FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**CHSC-02T**		
2	**Course Title**	**FUNDAMENTAL CHEMISTRY-II**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *To understand different acid-base theories and solvent system .* ➢ *To learn the preparation, bonding, and reactions of C-C σ- & π- bonded compounds* ➢ *To understand the concept and chemistry of aromatic compounds and their reactions* ➢ *To learn the basic concepts of various states of matter &understand the basic concepts of surface chemistry and chemical kinetics*		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Acid, Base and Solvent System** **Theories of acids and bases**: Arrhenius, Bronsted-Lowry, conjugate acids and bases, relative strengths of acids and bases, the Lux-flood, solvent system and Lewis concepts of acids and bases. **HSAB concept**: Classification of Acids and Bases According to HSAB Theory (Hard, Borderline, Soft). Applications of HSAB Theory in Inorganic Reactions - Solubility, Selectivity, Redox Reactions Non-aqueous solvents: .Physical properties of a solvent, types of solvents and their general characteristics, Liquid ammonia as a solvent. Acid-base, precipitation and complex, formation reactions. Solutions of alkali and alkaline earth metals in ammonia-application)	11
II	**CHEMISTRY OF C-C σ–BONDING** Alkanes: Preparation (Wurtz reaction, reduction/hydrogenation of alkenes, Corey-House method). Reactions (mechanisms): halogenation, free radical substitution. Cycloalkanes: Preparation (Dieckmann's ring closure, reduction of aromatic hydrocarbons), Reactions (mechanisms): substitution and ring-opening reactions. Stability of cycloalkanes -Baeyer's strain theory, Sachse and Mohr predictions, Conformational structures of ethane, n-butane and cyclohexane. **CHEMISTRY OF C-C π–BONDING** Alkenes: Preparation methods (dehydration, dehydrohalogenation, dehydrogenation, Hoffmann and Saytzeff rules, cis and trans eliminations). Reactions (mechanisms): electrophilic and free radical addition (hydrogen, halogen, hydrogen halide, hydrogen bromide, water, hydroboration, ozonolysis, dihydroxylation with $KMnO_4$). Dienes: 1,2- and 1,4-additions, Diels-Alder reactions. Alkynes: Preparation (dehydrohalogenation, dehydrogenation), Reactions: Acidity, formation of acetylides, addition of water, hydrogen halides and halogens, oxidation,	12

	ozonolysis, hydroboration/oxidation. **Aromatic Hydrocarbons** Aromatic hydrocarbons: Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.	
III	**Behaviour of ideal gases:** Kinetic theory of gases – postulates and derivation of the equation, $PV = 1/3\ mnc^2$ and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. **Behaviour of Real gases:** Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. **Liquid state chemistry:** structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. **Solid state chemistry:** Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects.	**11**
IV	**A. Colloids and surface chemistry:** Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotropy, Physical adsorption, chemisorption, **B. Chemical kinetics:** Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. **C. Catalysis:** Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of catalysis.	**11**
Keywords	***Acid & Bases, Alkanes, Cycloalkanes, Alkenes, Dienes, Alkynes, Aromatic Hydrocarbons, Kinetic theory of gases, Real gases, Intermolecular forces, Crystal structure, Chemical kinetics***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

1. *Bahl, A., & Bahl, B. S. (2014). Organic Chemistry (22nd Ed.). S. Chand & Sons.*
2. *Ahluwalia, V. K., & Goyal, M. (2001). A Textbook of Organic Chemistry. Narosa Publishing House.*
3. *Jain, M. K., & Sharma, S. C. (2017). Modern Organic Chemistry. Vishal Publishing Company.*
4. *Puri, B. R., Sharma, L. R., & Pathania, M. S. (2013). Principles of Physical Chemistry (46th Ed.). Shoban Lal Nagin Chand And Co.*
5. *Bahl, B. S. A., & Tuli, G. D. (2009). Essentials of Physical Chemistry (Multicolour Ed.). S. Chand & Company Pvt Ltd.*
6. *Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). Principles of Inorganic Chemistry. Nagin Chand and Co., New Delhi.*

