SHAHEED NANDKUMAR PATEL VISHWAVIDYALAYA, RAIGARH (C.G.)

(A State University Established under Chhattisgarh Vishwavidyalaya Adhiniyam. 1973)

Scheme and Syllabus

of

Bachelor of Science

(Year – Third)

W.E.F. Session :- 2025-26

Syllabus Approved by the Central Board of Studies

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

बायोटेक्नोलॉजी

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.

DR. K. K. Patel
10/07/25

DR. K. K. Patel
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विश्वविद्यालय, रायगढ़ (छ.ग.)

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,		

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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: -		

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महाविद्यालय, [illegible]

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	

Dr. K.K Patel
10.07.2025
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विश्वविद्यालय, रायगढ़ (छ.ग.)

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.		

DR KK Pathy
10.07.2025

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.clearilitmedical.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: -		

DR. R.K. Patel 10.07.2025

शहीद नंदकुमार पटेल
विद्यालय, रायगढ़ (छ.ग.)

Declaration

Syllabus is framed as per the ToR

Name	Signature
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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	
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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	

Dr. K. K. Patel 10.07.25

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.

DR.K K Patil 10.07.2025

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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	

10.07.2025

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10.07.2025

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

वनस्पति विज्ञान

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.

Chairman
Board of Studies .....
Head Nandkumar Patel
Vidyalaya, Raigarh (C.G

Dr A.K. Bhartiya 27/6/23
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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

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

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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Chairman Board of Studies

अध्यक्ष अध्ययन मंडल शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

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.
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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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अध्ययन मंडल ....
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27/6/23

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

for 13.6.22

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   Professor
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   Professor
   Govt. Nagarjun P.G. College of Science, Raipur
8. Dr. Usha Chandel - Member 13/6/22
   Asst. Prof.
   Govt. Dr. W.W. Patankar Girls P.G. College, Durg
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   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur
10. ~~Manisha Gupta~~ - ~~Member~~ Member

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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

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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

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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

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10. [redacted] - Member

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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: I 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

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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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6. Dr. Smriti Chakravarty Professor Govt. J.Y. Chhattisgarh College, Raipur	-	Member
7. Dr. Rupinder Diwan Professor Govt. Nagarjun P.G. College of Science, Raipur	-	Member
8. Dr. Usha Chandel Asst. Prof. Govt. Dr. W.W. Patankar Girls P.G. College, Durg	-	Member
9. Mr. Kaushal Kishor Asst. Prof. Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur	-	Member
10. [redacted]	-	Member

Chairman

अध्यक्ष

अध्ययन मंडल

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

कम्प्यूटर विज्ञान

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.

Dr. Vikrant Gupta
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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

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

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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

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    Pt. Ravishankar Shukla University, Raipur
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    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

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शहीद नंदकुमार पटेल
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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

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	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/IoL9Ve2SRwQ
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

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Part D: Assessment and Evaluation
Maximum Marks: 50

Declaration

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Date: 03-06-2022

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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 :

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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.

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	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

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   Shaheed Nand Kumar Patel University, Raigarh - Member
8. Mr. L.K. Gavel
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg - Member
9. Dr. Anil Kumar Sharma
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg - Member
10. Mr. Vishwnath Tamrakar
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur - Member
11. Ms. Anjeeta Kujur
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur - Member
12. Mr. Suresh Kumar Thakur
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg - Member
13. Dr. Ugrasen Suman
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore - Member (Present Online)

Date: 03.06.2022

अध्ययन मंडल .....
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

अध्यक्ष Dr. Vikrant Gupta C.S.
अध्ययन मंडल .....
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

बी.एस.सी. (गृह विज्ञान)

Learning Outcome Based Scheme and Syllabus of Examination

For

~~Bachelor of~~ B.Sc. Home Science (B.Sc.-H.Sc.)

Courses Effective from Academic Session 2022-2023

General Information of B.Sc. Home Science Program

1. **Title and code of the program:** The title of the programme shall be Bachelor of Home Science (B.Sc. H.Sc.) The program code of B.Sc. Home Science shall be "**HSc2022**".
2. **Eligibility for admission:** Eligibility of admission in B.Sc. Home Science will be as follow:
   i. Students must pass H.Sc. (Class 12th) in any stream/Three year diploma course in any branch of technical education / Vocational Education or equivalent from a recognized board.
   ii. Students must have a minimum aggregate of 40% marks in HSc examination (Relaxation in percentage will be as per rule of C.G. Govt.).
3. **Scheme of examination:** Each theory paper is divided into three components as follow, there shall not be any Internal Assessment (IA) for practical part of every subject :-
   i. Total Marks:100 Marks
   ii. University Examination (UE): 60 Marks
   iii. Internal Assessment (IA): 15 Marks
   iv. Practical : 25 Marks
4. **Internal Assessment (IA):** The structure of IA shall be as follow:
   i. **Internal test (15 Marks):** There shall be two internal tests of 15 marks each, the average of both tests shall be considered as the marks of internal test. The marks of assignment shall be of 15, the average of the both tests shall be added with marks of assignment, and the total will be divided by two.
5. **University Examination (UE):** The pattern of examination shall be as follow:
   i. There shall be three sections of question paper: A, B and C.
   ii. Section A (20 Marks) shall consists "Very Short Answer questions", Three questions from each unit with internal choice of solving two.
   iii. Section B (20 Marks) shall consist of "Short answer questions" from each unit, two questions from each unit with internal choice of solving one.
   iv. The Section C (20 Marks) shall consist "Long answer questions", one from each unit, with internal choice of solving any two questions, each has 10 marks.
6. **Programme Learning Outcomes (PLO):** On completion of this programme, the students are expected to:

   PLO1: To Apply knowledge of Basic Nutrition, Textile and Fibre Science, Resource Management , Community Development , Human Development with basic knowledge of women empowerment and Computer Basics at the individual level , community level and also on commercial level.

   PLO2: To apply knowledge of nutrition as Medical Nutrition Therapy for disease correction, Technical knowledge of physio-chemical nature of textile fibres and yarn making, working of various systems in human body, Skillful communication techniques, Developmental stages in life cycle and consumer economics related knowledge.

   PLO3: To apply knowledge of Biochemistry of Macro molecules as Protein, Lipids, Carbohydrates and Micro-Molecules as Vitamin, Minerals, Antioxidants, Preservation Technology, Extension education for the community and national benefit, Care of human in early years of life, Principles of Art and Designing and skills of apparel making with fashion designing.

   PLO4: To apply new technology in the field of Nutrition as Neutrogenomics, Nanotechnology for Medical Nutrition Therapy, Management of human resources properly, advances in Textile science, advances in Human developments as maintenance of good mental health and Research Methodology with latest data collection and analysis details in the field of Home Science Research.

B.Sc. (HOME SCIENCE)

Year	Course Code	Subject Name	Theory / Practical	Total Credit	Marks			
					UE	IA	Total	
							Max	Min
First	HSCF-1T	Environmental studies	Theory	4	60	15	75	25
	HSCF-2T	Hindi Language	Theory	4	60	15	75	25
	HSCF-3T	English Language	Theory	4	60	15	75	25
	HSC-1T	Basic Nutrition	Theory	4	60	15	75	25
	HSC-2T	Introduction to Resource Management	Theory	4	60	15	75	25
	HSC-3T	Introduction to Human Development	Theory	4	60	15	75	25
	HSC-4T	Textile and Clothing	Theory	4	60	15	75	25
	HSC-5T	Community Development	Theory	4	60	15	75	25
	HSC-6T	Personal Empowerment and Computer Basics	Theory	4	60	15	75	25
	HSCF-1P	Environmental Study Field work	Practical	2	25	NA	25	25
	HSC-1P	Basic Nutrition	Practical	2	25	NA	25	09
	HSC-2P	Introduction to Resource Management	Practical	2	25	NA	25	09
	HSC-3P	Introduction to Human Development	Practical	2	25	NA	25	09
	HSC-4P	Textile and Clothing	Practical	2	25	NA	25	09
	HSC-5P	Community Development	Practical	2	25	NA	25	09
	HSC-6P	Personal Empowerment and Computer Basics	Practical	2	25	NA	25	09
		Total		**50**	**715**	**135**	**850**	
Second	HSCF-4T	Hindi Language	Theory	4	60	15	75	25
	HSCF-5T	English Language	Theory	4	60	15	75	25
	HSC-7T	Nutritional Management in Health & Diseases	Theory	4	60	15	75	25
	HSC-8T	Textile and Fiber Science	Theory	4	60	15	75	25
	HSC-9T	Human Physiology and Community Nutrition	Theory	4	60	15	75	25
	HSC-10T	Communication Process	Theory	4	60	15	75	25
	HSC-11T	Life Span Development	Theory	4	60	15	75	25
	HSC-12T	Consumer Economics	Theory	4	60	15	75	25
	HSC-7P	Nutritional Management in Health and Diseases	Practical	2	25	NA	25	09
	HSC-8P	Textile and Fiber Science	Practical	2	25	NA	25	09
	HSC-9P	Human Physiology and Community Nutrition	Practical	2	25	NA	25	09
	HSC-10P	Communication Process	Practical	2	25	NA	25	09
	HSC-11P	Life Span Development	Practical	2	25	NA	25	09
	HSC-12P	Consumer Economics	Practical	2	25	NA	25	09
		Total		**44**	**630**	**120**	**750**	

Third	HSCF-6T	Hindi Language	Theory	4	60	15	75	25
	HSCF-7T	English Language	Theory	4	60	15	75	25
	HSC-13T	Nutritional Biochemistry	Theory	4	60	15	75	25
	HSC-14T	Food Preservation	Theory	4	60	15	75	25
	HSC-15T	Early Childhood Care and Education	Theory	4	60	15	75	25
	HSC-16T	Extension Education	Theory	4	60	15	75	25
	HSC-17T	Foundation of Art and Design	Theory	4	60	15	75	25
	HSC-18T	Apparel Making and Fashion Designing	Theory	4	60	15	75	25
	HSC-13P	Nutritional Biochemistry	Practical	2	25	NA	25	09
	HSC-14P	Food Preservation	Practical	2	25	NA	25	09
	HSC-15P	Early Childhood Care and Education	Practical	2	25	NA	25	09
	HSC-16P	Extension Education	Practical	2	25	NA	25	09
	HSC-17P	Foundation of Art and Design	Practical	2	25	NA	25	09
	HSC-18P	Apparel Making and Fashion Designing	Practical	2	25	NA	25	09
		Total		44	630	120	750	

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.

