackwell publishing (Oxford) ISBN: 13: 978-1-4051-3544-3.
4. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
5. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13; 978-1-4641-0962-1 / ISBN:10-14641- 0962-1.
6. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
7. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
8. Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

learning Resources

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)		**Total: 50M**
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr. DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Part A: Introduction				
Program: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-2025**
1	Course Code	**BIOC-3P**		
2	Course Title	**LAB 1 : Molecular cell Biology and Applied Biochemistry lab**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Demonstrate assay for nucleic acid by various methods. • Demonstrate isolation process of DNA from different samples. • Apply electrophoresis technique for different isolated compounds. • Illustrate PCR techniques. • Illustrate SDS-PAGE techniques by biomolecules. • Demonstrate effect of various mutagens in various samples. • Demonstrate cell division in various types of cell. • Demonstrate transport of solute across the membrane.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total No. of Teaching Hours – 20 / 30 Periods	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more experiments as per requirement. 1. Visualization of animal and plant cell by methylene blue. 2. Identification of different stages of mitosis in onion root tip. 3. Identification of different stages of meiosis in grasshopper testis. 4. Micrographs of different cell components (dry lab). 5. Sub-cellular fractionation. 6. Visualization of nuclear fraction by acetocarmine stain. 7. Staining and visualization of mitochondria by Janus green stain. 8. Collection of blood and storage. 9. Estimation of blood glucose by glucose oxidase peroxidase method. 10. Amplification of DNA segment/gene of interest by PCR 11. Quantitative determination of DNA and RNA by absorbance at 260 nm and using A260/A280 ratio to distinguish between them 12. Permanent slides for different types of cancer
Key words: Cell, meoisis, mitosis, stain, amplification, PCR, cancer, Visualization	

Part C - Learning Resource
Text Books, Reference Books, Other Resources

Suggested Readings:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
2. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13; 978-1-4641-0962-1 / ISBN:10-14641- 0962-1.
3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
4. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
5. . Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

E-learning Resources:

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr. DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	3/6/2022
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Scheme of B.Sc./ B.Sc. (Hons.) Biotechnology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BIOT -1T	Biochemistry, Biostatics and Computers	Theory	4	50	17
	BIOT -2T	Cell Biology, Genetics and Microbiology	Theory	4	50	17
	BIOT -1P	LAB 1: Microbiology and Biochemical Techniques	Practical	2	50	17
Second year	BIOT -3T	Molecular Biology and Biophysics	Theory	4	50	17
	BIOT -4T	Recombinant DNA Technology and Genomics	Theory	4	50	17
	BIOT -2P	LAB 2: Molecular Biology, Bioinstrumentation, and Genomics	Practical	2	50	17
Third year	BIOT -5T	Plant, Environmental and Industrial Biotechnology	Theory	4	50	17
	BIOT -6T	Immunology, Animal and Medical Biotechnology	Theory	4	50	17
	BIOT -3P	LAB 3: Applied Biotechnology	Practical	2	50	17
			Total (I+II+III years)	**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the university concern.

Part A: Introduction				
Program: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOT-5T		
2	Course Title	**Plant, Environmental and Industrial Biotechnology**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • learn the basics of plant tissue culture • learn the application of GMO plants • learn about basics of Environmental Biotechnology and its management • learn the basics of Biological degradation of pollutant • learn the basics of Bioreactor		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period / Hour
1	1.Introduction to Plant cell and tissue culture: History Scope and Applications; Tissue culture media 2. Micropropagation, Somatic embryogenesis, Organogenesis, Somaclonal variations 3. Protoplast isolation and fusion, Anther and Ovule culture, Triploid production	12 Periods / 08 Hours
2	1.Agrobacterium mediated Transformation, Ti & Ri Plasmid 2. Bt gene and its applications, Edible vaccine; Genetically modified plants: Herbicide resistant Plant and drought resistant plants 3. Germplasm storage and cryopreservation	12 Periods / 08 Hours
3	1. Environmental Biotechnology: Introduction and scope 2. Environmental pollution and its types, Global environmental problems (Acid rain, Ozone depletion, Global warming) 3. Solid Waste management: Principle of management, Concept of composting and Vermicomposting 4. Wastewater Treatment: Primary, Secondary and Tertiary treatment	12 Periods / 08 Hours
4	1.Biofertilizer and Biopesticides: types and applications 2. Bioremediation and Biodegradation of Xenobiotics: Phytoremediation, Bioleaching 3. Biological indicators of pollution, Biotechnological method of pollution management	12 Periods / 08 Hours
5	1. Types of Bioreactor: Design of Stirred tank, Fluidized bed 2. Fermentation: Lactic acid & Alcohol 3. Industrially important microoganisms: Isolation, Preservation (Slant, Mineral Oil and Lyophilize) and its application) 4. Food Technology: Production of fermented foods (Chees, Butter milk & Yoghourt), Food spoilage, Canning, Packing and Food Preservation	12 Periods / 08 Hours
Keywords: Plant cell and Tissue culture, Agrobacterium, Waste water treatment, Bioremediation, Bioreactor,		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. A text Book of Biotechnology: Indu Shekher Thakur, 2nd edition. I.K. International Pvt. Ltd. New Delhi.
2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.
3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee – New Central Book Agency (NCBA); 1st edition (2017)
4. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi.
6. Biotechnology: Fundamental & Application (2005) S.S. Purohit
7. Immunology: J. Kubey et al. 7th edition.
8. Immunology: Roitt et al.
9. Fundamental of Immunology: W. Paul.
10. Plant Tissue culture: K. K. De.
11. Plant Tissue Culture (Practical): H.S. Chawla.
12. Biochemistry & Molecular Biology of Plant: Buchanan, Gruissemen& Jones 2nd edition.
13. Tools and Techniques in Biotechnology (2011) M. Debnath