Reference Books Recommended:

1. *Paula, B. Y. (2014). Organic Chemistry (7th Ed.). Pearson Education, Inc. (Singapore).*
2. *Solomons, T. W. G. (2017). Organic Chemistry (Global Ed.). John Wiley & Sons.*
3. *Morrison, R. T., & Boyd, R. N. (2010). Organic Chemistry (7th Ed.). Prentice-Hall Of India Limited.*
4. *Laidler, K. J., & Meiser, J. H. (2006). Physical Chemistry (2nd Indian Ed.). CBS Publishers.*
5. *Atkins, P. W., & De Paula, J. (2006). Physical Chemistry (8th Ed.). Oxford University Press.*
6. *Dogra, S., & Dogra, S. (2006). Physical Chemistry through Problems (2nd Ed.). New Age International.*
7. *Sangaranarayanan, M. V., & Mahadevan, V. (2011). Textbook of Physical Chemistry. University Press.*

Online Resources–

- https://bit.ly/3Gb99iy
- https://www.organic-chemistry.org/
- https://bit.ly/3GduvMi
- https://bit.ly/30TXm8d
- https://application.wiley-vch.de/books/sample/3527316728_c01.pdf
- https://www.ncbi.nlm.nih.gov/books/NBK547716/

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20** **+20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks

End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester- II**	Session: **2024-2025**
1	**Course Code**	**CHSC-02P**		
2	**Course Title**	**CHEMISTRY LAB. COURSE-II**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *Demonstrating and using common glassware for accurate measurements* ➢ *Studying the functional group analysis organic compounds* ➢ *Determining melting points to assess compound purity and employing distillation and sublimation techniques to establish boiling points* ➢ *Equipping with essential skills in measuring liquid surface tension and solution viscosity*		
6	**Credit Value**	**1 Credits**	*Credit =30 Hours Laboratory or Field learning/Training*	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**Basic Laboratory Techniques** Demonstration of Laboratory Glassware and Equipment, Calibration of Thermometer : 80-82°C (Naphthalene), 113.5°-114°C (Acetanilide), 132.5°C - 133°C (Urea), 100°C (Distilled Water) **Functional group Analysis of Organic Compounds,** Detection of elements (N, S, and halogens) and functional groups **Physical chemistry** Surface tension measurements: Determine the surface tension by (i) drop number (ii) drop weight method. Surface tension composition curve for a binary liquid mixture. Viscosity measurement using Ostwald's viscometer, Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature. Study of the variation of viscosity of sucrose solution with the concentration of solute. Viscosity Composition curve for a binary liquid mixture	**30**
Keywords	***Basic laboratory techniques, Equipments, Calibration, Melting points, Qualitative analysis, Physical chemistry, Surface tension, Viscosity***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

1. *Ahluwalia, V. K., Dhingra, S., & Gulati, A. (N.D.). College Practical Chemistry. University Press.*
2. *Khosla, B. D., Garg, V. C., & Gulati, A. (2011). Senior Practical Physical Chemistry. S. Chand & Co.*

Reference Books Recommended:

3. *Garland, C. W., Nibler, J. W., & Shoemaker, D. P. (2003). Experiments in Physical Chemistry (8th Ed.). Mcgraw-Hill.*
4. *Mendham, J. (2009). Vogel's Quantitative Chemical Analysis (6th Ed.). Pearson Education.*
5. *Mann, F. G., & Saunders, B. C. (2009). Practical Organic Chemistry. Pearson Education.*
6. *Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (2012). Practical Organic Chemistry (5th Ed.). Pearson Education.*

Online 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/VirtTxtml/introl.htm
- https://nptel.ac.in/courses/104/103/104103071/W