Abbreviations Used- **UE: University Examination** **IA: Internal Assessment**

Note:

1. Students have to pass the Environment Studies (Additional & Compulsory) till the end of the maximum duration provided for the program. Degree will not be awarded without passing the environmental studies paper.
2. There shall be four extra credits in all the years of under graduation for internship/apprenticeship/Skill development program/Value added program. The certificate of extra credits would be provided by the university concern and is not mandatory.

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session: **2022:2023**
1	Course Code	HSC-13T		
2	Course Title	Nutritional Biochemistry		
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 enable to: • To understand concepts of Biochemistry. • To understand metabolic cycles related to Carbohydrates. • To understand metabolic cycles related to Protein and Lipids. • To understand Chemistry and functions of Hormones. • To understand kinetics of Enzymes.		
6	Credit Value	**Theory: 4**		
7	Total Marks	**Max. Marks: 60+15**	**Min Passing Marks : 25**	

Part B: Content of the Course		
Total NO of Periods: 60		
Unit	**Topics**	**NO. of Periods**
I	**Introduction to Biochemistry:** definition, objectives, scope and Inter-relationship between Biochemistry and other biological sciences. **Carbohydrates:** Definition, classifications functions and properties of MoNOsaccharide's : Glucose, Fructose, Galactose , Disaccharides: Maltose, Lactose, Sucrose, Polysaccharides : Dextrin, Starch, Glycogen. Metabolic cycles- Glycolysis, Gluconeogenesis, Glycogenesis, Glycogenolysis, citric and cycle, Hexose Mono-phpspahe Shunt, Blood sugar regulation procedure.	12
II	**Lipids:** Definition, composition, importance and classification Fatty Acids: Functions, properties Significance of Acid value, Iodine value and saponification value. Chemistry and function of Phospholipids, Glycolipids and sterols. Metabolism : B (Beta) Oxidation. Aspects of transport-Passive diffusion, Facilitated diffusion, Active transport.	12
III	**Proteins** : Definition composition function and classification. AmiNO acids: Essential and NOnessential. Metabolism: Urea cycle, one carbon metabolism. Nitrogen balance, AmiNO acid pool. Enzymes: Definition, properties, classification, Mode of action of enzymes, factors affecting velocity of enzyme catalyzed reactions, coenzymes.	12

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IV	**Hormones:** Biological roles of hormones of Pituitary, Adrenal cortex and medulla, Thyroid, Parathyroid, Pancreas, Sex glands. Urine: Formation procedure and Composition.	12
V	**Energy:** Definition, Unit, calorimeter, caloric value of foods, BMR, RQ, SDA of Foods. Nucleic Acid and Nucleo-proteins : Chemistry, composition, structure, Functions, Types of RNA.	12

Keywords: : Biochemistry, Carbohydrate Metabolism, Gluconeogenesis, Glycogenolysis, Urea Cycle, Beta Oxidation of Fatty Acids, Energy Metabolism, Nucleic Acid, Hormones, Urine synthesis, Enzymes.

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. Biochemistry:O.P Agrawal, 5th Edition, Prasad's Publication.
2. Lehninger's Principles of Biochemistry:H. Lehninger, 6th Edition, Macmillan publication.
3. Biochemistry: Harper Illustrated Biochemistry, 31st Edition, Mac Graw Hill publication.
4. Biochemistry: Asha Chaudhary, , 11th edition, Shiva Publication.
5. Microbiology: RC Dubey and Maheswari, 4th Edition, S.Chand Publication.
6. Biochemistry: Ranjana Chawala and Sushmita Nyer, 5th Edition, Jaytee Brothers publication
7. Textbook of Biochemistry and Human Biology : G.P. Talwar, 3rd edition, PHI Publication.
8. Fundamentals of Biochemistry : A.C. Deb,6th Edition, NCBI Publication.

E-Learning Sources:

1. The Active Site of enzymes
   https://youtu.be/x_KvWqdzSII
2. Applications and importance of factors affecting enzyme action
   https://youtu.be/LbXx3j7b7hE
3. Coenzymes and cofactors
   https://youtu.be/bubY2Nm7hVM
4. Sources of Ammonia
   https://youtu.be/gSB4bshZcMU
5. Ammonia detoxification
   https://youtu.be/x0BAnbfK5f8
6. Disorders of ammonia metabolism
   https://youtu.be/WVhbn6OspZk
7. Overview of neurotransmitter metabolism with emphasis on myasthenia gravis and Parkinson disease
   https://youtu.be/N6OpSyzyOJY
8. Formation and fate of Bilirubin
   https://youtu.be/r2s0RPnCfZA
9. Disorders of ammonia metabolism
   https://youtu.be/WVhbn6OspZk
10. Bilirubin formation

https://youtu.be/qX0_q0ZJtCA

11. Biochemical basis for jaundice
    https://youtu.be/bBUCKxeqeAQ
12. Jaundice: A introduction classification and causes of each type with emphasis on physiologic jaundice
    https://youtu.be/wmllt0D2nY8
13. Investigations for differential diagnosis of jaundice
    https://youtu.be/Y11f9xQVHlo
14. Alcohol metabolism
    https://youtu.be/TMbGJTsRQpk

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::
Maximum Marks: 75
Continuous Comprehensive Evaluation(CCE): 15
University Exam (UE): 60

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)

Part A: Introduction				
Program: Degree Course		Class: B.Sc. Home Science III Year	Year: 2022	Session:2022:2023
1	Course Code	HSC-13P		
2	Course Title	LAB13:Nutritional Biochemistry		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of Biochemistry of Carbohydrates, Protein, Lipids, Vitamins.		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: • To understand concepts of Biochemistry based identification tests. • To understand various qualitative tests of major nutrients. • To understand quantitative tests of nutrients. • To understand Titration methodology. • To understand formation and uses of Haemin crystals from human blood. • To understand Idiometric method for quantitative estimation of Ascorbic Acid. • To understand quantitative estimation of Serum Hemoglobin level to assess the condition of anemia.		
6	Credit Value	Practical: 2		
7	Total Marks	Max. Marks: 25	Min Passing Marks : 09	

Part B: Content of the Course	
Total No. of Periods:15	
Tentative practical List	**Note:** This is tentative list; the teachers concern can add more Experiment as per requirement. 1. Identification of Glucose, Fructose, Maltose, Lactose, Sucrose, Starch. 2. Colour and precipitation reactions of Protein. 3. Colour reactions of Cholesterol. 4. Estimation of Glucose by Benedict's method. 5. Estimation of Ascorbic acid by Idiometric method. 6. Estimation of Glycine by double Titration. 7. Estimation of Hemoglobin by Acid Hematin method. 8. Preparation of Haemin crystals. 9. Action of Salivary amylase on conversion of starch. 10. **Project**: Recording Hemoglobin level, its correlation with age, sex, weight.

अध्यक्ष मंडल
शहीद नंदकुमार पटेल
विज्ञान महाविद्यालय, रायगढ़ (छ.ग.)

Part C: Learning Resources

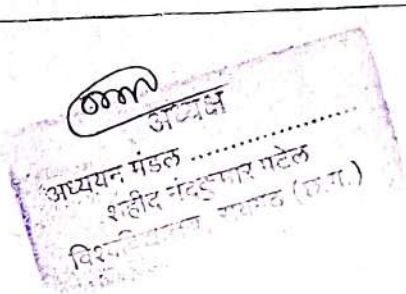
Text Books. Reference Books, Other Resources

Suggested Readings:

1. Biochemistry:O.P Agrawal, 5th Edition, Prasad's Publication.
2. Lehninger's Principles of Biochemistry:H. Lehninger, 6th Edition, Macmillan publication.
3. Biochemistry: Harper Illustrated Biochemistry, 31st Edition, Mac Graw Hill publication.
4. Biochemistry: Asha Chaudhary, , 11th edition, Shiva Publication.
5. Microbiology: RC Dubey and Maheswari, 4th Edition, S.Chand Publication.
6. Biochemistry: Ranjana Chawala and Sushmita Nyer, 5th Edition, Jaytee Brothers publication
7. Textbook of Biochemistry and Human Biology : G.P. Talwar, 3rd edition, PHI Publication.
8. Fundamentals of Biochemistry: A.C. Deb,6th Edition, NCBI Publication. .