E-learning Resources

https://swayam.gov.in/
https://lecturenotes.in/subject/652/environmental-biotechnology-eb
https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://onlinecourses.nptel.ac.in/noc21_bt41/preview

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE) Time 3Hours		As per Govt. norms
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: B.Sc **Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOT-6T		
2	Course Title	**Immunology, Animal and Medical Biotechnology**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • learn the basics of immune system • learn about the DNA diagnostic methods • learn the types of Ag-Ab interaction • learn the basics of Animal tissue culture		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	**No. of Period / Hour**
1	1. Concept of Immunity: Innate and Acquired, Humoral and Cell mediated Response. 2. Cells and Organs involved in Immune system-Structure and Function. 3. Antigen, Antibody: Types, Structure and Functions.	12 Periods / 08 Hours
2	1. Cytokines 2. Autoimmune diseases- Hemolytic Anemia, Rheumatoid arthritis, Insulin dependent diabetes. 3. Immuno deficiencies. Diseases-SCID, AIDS.	12 Periods / 08 Hours
3	1. Antigen-Antibody Interaction: Agglutination, Precipitation, RIA, ELISA. Immuno Electrophoresis and Immunofluorescence. 2. Immunity of Infectious Diseases: Protozoa (Malaria, Kalaazar), Bacteria (T.B., Typhoid) and Virus (Influenza, Pox). 3. Fundamental of Diseases: Swine flu, Dengue and Covid-19.	12 Periods / 08 Hours
4	1. Animal Cell Culture and Growth Media. 2. Primary, Secondary culture and Established Cell line Culture. 3. Tissue engineering: Basic Concept, Transgenic animal: Mice and Sheep.	12 Periods / 08 Hours
5	1. Hypersensitivity, Interferon and Monoclonal antibody. 2. Organ Transplantation, Biology of Cancer. 3. *In vitro* fertilization and Embryo Transfer. 4. Vaccine vectors and Nucleic acid vaccines 5. DNA in disease diagnosis (Tuberculosis and AIDS)	12 Periods / 08 Hours
Keywords: Immunity, Cytokines, Ag-Ab Interaction, Animal Cell Culture, Hypersensivity, DNA in Disease Diagnosis.		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee –New Central Book Agency (P) Ltd., Kolkata.
2. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi.
4. Biotechnology: Fundamental & Application (2005) S.S. Purohit
5. Immunology: J. Kubey et al. 7th edition.
6. Immunology: Roitt et al.
7. Fundamental of Immunology: W. Paul.
8. Biotechnology : Books and Allied Ltd : U Satyanarayana
9. Immunology : Saras Publication : Dulsy Fatima, N Arumugam

E-learning Resources

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://www.vedantu.com/biology/immunology
https://www.cleariitmedical.com/2019/06/biology-notes-biotechnology-principles-and-processes.html
https://www.edx.org/learn/immunology

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE) Time 3Hours		As per Govt. norms
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: **B.Sc Course**		Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-2025**
1	Course Code	**BIOT-3P**		
2	Course Title	**LAB 3: Applied Biotechnology**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • learn to prepare Plant Tissue Culture (PTC) media • learn to perform PTC • learn to determine the quality of water • learn to perform the diagnostic test of microbial disease		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total No. of Teaching Hours – 20 / 30 Periods	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more practical's as per requirement. 1. Preparation of Tissue culture media (ATC/PTC). 2. Sterilization of plant material (Explants). 3. Seed Germination, Root, Shoot and Callus Culture. 4. Determination of total dissolved solids of water. 5. Determination of DO, BOD, COD of water. 6. Determination of Coliform by MPN Test. 7. Production of Enzymes/Antibiotics/Acids. 8. Effect of Biopesticides on microorganism. 9. Antigen Antibody interaction- Determination of Blood Group and Rh factor. 10. Widal Test 11. VDRL Test. 12. ELISA Test. 13. Perform of Immuno-diffusion test

Part C - Learning Resource
Text Books, Reference Books, Other Resources
Suggested Readings: 1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC). 2. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13; 978-1-4641-0962-1 / ISBN:10-14641- 0962-1. 3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4. 4. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708. 5. . Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

E-learning Resources:

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://freebookcentre.net/biology-books-download/Introduction-to-Biotechnology-Laboratory-Manual.html
http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf
https://www.vnmkv.ac.in/student-academic/Study_Material_Practical_Manual_Fundamental_of_Plant_Biochemistry_Biotechnology.pdf

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)	As per Govt. norms	

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
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Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
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