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **D. Performed the Task based on lab. work - 20 Marks** **E. Spotting based on tools & technology (written) – 10 Marks** **F. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**BOSC -02 T**		
2	**Course Title**	**Microbes and Thallophyta**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to 1. Understand about the Microbes and their Importance. 2. Identify edible mushrooms and learn cultivation techniques. 3. Learn about bio-fertilizers and their uses. 4. Understand life cycles of different algae and fungi.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Viruses**: - general characteristics,nature , structure and nomenclature, Bacteriophages and TMV; Lytic and Lysogenic cycles, transmission and replication of viruses, Symptoms of viral diseases on plants , important plant diseases, viroid, prions.Actinomycetes: general characteristics ,Structure, reproduction and economic importance. Mycoplasma, Phytoplasma,: general characteristics , structure, reproduction and their economic uses.	12
II	**Bacteria:** History, general character, classification and morphology, Gram positive and Gram-negative bacteria, structure of bacteria shape, size flagella and ultra structure of bacterial cell; Bacterial Growth curve, factors affecting growth of microbes; sporulation, reproduction, recombination in bacteria- Transformation Conjugation and Transduction, and Economic importance. Cyanobacteria : General characteristics, morphology,Heterocyst, cell structure of Cyanobacteria, reproduction and economic importance of Bacteria.	11
III	**Phycology:** General characteristic features of Algae. Algae in diversified habitat, Salient features, occurrence, classification and range of thallus organization.Prominent pigments found in Algae. Reproduction classification, general character and life cycle of –*Volvox, Oedogonium, Chara, Vaucheria,Ectocarpus*and*Polysiphonia*. Economic importance of algae - Role of algae in soil fertility, algae as biofertilizer , blue green algae and nitrogen fixation. Symbiosis ; algal products - Agar, biofuel	11
IV	**Mycology, Mushroom Cultivation, Lichenology &Mycorrhiza:** General characteristic features of Fungi, Economic importance and Classification of Fungi, Nutrition, Heterothallism, Physiological specialization, Heterokaryosis &Parasexuality in Fungi. Fungi as biocontrol agent. Classification, general character and life cycle of -*Mucor*, Phytophthora*Penicillium, Peziza. Ustilago, Puccinia, Agaricus*; *Colletotrichum*, *Alternaria*. Edible Mushroom- Button and Oyster mushroom and their cultivation. General account of lichens. General account of Myccorrhiza.	11
Keywords	***Mycoplasma, Transduction, Biofertilizer, Parasexuality.***	

Signature of Convener & Members (CBoS) :

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Aggarwal, S. K. 2009. Foundation Course in Biology, A one books Pvt. Ltd., New Delhi.
5. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, VishwaPrakashan, NewDelhi.
6. Annie Ragland, 2012. Algae and Bryophytes, Saras Publication, Kanyakumari, India.
7. Basu, A. N. 1993. Essentials of Plant Viruses, Vectors and Plant diseases, New Age International, New Delhi.
8. Chopra. G. L. 1984. A text book of Algae, Rastogi publications, Meerut,India.
9. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., NewDelhi.
10. Fritsch, R. E. 1977. Structure and Reproduction of Algae, Cambridge University Press, London.
11. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: Rastogi Publication.
12. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, New Delhi.

Reference books:

1. Webster, J., Weber, R. (2007). Introduction to Fungi, 3rd edition. Cambridge, U.K.: Cambridge University Press.
2. Pelzar, 1963. Microbiology, Tata McGraw Hill, New Delhi
3. Rangaswamy, G. 2009, Disease of Crop Plants in India, Prientice Hall of India, New Delhi.
4. Microbiology Fundamental and Applications (hindi) (pb) 9. ISBN: 9788188826230 Edition: 03Year : 2016Author : Dr. Purohit SS , Dr. Deo Publisher : Student Edition Language : Hindi
5. Modern Microbiology (hindi) (hb) ISBN: 9788177543599Edition : 1Year : 2018Author : Dr. Purohit SS , Dr. Singh T Publisher : Agrobios (India)
6. Plant pathology by R.S. Mehrotra, Tata McGraw-Hill Publication