E-Learning Sources:

1. The Active Site of enzymes
   https://youtu.be/x_KvWqdzSII
2. Applications and importance of factors affecting enzyme action
   https://youtu.be/LbXx3j7b7hE
3. Coenzymes and cofactors
   https://youtu.be/bubY2Nm7hVM
4. Sources of Ammonia
   https://youtu.be/gSB4bshZcMU
5. Ammonia detoxification
   https://youtu.be/x0BAnbfK5f8
6. Disorders of ammonia metabolism
   https://youtu.be/WVhbn6OspZk
7. Overview of neurotransmitter metabolism with emphasis on myasthenia gravis and Parkinson disease
   https://youtu.be/N6OpSyzyOJY
8. Formation and fate of bilirubin
   https://youtu.be/r2s0RPnCfZA
9. Disorders of ammonia metabolism
   https://youtu.be/WVhbn6OspZk
10. Bilirubin formation
    https://youtu.be/qX0_q0ZJtCA
11. Biochemical basis for jaundice
    https://youtu.be/bBUCKxeqeAQ
12. Jaundice: A introduction classification and causes of each type with emphasis on physiologic jaundice
    https://youtu.be/wmllt0D2nY8
13. Investigations for differential diagnosis of jaundice
    https://youtu.be/Y11f9xQVHlo
14. Alcohol metabolism
    https://youtu.be/TMbGJTsRQpk



Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 25 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam (UE): 25		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Not Applicable

अध्यक्ष
अध्ययन मंडल .....
शहीद वेदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. बबीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. भारती सेठी, डॉ. खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई, – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि मिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, यामन राव पाटनकर महिला महावि, दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीकास महिला महावि. अंबिकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर. देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राव, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि, बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोभा महिश्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे।

अध्यक्ष अध्ययन मण्डल
शहीद नंदकुमार पटेल
विश्वविद्यालय, सारंगढ (छ.ग.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	HSC-14T		
2	Course Title	Food Preservation		
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 enable to: • To understand Basic Knowledge of Principles of Preservation. • To understand Basic Knowledge of Asepsis, Temperature. • To understand Basic Knowledge of Food Processing. • To understand Basic Knowledge of Traditional Foods preservation. • To understand Basic Knowledge of Effects of Food Storage. • To understand Basic Knowledge of Dehydration and Pasteurization.		
6	Credit Value	**Theory: 4**		
7	Total Marks	**Max. Marks: 60+15**	**Min Passing Marks : 25**	

Part B: Content of the Course		
Total NO. of Periods: 60		
Unit	**Topics**	**NO. of Periods**
I	**Food Preservation:** Food and its preservation. Home and community level including commercial operations.Principles of food Preservation. Causes of spoilage of food.	12
II	**Food Storage:** Food Storage Principles -Plant product. Storage, Animal product Storage, Effects of Storage. Canning: Principles and methodology.	12
III	**Pasteurization:** Principles and Methodology,Effect on food quality, Drying and Dehydration: Methods used and effect on food quality.	12
IV	**Uses of low temperature:** Refrigeration and freezing methods, Principles and applications. Shelf life of frozen foods Pickling and Fermentation: Pickles, chutneys, ketchups sauces. Fermentation: Types, products and method use.	12
V	**Chemical Preservatives:** Preparation of Fruit, Juices, Squashes, Fruited Syrups, Cordials, Jam Jelly. Nutritional Implications of food processing: Causes for loss of Vitamins and minerals, Enrichment and Fortification.	12
Keywords: : Food preservation, Food Storage, Pasteurization, Drying and Dehydration, Uses of low temperature, Pickling and Fermentation, Chemical Preservatives, Nutritional Implications of food processing.		

अध्यक्ष मंडल .....
शहीद पं. गुलार पटेल
विश्वविद्यालय, रायपुर (छ.ग.)

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. Fruit and vegetable preservation, R.P.Shrivastava, 3rd Edition, CBS Publication,
2. Food processing and preservation, G.Subulakshmi, 2nd Edition, New age International Publication.
3. Food science, B. Shrilaxmi, 7th Edition, New age International Publication.
4. Food processing and preservation, D S Warris 1st Edition, CBS Publication.
5. Food processing and techNOlogy, Atul Agnihotri, 2nd Edition, Crescent publication.
6. Food processing, packaging, preservation and safety, R.D.Joshi, 3rd Edition, Agrotech press Publication
7. Handbook of Food Preservation, M. Shafiur Rahman, 5th Edition, CRC publication.

E: Resources:

1. Food preservation
   https://youtu.be/2PgVWLjK0gE
2. Food Preservation Part II. Preservation by Chemical preservatives.
   https://youtu.be/HTIetKeQx1g
3. Food chemistry : preservatives and additives (beginners guide)
   https://youtu.be/9dhjmfdBQh8
4. Physical and chemical methods of food preservation | Food and industrial Microbiology
   https://youtu.be/ItmBg5FBdRM
5. Principles and methods of food preservation
   https://youtu.be/sE6ABn7qbmY
6. CANNING: canning of fruits and vegetables. Types of cans process of canning.
   https://youtu.be/XKvo9_Jdjt4
7. खाद्य परिरक्षण //Food preservation
   https://youtu.be/WngqPRYWvAY
8. Food Preservation Techniques? Definition, Principle, Physical and Chemical Methods
   https://youtu.be/M:5pgPzyCS4
9. Chemical Preservation of Foods l Food Preservation Methods : Lesson 11 Food Processing TechNOlogy
   https://youtu.be/BQFC4APvqDo
10. Food Preservation and Storage
    https://youtu.be/uRd3VzOfOJc

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::

Maximum Marks: 75

Continuous Comprehensive Evaluation(CCE): 15

University Exam (UE): 60

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)

अध्ययन मंडल
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session: **2022:2023**
1	Course Code	HSC-14P		
2	Course Title	LAB14: Food Preservation		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of principles and technology of food preservation.		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: 1. To understand Basic Knowledge of Principles of Preservation. 2. To understand Basic Knowledge use of temperature for preservation. 3. To understand use of chemical preservatives. 4. To understand Basic Knowledge of Asepsis. 5. To understand technology of dehydration up to optimal level. 6. To understand packing techniques.		
6	Credit Value	**Practical: 2**		
7	Total Marks	**Max. Marks: 25**	**Min Passing Marks : 09**	

Part B: Content of the Course	
	Total NO. of Periods:15
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more Experiment as per Requirement. 1. Preparation of Jam, Jellies marmalades. 2. Preparation of Pickles and chutneys. 3. Dehydration of Vegetables and Fruits. 4. Preparation of synthetic syrups and squashes. 5. Preparation of Sauces. 6. Preparation of preserved foods by using chemical preservatives by using quantities suggested by FAD and to observe their shelf life. 7. Preparation of Papad, Badi, Chips. 8. Survey of market products. 9. Packaging technique. 10. **Project**: Survey of popular preserved foods in market.

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विश्वविद्यालय, सरगुजा (छ.ग.)

Part C: Learning Resources
Text Books. Reference Books, Other Resources

Suggested Readings:

1. Fruit and vegetable preservation, R.P.Shrivastava, 3rd Edition, CBS Publication,
2. Food processing and preservation, G.Subulakshmi, 2nd Edition, New age International Publication.
3. Food science, B. Shrilaxmi, 7th Edition, New age International Publication.
4. Food processing and preservation, D S Warris 1st Edition, CBS Publication.
5. Food processing and technology, Atul Agnihotri, 2nd Edition, Crescent publication.
6. Food processing, Packaging, Preservation and safety- R.D.Joshi, 3rd Edition, Agrotech press Publication
7. Handbook of Food Preservation, M.Shafiur Rahman,5th Edition, CRC publication.

E-Learning Sources:

1. Food Preservation Part II. Preservation by Chemical preservatives.
   https://youtu.be/HTIetKeQx1g
2. Food Chemistry : preservatives and additives (beginners guide)
   https://youtu.be/9dhjmfdBQh8
3. Physical and chemical methods of food preservation | Food and industrial Microbiology
   https://youtu.be/ItmBg5FBdRM
4. Principles and methods of food preservation
   https://youtu.be/sE6ABn7qbmY
5. CANNING: canning of fruits and vegetables. Types of cans process of canning.
   https://youtu.be/XKvo9_Jdjt4
6. खाद्य परिरक्षण //Food preservation
   https://youtu.be/WngqPRYWvAY
7. Food Preservation Techniques? Definition, Principle, Physical and Chemical Methods
   https://youtu.be/M:5pgPzyCS4
8. Chemical Preservation of Foods l Food Preservation Methods : Lesson 11 l Food Processing TechNOlogy
   https://youtu.be/BQFC4APvqDo
9. Food Preservation and Storage
   https://youtu.be/uRd3VzOfOJc

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:: Maximum Marks: 25 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam (UE): 25		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Not Applicable

अध्यक्ष
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. बबीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. भारती सेठी, डॉ. खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई, – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि सिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, वामन राव पाटनकर महिला महावि, दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीक्रास महिला महावि. अबिंकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर. देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राय, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि, बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोना महिस्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे,

अध्यक्ष मंडल
शहीद गंगाधर मेहर
विश्वविद्यालय, रायगढ़ (छ.ग.)

Part A: Introduction				
Program: Degree Course		Class: B.Sc. Home Science III Year	Year: 2022	Session: 2022:2023
1	Course Code	HSC-15T		
2	Course Title	Early Childhood Care and Education		
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 enable to: 1. To understand basic Knowledge of early Childhood care. 2. To understand basic Knowledge of Theoretical approaches. 3. To understand basic Knowledge of current status and expansion of ECCE. 4. To understand basic Knowledge of Language skills. 5. To understand basic Knowledge of Effects of various Play. 6. To understand basic Knowledge of Evaluation techniques.		
6	Credit Value	Theory: 4		
7	Total Marks	Max. Marks: 60+15	Min Passing Marks : 25	

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	NO. of Periods
I	**Significance and objectives of Early Childhood care and education:** Significance if early childhood years in individual's development Meaning and need for intervention programs for better growth and development. Objectives of ECCE-Different types of programs currently offered, objectives of the programs routine and target group covered by each of the following: ECE programs Balwadi, Aanganvadi, Nursery school, Kinder garden, Montessori School, Laboratory nursery school. ECCE programs - ICDS and Mobile crutch, Day Care Centre.	12
II	**Current status and expansion and scope of ECE to ECCE:** Expansion from ECE TO ECC, Current / status of ECCE programs, Objectives: staff qualifications, teacher: children ratio, Indoor and Outdoor Play space, Play facilities, Equipments, curriculum and evaluation, Admission tests and effects on children Needs for ECCE programs to provide quality acre where mothers are at work.	12

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विश्वविद्यालय, रसड़ा (उ.प्र.)