Online Resources–

- **e-Resources / e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://www.classcentral.com/tag/microbiology
2. https://www.edx.org/learn/microbiology
3. https://www.mooc-list.com/tags/microbiology
4. https://www.udemy.com/topic/microbiology/
5. https://ucmp.berkeley.edu/bacteria/bacteria.html
6. https://www.livescience.com/53272-what-is-a-virus.html
7. https://gclambathach.in/lms/Economic%20importance%20of%20Algae.pdf
8. https://www.slideshare.net/sardar1109/algae-notes-1
9. https://www.onlinebiologynotes.com/algae-general-characteristics-classification/
10. https://www.sciencedirect.com/topics/immunology-and-microbiology/fungus
11. https://ucmp.berkeley.edu/fungi/fungi.html
12. https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdf
13. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=11293
14. http://www.jnkvv.org/PDF/11042020102651plant_pathology.pdf
15. https://www.apsnet.org/edcenter/disimpactmngmnt/topc/EpidemiologyTemporal/Pages/ManagementStrategies.aspx
16. https://www.agrilcareer.com/6-easy-steps-for-mushroom-cultivation/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**BOSC- 02**		
2	**Course Title**	**Lab. Course –02 (Microbes and Thallophyta)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	1. Understand the Viruses, Bacteria, Phycology, Mycology and Plant pathology 2. Learn microbial techniques which will be beneficial for agriculture and industry. 3. Learn life cycles of selected genera of different groups 4. Understand etiology of plant diseases 5. Apply their knowledge in the crop fields to eradicate or avoid the diseases		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**1.** Collection of viral/ Bactrial /fungal infected plants **2.** Study of plant disease symptoms caused by viral/ Bactrial /fungal/ Mycoplasma **3. BACTERIAL IDENTIFICATION:** Isolation of bacteria Staining techniques: Gram's, staining **4.** Study / Slide preparation of available Cyanobacteria **5. PHYCOLOGY:** Study / Slide preparation and Staining of algae –*Volvox, Oedogonium* and *Chara; Vaucheria;Ectocarpus Polysiphonia* **6. MYCOLOGY:** Study/ Slide preparation and . Staining of fungi. *Mucor,Phytophthora, Penicillium, Peziza, Ustilago, Puccinia; Agaricus, colletotrichum, Alternaria.*: Study of Button and Oyster Mushroom Lichens: crustose, foliose and fruticose specimens. Study of VAM fungi	**30**
Keywords	infected plants, VAM, algae, fungi	

Signature of Convener & Members (CBoS) :

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PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
2. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
3. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
4. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://community.plantae.org/tags/moocfuturelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
2. https://microbiologysociety.org/publication/education-outreach-resources/basic-practical-microbiology-a-manual.html
3. https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf
4. http://allaboutalgae.com/benefits/
5. https://repository.cimmyt.org/xmlui/bitstream/handle/10883/3219/64331.pdf
6. https://www.mooc-list.com/tags/microbiology\
7. http://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8
8. https://171339239%5D%20%281984%29.pdf

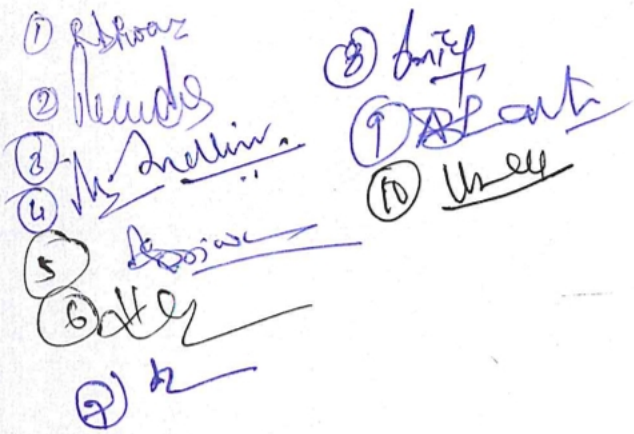
PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree / Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**ZOSC- 02T**		
2	**Course Title**	**Cell Biology and Histology**		
3	**Course Type**	**Discipline Specific Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Acquire knowledge of Cell membrane and function ➢ Understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved. ➢ Gain Knowledge of key processes like cell division, ➢ Learn about various tissues of body their structural significance		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Cell Structure, Cell Membrane and Extra Nuclear Cell Organelles:** General structure of Prokaryotes and Eukaryotes. **Cell membrane organization: O**rigin, structure (Lipid-Lipid Bilayer Model, Dannelli & Davson Model, Unit Membrane Model and Fluid mosaic model), chemical composition and function of cell membrane, Specialization of cell membrane: microvilli desmosomes, Hemidesmosome, Septate Desmosome, plasmodesmata, tight and gap junction. **Extra Nuclear Cell Organelles:** Ultra structure and functions of Endoplasmic reticulum and Golgi apparatus.	11
II	**Extra Nuclear Cell Organelles:** Ultra structure and functions of Ribosome, Lysosome, Peroxisomes, Mitochondria: Origin, structure and function.	11
III	**Nuclear Organization and Cell Division:** Size, shape, structure and functions of interphase nucleus. Ultra structure of nuclear membrane and pore complex. Nucleolus: general organization, chemical composition and functions, Chromosome Morphology, Cell cycle, Cell division- Mitosis and Meiosis. Cell division checks points and their regulation. Programmed cell death (Apoptosis).	12
IV	**Introduction to tissues.** Epithelial tissue: types, structure and characteristics. surface modifications. Basement membrane: structure and characteristics. Connective tissue cells. Structure and function of loose, dense and adipose tissue. Cartilage and bone: classification, and fine structure. Blood: plasma, blood cells, lymph– their structure and function. Bone marrow and haemopoesis. Structure and function of spleen. Muscular tissue: ultrastructure of smooth, skeletal and cardiac muscles. Muscle-tendon attachment. Structure and classification of neurons.	11
Keywords	*Cell Biology, Cell Membrane, Cell organelle, Nucleus, endoplasmic reticulum and Golgi apparatus, ribosome, lysosome, peroxisomes, Mitochondria, tissues.*	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Gupta P.K. Cell and Molecular Biology, Himalaya Publication
2. Arumugam.N, Cell biology and Molecular Biology, Saras Publication
3. Rastogi V.B. Cell Biology, Rastogi Publication
4. Verma P.S. and Agrawal Cell Biology, S. Chand Publication

Reference Books Recommended –

5. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
7. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. (5th edition) ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
8. Becker, W.M.; Kleinsmith, L.J.; Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. (7th edition) Pearson Benjamin Cummings Publishing, San Francisco. Practical

Online Resources–

1. National digital Library.- http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY0poaUVtYlByc1BZNXk3TnZMWVFzQXpZNjhhQUplR1BTOERHelZXZUp5Nw
2. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS0kwNi9tbi91UGYxaFl6OC9Sb25QWUlXLzF1V3NUZw
3. https://www.youtube.com/watch?v=GYY627IeAKg
4. E-PG Pathshala. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA==

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20** +**20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of ZOOLOGY
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree / Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**ZOSC-02P**		
2	**Course Title**	**Cell Biology and Histology**		
3	**Course Type**	**Discipline Specific Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Understand ultra structure of prokaryote and Eukaryote cell, undertake microscopic study to gain knowledge ➢ learn to identify cell organelles ➢ Explain and demonstrate mitosis and meiosis division in onion root tip, Grass hopper testis, etc ➢ Gain knowledge of Microtomy		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. 2. Separation and isolation of cells by sedimentation velocity in unit gravity. 3. Disruption of cells, isolation and identification of subcellular components, isolation of nuclei. 4. Isolation of mitochondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondrial pellet. 5. Chromosome segregation in mitosis and meiosis. 6. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis 7. Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis. 8. Isolation and estimation of DNA. 9. Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc. 10. Preparation of Practical Record 11. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper	**30**
Keywords	*Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.*	
Signature of Convener & Members (CBoS) :		