III	**Meaning of curriculum, foundation of curriculum development:** Impact of play as meanings of development and learning. Teacher's role in creating environment and promoting play. Classical theories of play: surplus energy theory, relaxation theory, pre: exercise and recapitulation theory. Programs Planning: Approaches to learning: incidental and planned learning, Principles of programs planning: from known to unknown, simple to complex, concrete to abstract, Factors influencing programs planning, Balance between individual and group activity, indoor and outdoor play, guided and free activities, quite and active plays.	12
IV	**Language:** Goals of language teaching, Readiness for ready and writing, meaning of readiness, Factors to be considered for readiness: age , vision, caring, physical, emotional , social ,experimental background, finger: motor coordination, eye and hand coordination, reading from left to right and top to bottom. Mathematics: Importance of number and mathematics, Number as a language and history of its development, Abstract nature of number, Mathematical readiness, Decimal system, Number line position and relevance of zero, Subtraction, multiplication and division, Two and three dimensional shapes: properties, characteristics.	12
V	**Project Method:** Introduction, Meaning and advantages of using project method, Planning Resource unit, Alternative to home work, Disadvantages of learning by role, Suitable alternatives such as observations, Experimentation and reporting orally, picture etc, something related to the Concepts covered in class, Evaluation-Need for evaluation, formatting Evaluation, Method of evaluation: Observations, Evaluation of daily work, Tools for evaluation, reporting to parents.	12

Keywords: : Early Childhood, ECCE, curriculum, foundation of curriculum development, Program Planning, Language, Learning, Evaluation.

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

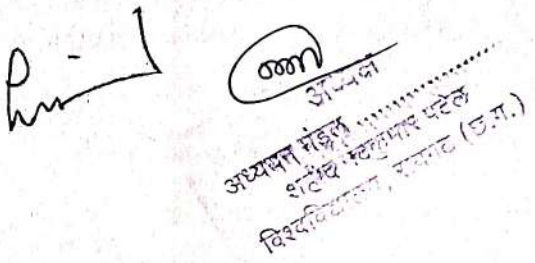
1. प्रारम्भिक बाल्यावस्था, देखभाल एवं शिक्षा, डा. सविता सक्सेना, 4th edition, Shri viNOd mandir Publication.
2. Early childhood care and education, M Sen Gupta, Eastern ecoNOmy edition, PHI publication.
3. Early childhood care and education, J.C. Aggarwal, S. Gupta,2nd edition, Shipra Publication.
4. Child care and education, Tina Bruce and Carolyn Meggitt, 2nd edition, Hodder Publication.
5. Early childhood care and education, Dr. Amaresh Chandra sahoo, 3rd edition, Data book world publication.
6. Play and practice in the early years: Foundation stage. Canning, N. 2010th edition, Sage Publication.
7. Early detection of disabilities and persons with disabilities in the community, Chopra, G.2012th

edition, Engage Publications.

E-Learning Sources:

1. भाषा एवं वाणी किसे कहते हैं
   https://youtu.be/2vcqU2FOU90
2. भाषा विज्ञान के सिद्धान्त
   https://youtu.be/4ug6UUqWcQM
3. भाषा विकास मे वाणी विकार क्या होते हैं
   https://youtu.be/lV35upbHPPY
4. Eric:eriction theory:!!psycho:social development!!child development
   https://youtu.be/NEL6wNmSqFQ
5. खेल एवं विकास
   https://youtu.be/dXMRB97r57E
6. बाल विकास में खेल और काम में अन्तर
   https://youtu.be/FANhL3AdksE
7. संवेगात्मक विकास
   https://youtu.be/EFxlkCpedlg
8. विभिन्न अवस्थाओं में क्रियात्मक विकास
   https://youtu.be/v9Zra08uS9Q
9. Stages of development infancy babyhood ,earl childhood late childhood adolescence adulthood old age
   https://youtu.be/2fgDs8SgpY8
10. जीन पियाजे के सिद्धांत
    https://youtu.be/gnlkUzdWV0Y
11. POCSO,PCPNDT CARA GAWA!!FOR WOMEN AND CHILDREN
    https://youtu.be/aL6tEqkbD64
12. Psycho sexual theory by Freud (child development)
    https://youtu.be/Y7jyaURVJuM
13. बाल्यावस्था में होने वाले क्रियात्मक विकास
    https://youtu.be/1Fy:FJY4WhY
14. Child Development :Reflex Action: Moro. rooting. palmer. grasp reflex in Infancy Stage
    https://youtu.be/BUs2UO5Si1o
15. गर्भावस्था की अवस्थाएं
    https://youtu.be/Idui61y1M5A
16. शैशवावस्था की विशेषताएं
    https://youtu.be/JwhscommKQg
17. कोलबर्ग की थ्योरी
    https://youtu.be/9AAV21lfTOY
18. Piagets Cognitive development theory
    https://youtu.be/QRXOneFB0Qo
19. Piaget's Cognitive development theory
    https://youtu.be/L9wcWOrZzK4
20. psychosexual theory
    https://youtu.be/GSMNWoD45VA
21. फ्रायड की मनोविश्लेषणात्मक सिद्धान्त
    https://youtu.be/ZgKrYH3HF34

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 75 Continuous Comprehensive Evaluation(CCE): 15 University Exam (UE): 60		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)



Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session:**2022:2023**
1	Course Code	HSC-15P		
2	Course Title	LAB15: Early Childhood Care and Education		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of objectives and various methods of studying Early childhood care and education.		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: 1. To understand Basic Knowledge objectives of child care. 2. To understand approaches to care children. 3. To understand current status and expansion techniques of ECCE. 4. To understand how to develop Language skills in children. 5. To understand importance of play in childhood. 6. To understand Basic Knowledge of Evaluation techniques related with children.		
6	Credit Value	**Practical: 2**		
7	Total Marks	**Max. Marks: 25**	**Min Passing Marks : 09**	

Part B: Content of the Course	
Total NO. of Periods:15	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more Experiment as per requirement 1. Plan three activities for children: list objectives, analyst tasks to achieve goals, select and organize instructional and .learning materials, teacher's role, Preparation of evaluation sheets i.e. chick list, rating scale. 2. Prewriting activities. (a) Mathematics (b) Readiness (c) Materials for classifying, comparing, serrations, patterning, counting shapes, Fractions, list vocabulary related to mathematical concepts. (d) Material for addition, subtraction, multiplication and divisions. , (e) Graphs. (f) Experiences for understanding time distance weight, capacity and Money. 4. Plan science experiences. 5. **Project**: Plan a study based on lessons of first and second standard, plan Activities which children can do at home.

अध्यक्ष
शहीद नंदकुमार पटेल
महाविद्यालय, जगदलपुर (छ.ग.)

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. प्रारम्भिक बाल्यावस्था, देखभाल एवं शिक्षा, डा. सविता सक्सेना, 4th edition, Shri vinod Mandir Publication
2. Early childhood care and education, M Sen Gupta, Eastern economy edition, PHI publication.
3. Early childhood care and education, J.C. Aggarwal, S. Gupta,2nd edition, Shipra Publication.
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7. Early detection of disabilities and persons with disabilities in the community, Chopra, G.2012th edition, Engage Publications.

E-Learning Sources:

1. भाषा एवं वाणी किसे कहते हैं
   https://youtu.be/2vcqU2FOU90
2. भाषा विज्ञान के सिद्धान्त
   https://youtu.be/4ug6UUqWcQM
3. भाषा विकास मे वाणी विकार क्या होते हैं
   https://youtu.be/IV35upbHPPY
4. Eric:eriction theory:!!psycho:social development!!child development
   https://youtu.be/NEL6wNmSqFQ
5. खेल एवं विकास
   https://youtu.be/dXMRB97r57E
6. बाल विकास में खेल और काम में अन्तर
   https://youtu.be/FANhL3AdksE
7. संवेगात्मक विकास
   https://youtu.be/EFxlkCpedlg
8. विभिन्न अवस्थाओं में क्रियात्मक विकास
   https://youtu.be/v9Zra08uS9Q
9. Stages of development infancy babyhood ,earl childhood late childhood adolescence adulthood old age
   https://youtu.be/2fgDs8SgpY8
10. जीन पियाजे के सिद्धांत
    https://youtu.be/gnlkUzdWV0Y
11. POCSO,PCPNDT CARA GAWA!!FOR WOMEN AND CHILDREN
    https://youtu.be/aL6tEqkbD64
12. Psycho sexual theory by Freud (child development)
    https://youtu.be/Y7jyaURVJuM
13. बाल्यावस्था में होने वाले क्रियात्मक विकास
    https://youtu.be/1Fy:FJY4WhY
14. गर्भावस्था की अवस्थाएं

https://youtu.be/Idui61y1M5A

15. शैशवावस्था की विशेषताएं

https://youtu.be/JwhscommKQg

16. कोलबर्ग की थ्योरी

https://youtu.be/9AAV21IfTOY

17. Piagets Cognitive development theory

https://youtu.be/QRXOneFB0Qo

18. Piaget's Cognitive development theory

https://youtu.be/L9weWOrZzK4

19. psychosexual theory

https://youtu.be/GSMNWoD45VA

20. फ्रायड की मनोविश्लेषणात्मक सिद्धान्त

https://youtu.be/ZgKrYH3HF34

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 25 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam (UE): 25		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Not Applicable