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Debarati Das Essential Practical Handbook of Cell Biology & Genetics, Biometry & Microbiology, A Laboratory Manual, Academic Publishers.
2. Mohan P Arora Cytogenetics:, Himalayan Publishing House

Reference Books Recommended –

3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.

Online Resources– National Digital Library

- **http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN_I_e_P_P_1_Z_51296_P_1_P_o_e_51600_M_0_P_g_51604_51605?e=13|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of BoS :

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF FORESTRY & WILDLIFE
COURSE CURRICULUM

PART-A: Introduction				
Program: Bachelor in Life Science (Certificate/Diploma/Degree /Honors)		**Semester- II**		**Session: 2024-2025**
1	Course Code	**FOSC-2 T**		
2	Course Title	**Introduction to Ecology & Forest Ecosystem**		
3	Course Type	**Discipline Specific Course (Theory)**		
4	Pre-requisite (if any)	As per Programme requirement		
5	Course Learning Outcome (CLO)	The graduates/postgraduates students able to demonstrate the acquisition of: • Students understand basic and advance level knowledge about ecology and forest ecosystem. • Able to know about factors responsible for unbalancing the ecology. • Develop ability and idea to protect the natural resources. • Buildup skill professionals in Ecology and Forest ecosystem.		
6	Credit Value	3 Credits	(Credit=15 hours-learning & observation)	
7	Total Marks	Maximum Marks: 100		Minimum passing Marks: 40

PART- B: Content of the Course		
Total No. of Teaching- learning Periods (01 hr. per period) – 45 Periods (45 Hours)		
Unit	**Topics (Course Contents)**	**No. of Period**
I	**Introduction of Ecology:** Definition and importance of ecology, Forest ecology: Definition Concept of ecosystem, structure and function of ecosystem, biotic and abiotic components, energy flow in the ecosystem, food chain, food web in forest ecosystem. Ecological relation between forests and wildlife.	10
II	**Community Ecology:** Concept of community, attributes, physiognomy, species composition, species diversity, Community ecology, definition, characterization of community; composition, structure, origins and development of community, method of study of community, vegetation classification.	10
III	**Population Ecology:** Basic concepts of population ecology, population characteristic, population dynamics, regulation of population density, growth and population interactions. Habitat ecology; fresh water ecology, marine ecology, estuarine ecology, terrestrial ecology and desert ecology.	10
IV	**Succession:** Definition & concept of succession, causes of succession, trends of succession, basic types of succession, mechanism of succession, general process of succession, hydrosere, lithosere, heterotrophic succession, ecosystem development, Climax concept in succession.	15
Keywords: Ecology, Forest ecology, Ecosystem, Food web, Energy flow, Succession, etc.		

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PART- C
Learning Resources: Text Book, Reference Book, Others

Text BooksRecommended-

1. Sharma, P.D. (2013). Ecology and Environment. (11th Edition), Rastogi Publication, Meerut, UP.
2. Odum, E. P. (1971). Fundamental of Ecology 3rd Edition Saunders Philadelphia, USA.
3. Odum, E.P. (1983). Basic Ecology. Saunders College Publishing, Philadelphia.
4. Misra, K.C. (1974). Manual of Plant Ecology. Oxford &IBH Pub Co. New Delhi.
5. Michael, P. (1984). Ecological Methods for Field and Laboratory Investigations. Tata McGrawHill Pub.Co. New Delhi.
6. Montagnini, F. and Jordan, C.F. (2000). Tropical Forest Ecology: The Basis for Conservation and Management. Springer.
7. Saggwal, S.S. (1995). Forest Ecology of India. Pioneer Publishers, India.
8. मुखर्जी, अंजलि (2007). पर्यावरण अध्ययन, छत्तीसगढ़ राज हिंदी ग्रंथ अकादमी, रायपुर
9. जागेटिया, बी एल. और पुरोहित पंकज (2004). पर्यावरण अध्ययन, एग्रोटेक प्रकाशन एकेडेमी