अध्यक्ष मंडल .....
शहीद महेन्द्रकर्मा
विश्वविद्यालय, जगदलपुर (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. सबीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. मास्ती सेठी, डॉ. खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई, – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि सिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, वामन राव पाटनकर महिला महावि, दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीकास महिला महावि. अंबिकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर. देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राव, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि, बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोभा महिस्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोंडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे,

अध्यक्ष मंडल
शासकीय बिलासा कन्या महाविद्यालय
विश्वविद्यालय, रायपुर (छ.ग.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session:**2022:2023**
1	Course Code	HSC-16T		
2	Course Title	Extension Education		
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 enable to: • To understand basic concept of Extension. • To understand basic Knowledge of Role of NGOs for the community. • To understand basic concept of Principle and Methods of extension. • To understand basic Knowledge of Enhancement of food production. • To understand basic concept of Family welfare programs.		
6	Credit Value	**Theory: 4**		
7	Total Marks	**Max. Marks: 60+15**	**Min Passing Marks : 25**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**NO. of Periods**
I	**Concept of Education:** Meaning of Extension, Origin of Extension Extension Education Process- Environment for learning, Role of educator.	12
II	**Concept of adult / Non formal education:** Meaning, Purpose Five Year Plans: History of planning in India, Five year plans and their focus.	12
III	**Programs to enhance food production:** National food production programs. Poverty alleviation efforts: Programs for poverty alleviation for rural and urban areas.	12
IV	**Programs for women and children:** Women as target groups: specific measures for women and children such as DWCRA, ICDS, IMY. Current programs for women as initiated and implemented by the different ministries and Departments. Role of NGOs: Need for participation of Non-Governmental organizations in developmental efforts.	12
V	**Advertising Media:** Non-media advertising, Outdoor advertisement : Hoardings, Posters, Bill boards, Bulletin Boards, and Electronic sings, Litterbins, Aerial methods, Transportation media (Mobile Vehicles).	12
Keywords:: Concept of Education, Extension Education Process,adult / NOn formal education, Five Year Plans, food production, Poverty alleviation, Programs for women and children, Role		

अध्ययन मंडल .....
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विश्वविद्यालय, रायगढ़ (छ.ग.)

of NGO, Advertising Media.

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. Extension Education: Vrinda Singh,2nd edition, Panchsheel Publication
2. Education and communication for development: O P Dhama,2rd edition, oxford publication.
3. Extension Education and Communication: V K Dubey, 1st edition, New age International Publication.
4. Extension Communication and Management: G L Ray, 3rd edition, Kalyan Publication
5. A brief book on Extension Education: Shruti Madan Singh,2nd edition, New Vishal Publication.

E-Learning Sources:

1. Communication:types, function, model
   https://youtu.be/:bW8gYwOlGM
2. प्रसार शिक्षा क्या होता है :2
   https://youtu.be/c7fQOnIyV6s
3. प्रसार शिक्षा क्या होता है :1
   https://youtu.be/6EI5S2wpBlk
4. History of extension education
   https://youtu.be/oCJ4NIzch7w
5. Process of Extension Education
   https://youtu.be/vOVmKIgSCzs
6. प्रसार शिक्षा के दर्शन
   https://youtu.be/NKQlQMVNZdQ
7. Extension Teaching method: Audio ,Visual, Audio-visual
   https://youtu.be/kSXiAQFd7sI
8. Types of chart: pictorial ,organization, flow-line
   https://youtu.be/lLhXyUbrI70
9. Types of communication : intra ,inter group ,communication.
   https://youtu.be/T50JUwc1_Bs
10. Elements of Adoption and categories of Adopters in extension education!! Extension Education!
    https://youtu.be/sBCXbB_7_44
11. Extension and communication
    https://youtu.be/V8IZsdIzbMc
12. Extension Education
    https://youtu.be/x4VqsPFSXcA
13. Teaching aids
    https://youtu.be/l5amubD_DZg
14. प्रसार शिक्षा में कार्यक्रम नियोजन की प्रक्रिया
    https://youtu.be/sIUE_xg5ElM

अध्ययन मंडल
शहीद मंगल पांडेय
विश्वविद्यालय, मेरठ (उ.प्र.)

15. seven C's of effective communication https://youtu.be/tZkvgFuzLSw

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:: Maximum Marks: 75 Continuous Comprehensive Evaluation(CCE): 15 University Exam (UE): 60		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)

अध्यक्ष
अध्ययन मंडल
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session:**2022:2023**
1	Course Code	HSC-16P		
2	Course Title	Extension Education		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of Extension education practices in Home Science		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: 1. To understand importance of Extension techniques. 2. To understand importance of role of NGOs for the community. 3. To understand techniques for mass communication. 4. To understand script writing related with community problems. 5. To understand implication of extension activities for the subject.		
6	Credit Value	**Practical: 2**		
7	Total Marks	**Max. Marks: 25**	**Min Passing Marks : 09**	

Part B: Content of the Course	
Total NO. of Periods :15	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more Experiment as per requirement : 1. Visits to Radio / T.V. stations. 2. Script writing for Radio. 3. Visit to Extension Education Unit. 4. Write slogan about Adult-Education. 5. **Project**: Designing an Advertisement for any product with relevant slogan 6. Designing an advertising policy for any product.

Part C: Learning Resources
Text Books. Reference Books, Other Resources
Suggested Readings: 1. Extension Education: Vrinda Singh,2nd edition, Panchsheel Publication 2. Education and communication for development: O P Dhama,2rd edition, oxford publication. 3. Extension Education and Communication: V K Dubey, 1st edition, New age International Publication. 4. Extension Communication and Management: G L Ray, 3rd edition, Kalyan Publication 5. A brief book on Extension Education: Shruti Madan Singh,2nd edition, New Vishal Publication.

E-Learning Sources:

1. Communication:types, function, model
   https://youtu.be/:bW8gYwOlGM
2. प्रसार शिक्षा क्या होता है :2
   https://youtu.be/c7fQOnIyV6s
3. प्रसार शिक्षा क्या होता है :1
   https://youtu.be/6EI5S2wpBlk
4. History of extension education
   https://youtu.be/oCJ4NIzch7w
5. Process of Extension Education
   https://youtu.be/vOVmKIgSCzs
6. प्रसार शिक्षा के दर्शन
   https://youtu.be/NKQlQMVNZdQ
7. Extension Teaching method:Audio ,Visual, Audio:visual
   https://youtu.be/kSXiAQFd7sI
8. What is chart and poster? types of chart: pictorial ,organization, flow,line
   https://youtu.be/lLhXyUbrI70
9. What is communication? types of communication :intra ,inter group ,communication.
   https://youtu.be/T50JUwc1_Bs
10. Elements of Adoption and categories of Adopters in extension education!! Extension Education!
    https://youtu.be/sBCXbB_7_44
11. Extension and communication
    https://youtu.be/V8IZsdIzbMc
12. Extension Education
    https://youtu.be/x4VqsPFSXcA
13. Teaching aids
    https://youtu.be/l5amubD_DZg
14. प्रसार शिक्षा में कार्यक्रम नियोजन की प्रक्रिया
    https://youtu.be/sIUE_xg5ElM
15. Seven C's of effective communication
    https://youtu.be/tZkvgFuzLSw

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:: Maximum Marks: 25 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam (UE): 25		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Not Applicable

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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. बबीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. भारती सेठी, डॉ, खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई, – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि मिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, वामन राव पाटनकर महिला महावि, दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीक्रास महिला महावि. अंबिकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर, देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राव, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि, बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोभा महिस्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोंडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे.

अध्यक्ष मंडल
शहीद वीरनारायण सिंह
विश्वविद्यालय, बालोद (छ.ग.)

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session: **2022:2023**
1	Course Code	HSC-17T		
2	Course Title	Foundation of Art and Design		
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 enable to: 1. To understand basic Knowledge of various designs. 2. To understand basic Knowledge of role of accessories in any house. 3. To understand basic concept of family housing needs. 4. To understand basic Knowledge of financial management in home. 5. To understand basic concept of Landscape planning.		
6	Credit Value	**Theory: 4**		
7	Total Marks	**Max. Marks: 60+15**	**Min Passing Marks : 25**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**NO. of Periods**
I	**Introduction to foundation of Art:** Design, Definition and types:: Structural and Decorative, Elements of design ,Light : Characteristics and Classification, Study of Colour : classification, dimensions, colour schemes and effect.	12
II	**Indian, regional, traditional and contemporary arts and their use in:** Floor decoration, Home decoration, Accessories.	12
III	**Family's Housing Needs:** Protective, economic, affection, social, standard of living, housing goals, style and function occupation. Factors influencing selection and purchase of site for house building. Legal aspects, location, physical feature, soil conditions, cost, services. Landscape planning : Principles and application.	12
IV	**Financial Considerations:** Availability of funds for housing, Housing Development finance corporation, Cooperative Housing Society, Life Insurance corporation, Cooperative Banks, Loan from provident fund Finance corporation of India. **Disability of owning versus renting:** Housing problems, causes and remedial measures.	12
V	**Furniture:** Styles of furniture: traditional contemporary and modern. Selection of furniture for comfort, rest and relaxation for work, for storage Arrangement of furniture for living. Sleeping, dining and multipurpose rooms, Accessories and their role in interiors.	12

Keywords: Introduction to foundation of art, Indian, regional, traditional and contemporary arts, Family's Housing , Needs, Landscape planning, Financial Considerations, Disability of owning versus renting, Furniture, Accessories and their role in interiors.

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. Art and Design , Rachel Logan
2. Art and Design: Garry whitehead, 1st edition, Collins Publication.
3. Foundation of art and design: Dr.Pranav Bhatt, 3rd Edition, Embassy Publication.
4. Art and Design: Virginia Evans,11th edition, Express Publishing Company
5. Foundation of digital art and design: Xtine Burrough, 1st edition, Adoby creative Art publication, New Ridders publication.
6. The Interior Design: Chris Grimley,3rd edition, Rockport publication.
7. Home Management: MA Varghese, 2nd edition. New age International Publication.
8. Management in Family living: Nickell Dorsie ,4th edition, Macmillan Publication.

E- Learning sources:

1. बुनाई के प्रकार!! सादी ,ट्वील,सेटीन!
   https://youtu.be/RAIuqExxtdw
2. भारत के प्रसिद्ध परम्परागत वस्त्र एवं कढ़ाई
   https://youtu.be/7kk3kb_YOBA
3. भारत के प्रसिद्ध परम्परागत वस्त्र !!जामदानी, कशीदाकारी,कसूती, चिकनकारी भाग
   https://youtu.be/wdNF_R39zTg
4. What is garment design
   https://youtu.be/Ef:0HUjl_Tc
5. Man made fibres :part 2# nylon, polyester ,acrylic
   https://youtu.be/4Y4Ic9v:Rxs
6. What is printing? types of printing:Hand and modern printing
   https://youtu.be/fvDeOy3BedE
7. Types of printing:block roller, transfer,batik, digital printing
   https://youtu.be/W4d0WIHFFSk
8. विभिन्न प्रकार के रेशों एवं उनके गुण:cotton ,wool and Silk ,rayon
   https://youtu.be/Ps:hY1BwZd4
9. Textile Fibre Properties and Definition of Textile
   https://youtu.be/NC7Hlk8cV84
10. Physical and Chemical Properties of Cotton II Ginning and Harvesting of Cotton
    https://youtu.be/XcCSoEGt8YU

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::

Maximum Marks: 75

Continuous Comprehensive Evaluation(CCE): 15

University Exam (UE): 60

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)

अध्ययन मंडल .....

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc. Home Science III Year**	Year: **2022**	Session:**2022:2023**
1	Course Code	HSC-17P		
2	Course Title	LAB17:Foundation Of Art And Design		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of Indian Art, housing and family's financial management.		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: 1. To understand concept of Indian Art. 2. To understand basic Knowledge Family housing needs of Indian Families. 3. To understand techniques for the financial management for families. 4. To understand basic concept of colour schemes and their impact. 5. To understand basic concept of Landscape planning.		
6	Credit Value	**Practical: 2**		
7	Total Marks	**Max. Marks: 25**	**Min Passing Marks : 09**	

Part B : Content of the Course	
Total NO. of Periods :15	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more Experiment as per requirement 1. Freehand drawing: Memory drawing and sketching. 2. Scale drawing, solid geometry, orthographic. 3. Preparation of colour wheel and colour schemes. 4. Elements of design laws of field size, proportion, types of shadows. 5. Residential space planning : scale, lines, abbreviations, metric projections, definingspace by shades, shadows. 6. Lettering. 7. Use of colour for wall/floor decoration and making accessories. 8. Application of design principles in flower arrangement, styles of flower ar arrangement,inNOvation of new styles. 9. Gift wrapping and preparing decorative articles of fibre, fabric, coir, bamboo, clay,metal etc. 10. **Project:**Drawing house plans with standard specification. 11. Furniture layout of living, dining. Kitchen and bedroom designs presentation withfurniture layout, sectional elevation, views. 12. Development of designs and construction of any five of the under mentioned items :Cushions, curtains, carpets, doormats, rugs, table mates. 13. Wall paintings, picture frame design. 14. Graphic designs.

अध्ययन मंडल .....
शहीद गंजुमार पटेल
विश्वविद्यालय, रायपुर (छ.ग.)

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. Art and Design , Rachel Logan
2. Art and Design: Garry whitehead, 1st edition, Collins Publication.
3. Foundation of art and design: Dr. Pranav Bhatt, 3rd Edition, Embassy Publication.
4. Art and Design: Virginia Evans,11th edition, Express Publishing Company
5. Foundation of digital art and design: Xtine Burrough, 1st edition, Adoby creative Art publication, New Ridders publication.
6. The Interior Design: Chris Grimley,3rd edition, Rockport publication.
7. Home Management: MA Varghese, 2nd edition. New age International Publication.
8. Management in Family living: Nickell Dorsie ,4th edition, Macmillan Publication.

E- Learning sources:

1. बुनाई के प्रकार!! सादी ,ट्वील,सेटीन!
   https://youtu.be/RAIuqExxtdw
2. भारत के प्रसिद्ध परम्परागत वस्त्र एवं कढ़ाई
   https://youtu.be/7kk3kb_YOBA
3. भारत के प्रसिद्ध परम्परागत वस्त्र !!जामदानी, कशीदाकारी,कसूती, चिकनकारी भाग
   https://youtu.be/wdNF_R39zTg
4. What is garment design
   https://youtu.be/Ef:0HUjl_Tc
5. Man made fibres :part 2# nylon, polyester ,acrylic
   https://youtu.be/4Y4Ic9v:Rxs
6. What is printing? types of printing:Hand and modern printing
   https://youtu.be/fvDeOy3BedE
7. Types of printing:block roller, transfer,batik, digital printing
   https://youtu.be/W4d0WIHFFSk
8. विभिन्न प्रकार के रेशों एवं उनके गुण:cotton ,wool and Silk ,rayon
   https://youtu.be/Ps:hY1BwZd4
9. Textile Fibre Properties and Definition of Textile
   https://youtu.be/NC7Hlk8cV84
10. Physical and Chemical Properties of Cotton II Ginning and Harvesting of Cotton
    https://youtu.be/XcCSoEGt8YU

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::

Maximum Marks: 25

Continuous Comprehensive Evaluation(CCE): Not Applicable

University Exam (UE): 25

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

अध्यक्ष मंडल
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. बबीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. भारती सेठी, डॉ. खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई, – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि मिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, वामन राव पाटनकर महिला महावि, दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीक्रास महिला महावि. अंबिकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर. देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राय, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि, बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोभा महिश्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे.

अध्ययन मंडल ..... शहीद गेंदसिंह विश्वविद्यालय, रायगढ़ (छ.ग.)

Part A: Introduction				
Program: Degree Course		Class: B.Sc. Home Science III Year	Year: 2022	Session:2022:2023
1	Course Code	IISC-18T		
2	Course Title	Apparel Making and Fashion Designing		
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 enable to: • To understand textile fibers. • To understand Importance of Clothing. • To understand Latest Fashion trends. • To understand various patterns in clothing. • To understand traditional embroidery of Indian tradition.		
6	Credit Value	Theory: 4		
7	Total Marks	Max. Marks: 60+15	Min Passing Marks : 25	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**NO. of Periods**
I	**Clothing: meaning and significance:** Origin of clothing, Costumes of ancient age , Costumes of modern age, Importance of clothing, Sociological and psychological aspects of clothing , Selection of suitable fabric for dress.	12
II	**Personality:** meaning, types and factors affecting personality Role of costumes in improving personality, Clothing and personality. Fashion: definition, theories, Fashion trends in India, Trimming materials used for making garment, Ornamentation techniques.	12
III	**General principles of tailoring and sewing machine:** Tailoring tools, Methods of taking body measurements for different garments, Pattern making techniques and pattern alteration, Flat pattern, Cloth estimation.	12
IV	**Fashion Illustrations:** Disposals of fullness, Plackets, Neck lines, Collars, Sleeves, Frill and gathers, Patch work.	12
V	**Traditional Embroideries of India:** Kasida of Kashmir, Kantha of Bengal, Chikankari of lucknow, Kutch and Kathiawar, Kasuti of Karnataka, Phulkari of Punjab, Zari embroidery.	12
Keywords::	Clothing , Impact of clothing on psychological profile, Cloth for various different occasions, Body Measurements, Fashion Illustrations, Finishing of garments, Embroidery.	

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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. वस्त्र विज्ञान एवं परिधान का परिचय, डा. मंजु पटनी, स्टार पब्लिकेशन, आगरा.
2. वस्त्र विज्ञान एवं परिधान: डा. प्रमिला वर्मा, 11th edition, Privilege Publication.
3. Fundamental of textiles and their care : Susheela Dantgagi, 5th edition, Orient blacksawn Publication.
4. Textile Design (Theory and concepts): Charu Swami, 7th edition, New age International publication .
5. Textile Science(A Practical Manual): Dr. Deepali Rastogi, 3rd edition, Elite Publication.
6. Textile Yarns: B.C.Goswami, 3rd edition, Wiley India Publication.

E-Learning sources:

1. बुनाई के प्रकार!! सादी ,ट्वील,सेटीन!
   https://youtu.be/RAIuqExxtdw
2. भारत के प्रसिद्ध परम्परागत वस्त्र एवं कढ़ाई
   https://youtu.be/7kk3kb_YOBA
3. भारत के प्रसिद्ध परम्परागत वस्त्र !!जामदानी, कशीदाकारी,कसूती, चिकनकारी भाग
   https://youtu.be/wdNF_R39zTg
4. What is garment design
   https://youtu.be/Ef:0HUjl_Tc
5. Man made fibres :part 2# nylon, polyester ,acrylic
   https://youtu.be/4Y4Ic9v:Rxs
6. What is printing? types of printing: Hand and modern printing
   https://youtu.be/fvDeOy3BedE
7. Types of printing:block roller, transfer,batik, digital printing
   https://youtu.be/W4d0WIHFFSk
8. विभिन्न प्रकार के रेशों एवं उनके गुण:cotton ,wool and Silk ,rayon
   https://youtu.be/Ps:hY1BwZd4
9. Textile Fibre Properties and Definition of Textile
   https://youtu.be/NC7Hlk8cV84
10. Physical and Chemical Properties of Cotton II Ginning and Harvesting of Cotton
    https://youtu.be/XcCSoEGt8YU

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::

Maximum Marks: 75

Continuous Comprehensive Evaluation(CCE): 15

University Exam (UE): 60

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	Two Test each of 15 Assignment Marks: 15 (Mean of Two Tests + Assignment Divided by 2)

अध्यक्ष संकाय
शहीद
विश्वविद्यालय, रायगढ़ (छ.ग.)

Part A: Introduction				
Program: Degree Course		Class: B.Sc. Home Science III Year	Year: 2022	Session:2022:2023
1	Course Code	HSC-18P		
2	Course Title	Apparel Making and Fashion Designing		
3	Course Type	Practical		
4	Pre-requisite (if any)	Theoretical Knowledge of Cloth construction.		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be enable to: • To understand textile fibers fit for any specific occasion. • To understand techniques of body measurement. • To understand cloth cutting and stitching techniques. • To understand various patterns in clothing construction. • To understand traditional embroidery of Indian tradition.		
6	Credit Value	Practical: 2		
7	Total Marks	Max. Marks: 25	Min Passing Marks : 09	

Part C: Content of the Course	
	Total NO. of Periods :15
Tentative Practical List	Note: This is tentative list; the teachers concern can add more Experiment as per requirement 1. Making samples of traditional embroideries of India : (i) Kashida of kashmir (ii) Kantha of Bengal. (iii) Kasuti of karnataka (iv) Kutch and kathiawar (v) Phulkari of punjab (vi) Chikankari of luckNOw (vii) Zari embroidery 2. 07 days workshop on Trimming materials 3. 07 days workshop on Ornamentation techniques in garments 4. 07 days workshop on Tailoring 5. 07 days workshop on fashion illustration 6. 07 days workshop on hand embroidery stitches 7. Educational visit to Boutique and famous tailoring shop Preparation of paper pattern for all age groups 8. Adoption of the basic block to various clothes and their stitching: blouse, Salwar, Chudidar Kameez , Petticoats , Frock , Night Dress. 9. Educational visit to garment industry.

अध्ययन मंडल
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विश्वविद्यालय, रायगढ़ (छ.ग.)

Part C: Learning Resources

Text Books. Reference Books, Other Resources

Suggested Readings:

1. वस्त्र विज्ञान एवं परिधान का परिचय, डा. मंजु पटनी, स्टार पब्लिकेशन, आगरा.
2. वस्त्र विज्ञान एवं परिधानरू डा.प्रमिला वर्मा, 11th edition, Privilege Publication.
3. Fundamental of textiles and their care : Susheela Dantgagi, 5th edition, Orient blacksawn Publication.
4. Textile Design (Theory and concepts): Charu Swami, 7th edition, New age International publication .
5. Textile Science(A Practical Manual): Dr. Deepali Rastogi, 3rd edition, Elite Publication.
6. Textile Yarns: B.C.Goswami, 3rd edition, Wiley India Publication.

E- Learning sources:

1. बुनाई के प्रकार!! सादी ,ट्वील,सेटीन!
   https://youtu.be/RAIuqExxtdw
2. भारत के प्रसिद्ध परम्परागत वस्त्र एवं कढ़ाई
   https://youtu.be/7kk3kb_YOBA
3. भारत के प्रसिद्ध परम्परागत वस्त्र !!जामदानी, कशीदाकारी,कसूती, चिकनकारी भाग
   https://youtu.be/wdNF_R39zTg
4. What is garment design
   https://youtu.be/Ef:0HUjl_Tc
5. Man made fibres :part 2# nylon, polyester ,acrylic
   https://youtu.be/4Y4Ic9v:Rxs
6. What is printing? types of printing:Hand and modern printing
   https://youtu.be/fvDeOy3BedE
7. Types of printing:block roller, transfer,batik, digital printing
   https://youtu.be/W4d0WIHFFSk
8. विभिन्न प्रकार के रेशों एवं उनके गुण:cotton ,wool and Silk ,rayon
   https://youtu.be/Ps:hY1BwZd4
9. Textile Fibre Properties and Definition of Textile
   https://youtu.be/NC7Hlk8cV84
10. Physical and Chemical Properties of Cotton II Ginning and Harvesting of Cotton
    https://youtu.be/XcCSoEGt8YU

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods::

Maximum Marks: 25

Continuous Comprehensive Evaluation(CCE): Not Applicable

University Exam (UE): 25

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

अध्यक्ष
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

आज दिनांक 31.05.2022 को केन्द्रीय अध्ययन मण्डल की मीटिंग गृहविज्ञान विभाग में आयोजित की गई जिसमें निम्नलिखित सदस्य उपस्थित हुए तथा विभिन्न गृहविज्ञान से संबंधित विषयों के पाठ्यक्रम संशोधित एवं अनुमोदित किये गये–

डॉ. सीमा मिश्रा, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – अध्यक्ष,

डॉ. चंचीता दुबे – प्रतिनिधि, उच्च शिक्षा विभाग, नया रायपुर

डॉ. भारती सेठी, डॉ, खूबचंद बघेल शासकीय स्नातकोत्तर महाविद्यालय, भिलाई–3, दुर्ग – सदस्य 31/5/22

डॉ. संध्या वर्मा, शासकीय कला एवं वाणिज्य महावि. देवेन्द्र नगर, रायपुर – सदस्य

डॉ. संध्या मृदन मोहन,प्राचार्य,भिलाई महिला महाविद्यालय, भिलाई. – सदस्य

एवं अध्यक्ष, अध्ययन मण्डल, हेमचंद यादव विश्वविद्यालय

डॉ. रश्मि सिंज, दूधाधारी महिला महावि. रायपुर – सदस्य

डॉ. अल्का दुग्गल, वामन राव पाटनकर महिला महावि. दुर्ग – सदस्य 31.5.22

डॉ. निशा श्रीवास्तव, होलीकास महिला महावि. अंबिकापुर – सदस्य

डॉ. शिप्रा बनर्जी, दूधाधारी महिला महावि. रायपुर – सदस्य

श्रीमती ममता आर. देव, शासकीय कमलादेवी राठी महिला स्नातको. महावि. राजनांदगांव छ.ग. – सदस्य

सुश्री सुषमा घई, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. दीपाली राव, शासकीय घनश्याम सिंह गुप्त स्नातको.महावि. बालोद – सदस्य

डॉ. अर्चना दीक्षित, शासकीय बिलासा कन्या महाविद्यालय, बिलासपुर – सदस्य

डॉ. शोभा महिस्वर, शासकीय माता शबरी महावि. बिलासपुर – सदस्य

डॉ वर्षा डोंडिया, विषय विशेषज्ञ तथा शेष अन्य सदस्य ऑन लाइन उपस्थित रहे।

अध्यक्ष
अध्ययन मंडल
शहीद गेंदसिंह पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

रसायन

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

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	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

अध्ययन मंडल .....
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	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/#

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- 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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7. Dr. P.K. Agnihotri, Professor, Govt. Yuganandam Chhattisgarh College Raipur(C.G.) - Member
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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

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	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 λ_{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
6. Dogra, S.K.,Physical Chemistry through problems, Wiley Eastern.

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7. Khera, H.C., Gurtu, J.N., Singh, J., Chemistry for B.Sc. Ist Year, Pragati Prakashan
8. Ball, D.W., Physical Chemistry, Thomson Press, India, 2007
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

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Part D: Assessment and Evaluation
Maximum Marks: 50

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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

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	• 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

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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/

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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.	 08 marks 04 marks
Organic chemistry – Two experiments to be performed. a) Qualitative analysis of organic mixture containing two solid components.	08 marks (03 marks for each compound and 02 marks for separation)
b) One experiment from synthesis of organic compound	04 marks
Physical chemistry – one experiment from physical chemistry	12 marks
Sessional	04 marks
Viva	10 marks
[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].	

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(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

इलेक्ट्रानिक

Scheme & Syllabus

Subject: Electronics

Approved at Central Board of Studies meeting held at School of Studies in Electronics & Photonics on 22nd Feb, 2023

Jointly by
School of Studies in Electronics & Photonics
Pt. RavishankarShukla University
Raipur (C.G.)
&
Office of Commissioner
Department of Higher Education
Govt. of Chhattisgarh, IndrāvatiBhavan,
Naya Raipur (C.G.)

22.2.23

22-2-2023

27.6.23

(Dr. A.K. Panigrahi)

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B.Sc. Electronics (Three Year)

Programme Outcomes (PO)

PO creates an educational environment to train the students to meet the challenges of modern Electronics & Communication industry through state of the art technical knowledge and present challenges. Following are the expected programme outcomes.

- Analyze, plan and apply the acquired knowledge in basic sciences and mathematics in solving Electronics and Communication Engineering problems with technical, economic, environmental and social contexts.
- Design, build and test analog & digital electronic systems for given specifications.
- Architect modern communication systems to meet stated requirements.
- Work in a team using technical knowhow, common tools and environments to achieve project objectives.
- Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.
- In addition the course caters to the requirements of providing complete exposure to NET/SET syllabus for Electronics farmed by the U.G.C.

Programme Specific Outcomes (PSO)

PSO enables the students

- To understand basic facts and concepts in Electronics while retaining the exciting aspects of Electronics so as to develop interest in the study of Electronics as a discipline.
- To develop the ability to apply the electronic circuits.
- To get benefited with the present state of art of the electronic based circuit and serve society with its applications.
- To develop the capability to work hands-on on the electronic circuits that is becoming vital for the mankind for the purpose of work regulation
- To be familiarized with the emerging areas of Electronics and their applications in various spheres of Electronic sciences.
- To appraise the capability of students to make its relevance in future studies.
- To develop skills in the building and studying the circuits along with the software implementation.
- To be exposed to get compete with present scenario of the industrial automation.

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Three Year (Yearly) Syllabus for Undergraduates

As recommended by Central Board of Studies of Electronics
For approval of Kuladhipati, Governor of Chhattisgarh
For Three Years 2023-26
July 2023 onwards
Class: B.Sc. Electronics

Program: Certificate/Diploma/Degree

Paper Code	Courses Opted	Title of Course	Total Credit (per year)	Total No. of (L-T-P) (Per week)
First Year (Under Graduate Certificate in Electronics)				
ELC-101T	Core Course-1	Network Analysis and Analog Electronics	4	2-0-0
ELC-102T	Core Course-2	Digital Electronics	4	2-0-0
ELC-103P	Core Course-1 &2 Practical/Tutorial	Network Analysis, Analog and Digital Lab	2	0-0-2
Second Year (Under Graduate Diploma in Electronics)				
ELD-201T	Core Course-3	Operational Amplifier	4	2-0-0
ELD-202T	Core Course-4	Industrial Electronics	4	2-0-0
ELD-203P	Core Course-3 & 4 Practical/Tutorial	Operational Amplifier and Industrial Electronics Lab	2	0-0-2
Third Year (Degree Bachelor in Electronics)				
ELB-301T	Core Course-5	Communication Electronics	4	2-0-0
ELB-302T	Core Course-6	Microprocessor and Microcontroller	4	2-0-0
ELB-303P	Core Course-5 & 6 Practical/Tutorial	Communication Electronics, Microprocessor and Microcontroller Lab	2	0-0-2

1. **Internship/Apprenticeship providing agencies would be enlisted by the concerned University.**
2. **15 Periods (10 hrs. of teaching) = 1 Credit**

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Three Year (Yearly) Syllabus for Undergraduates

As recommended by Central Board of Studies of Electronics
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For Three Years 2023-26
July 2023 onwards
Class: B.Sc. Electronics

Scheme of Examination

Paper Code	Course Opted	Title of Course	Theory	Practical	Grand Total	Minimum Passing Marks
First Year (Under Graduate Certificate in Electronics)						
ELC-101T	Core Course-1	Network Analysis and Analog Electronics	50	--	100	33
ELC-102T	Core Course-2	Digital Electronics	50	--		
ELC-103P	Core Course-1 &2 Practical/Tutorial	Network Analysis, Analog and Digital Lab	--	50	50	17
Second Year (Under Graduate Diploma in Electronics)						
ELD-201T	Core Course-3	Operational Amplifier	50	--	100	33
ELD-202T	Core Course-4	Industrial Electronics	50	--		
ELD-203P	Core Course-3 & 4 Practical/Tutorial	Operational Amplifier and Industrial Electronics Lab	--	50	50	17
Third Year (Degree Bachelor in Electronics)						
ELB-301T	Core Course-5	Communication Electronics	50	--	100	33
ELB-302T	Core Course-6	Microprocessor and Microcontroller	50	--		
ELB-303P	Core Course-5 & 6 Practical/Tutorial	Communication Electronics, Microprocessor and Microcontroller Lab	--	50	50	17

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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

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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

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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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विश्वविद्यालय, रायगढ़ (छ.ग.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

इनफॉरमेशन टेक्नालॉजी

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.

अध्यक्ष Dr. Vikram Gupta
C.S.
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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

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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=PGWZUgzDMYI&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
Prof. and Head, Dept. of Computer Science and Application
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

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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
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
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 (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 02.06.2022

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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

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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

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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/

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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
   Prof. and Head, Dept. of Computer Science and Application
   - Chairman
2. Dr. Sanjay Kumar
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
   - Member
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   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
   - Member
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   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
   - Member
5. Dr. Mamta Singh
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   Hemchand Yadav Vishwavidyalaya, Durg
   - Member
6. Mr. Sushil Kumar Sahu
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
   - Member
7. Mr. Vikrant Gupta
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
   - Member
8. Mr. L.K. Gavel
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
   - Member
9. Dr. Anil Kumar Sharma
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
   - Member
10. Mr. Vishwnath Tamrakar
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
    - Member
11. Ms. Anjeeta Kujur
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
    - Member
12. Mr. Suresh Kumar Thakur
    - Member

अध्यक्ष, बोर्ड 10/07/25
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विश्वविद्यालय, जशपुर (छ.ग.)

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

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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 yearl. 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

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	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

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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

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विश्वविद्यालय, जशपुर (छ.ग.)

Declaration

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    Sant Gahira Guru University Sarguja, Ambikapur
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    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Dr. Vikrant Gupta

अध्यक्ष

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

गणित

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.

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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.

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	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.

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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

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	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

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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.
   Govt. N.K. College, Kota
4. Ram Lakhan Pandey - Member
   Asst. Prof.
   Dr. B.R. Ambedkar Govt. College, Baloda
5. Dr. Arun Kumar Mishra - Member
   Professor
   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
   Asst. Prof.
   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

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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 have 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)

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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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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

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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

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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=PLwdnzlV3ogoXUbOmP-T2gPhYXeEcxP6U8

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 – 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

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	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* (7th edition),Pearson Education, India. 2008
3. M.K. Jain, S. R. K. Iyengar & R. K. Jain. *Numerical Methods for Scientificand Engineering Computation* (6th 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=pOtnzAXlXvI&list=PL3pGy4HtqwD0CWdFuygdF-gk0ORk5EFZg

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 – 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

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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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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

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	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-JUEZi7uS6IAT9a79nD

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(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

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	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

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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, Parallel vector 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

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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 Theory*. 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 and their probability distributions, Cumulative distribution function, n^{th} Moments, Moment generating function, Characteristic function.	12

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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.

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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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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.

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विश्वविद्यालय, रायगढ़ (छ.ग.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

माइक्रोबायोलॉजी

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.

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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

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/Hour
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

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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

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विश्वविद्यालय, जगदलपुर (छ.ग.)

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. Richa Mishra
Member
HoD Microbiology
APSGMNS Govt PG College Kawardha (CG)

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

Dr. DK Srivastava
HoD Microbiology
GATERR PG Sc College
Bilaspur

Rashmi
Dr. Rashmi Parihar
Subject Expert
Govt. E.R.R. P.G. Science College, Bilaspur

Dr. Svetlana Nagal
HOD Microbiology
Govt MKGC Mahasamund

Dr. Seema Anil Belorkar
Subject Expert,
MB BI, ABVV, Bilaspur

Dr. K.K. Patel
Member
Govt T.C.L. P.G. College
Janjgir

Dr. Sadhana Jaiswal
HoD - Microbiology
Govt. N.P.G. college of Science
Raipur

Dr. Saubhagya Pandey
Chancellor Nominated
Chairperson
HOD Microbiology
D.P Vipra College
Bilaspur (C.G.)

Prof DSVGK Kaladhar
CBoS Chairperson
Head, Microb. & Bi... UTD ABVV, Bilaspur

अध्ययन मंडल ....
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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

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विद्यालय

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

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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ (छ.ग.)

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. Richa Mishra
Member
H.O.D Microbiology
APSGMNS Govt P.G. College Kawardha (C.G.)

Dr. Rachana Choudhary
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Dr. D K Shrivastava
HOD
GVERR PG Sc College Bilaspur

Dr. Sadhana Jaiswal
Member
HOD - Microbiology
Govt. N.P.G. college of Science, Raipur

Dr. Sneha Nagal
HOD - Microbio
Govt. M.K.G. College
Mahasamund.

Dr. Seema Anil Belorkar
Subject Expert
Microbiology & Bioinfor
ABVV, Bilaspur.

Dr. R.K. Patel
Govt T.C.L. P.G. College Janjgir

Dr. Rashmi Parihar
Subject Expert
Dept. of microbiology
Govt. E.R.R. PG. Science College, Bilaspur

Dr. Shubhraje Pandey
Chancellor Nominated Chairperson
HOD, Microbiology
D. P Vipra College
Bilaspur (C.G)

Prof DSVGK Kaladhar
CBoS Chairperson
Head Microb. & Bioinformatics
UTD ABVV Bilaspur

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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	--

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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.

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

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भौतिकी

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.

27.6.23

Dr. A.K. Panigrahi

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शासकीय महाविद्यालय, रायगढ़ (छ.ग.)

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**	

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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

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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)

अध्यक्ष 27/6/23

अध्ययन मंडल .....
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विश्वविद्यालय, रायगढ़ (छ.ग.)

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शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

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

27/6/23
अध्यक्ष
अध्ययन मंडल .....
शहीद नंदकुमार पटेल
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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- 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**	

अध्यक्ष मंडल .....
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रायगढ़ (छ.ग.)

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

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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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विश्वविद्यालय, रायगढ़ (छ.ग.)

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

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अध्यक्ष 27/6/23

अध्ययन मंडल .....
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विश्वविद्यालय, रायगढ़ (छ.ग.)

अध्ययन मंडल .....
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विश्वविद्यालय, रायगढ़ (छ.ग.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)

नवीन पाठ्यक्रम सत्र 2023–24 से लागू

प्राणी शास्त्र

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

16/7/25
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27.6.23.
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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

27.6.23

(Dr. Ashok Tamboli)

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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.

27.6.23

(Dr. R. K. Tambat)

अध्यक्ष
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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

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विश्वविद्यालय, रायगढ़ (छ.ग.)

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.

अध्ययन मंडल.....
शहीद नंदकुमार पटेल
विश्वविद्यालय, रायगढ़ (छ.ग.)

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.

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13.6.2023
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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

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

13.6.2022

Prem Prakash Singh 13/06/2022

S Rahalkar 13.6.2022

13.6.22

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

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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.

अध्यक्ष
(Dr. R. K. Tambole)
अध्ययन मंडल
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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

27.6.23

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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).

27.6.23
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16/7/25
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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

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

15.6.2022

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R/6
अध्ययन मंडल 4/7/25
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