Online Resources- ebookdirectory.com, freebookcentre.net/ecology-book.

PART -D: Assessment and Evaluation -Theory

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam(ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 / 20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam(ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Signature of Convener & Members (CBoS)

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF FORESTRY & WILDLIFE
COURSE CURRICULUM

PART- A: introduction			
Program: Bachelor in Life Science (Certificate/Diploma/Degree /Honors)		**Semester- II**	**Session: 2024-2025**
1	Course Code	**FOSC-2 P**	
2	Course Title	**Introduction to Ecology & Forest Ecosystem**	
3	Course Type	**Discipline Specific Course (Practical)**	
4	Pre-requisite (if any)	As per Programme requirement	
5	Course Learning Outcome (CLO)	On completion of this course, the students will able to demonstrate the acquisition of: • Understand forest sites through ecolofical study. • Identify the tree species and their ecological value. • Know about forest compositions. • Estimate nutrients in soil & plants. • Quantify litter and litter decomposition.	
6	Credit Value	1 Credit	(Credit=30 hours laboratory or field learning/ traning)
7	Total Marks	Max. Marks: 50	**Minimum Passimg Marks: 20**

Part B: Content of Course		
Total No. of learning- Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field training/ Experiment Contents of Course	1. Vegetational survey to study forest composition of study sites. 2. Quantification of litter accumulation and decomposition. 3. Estimation of nutrients in soil & plant samples. 4. Asseemenets of forest Vegetation. 5. Herbarium preparation. 6. To study the community by quadrate method. 7. To study the vegetation by line transacts method. 8. To study the vegetation by point frame method.	**30**

PART- C
Learning Resources: Text Book, Reference Book, Others

Text BooksRecommended-

1. Sharma, P.D. (2013). Ecology and Environment. (11th Edition), Rastogi Publication, Meerut, UP.
2. Odum, E. P. (1971). Fundamental of Ecology 3rd Edition Saunders Philadelphia, USA.
3. Odum, E.P. (1983). Basic Ecology. Saunders College Publishing, Philadelphia.
4. Misra, K.C. (1974). Manual of Plant Ecology. Oxford &IBH Pub Co. New Delhi.
5. Michael, P. (1984). Ecological Methods for Field and Laboratory Investigations. Tata McGrawHill Pub.Co. New Delhi.
6. Montagnini, F. and Jordan, C.F. (2000). Tropical Forest Ecology: The Basis for Conservation and Management. Springer.

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7. Saggwal, S.S. (1995). Forest Ecology of India. Pioneer Publishers, India.
8. मुखर्जी, अंजलि (2007). पर्यावरण अध्ययन, छत्तीसगढ़ राज हिंदी ग्रंथ अकादमी, रायपुर ।
9. जागेटिया, बी एल. और पुरोहित पंकज (2004). पर्यावरण अध्ययन, एग्रोटेक प्रकाशन एकेडेमी।

Online Resources- ebookdirectory.com, freebookcentre.net/ecology-book.

PART -D: Assessment and Evaluation -Practical			
Suggested Continuous Evaluation Methods: Maximum Marks : 50 Marks Continuous Internal Assessment (CIA) : 15 Marks End Semester Exam (ESE) : 35 Marks			
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2) : **10 / 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks	
End Semester Exam(ESE):	**Laboratory / Field Skill Performance: On spot Assessment** A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks		Managed by Course teacher as per lab. Status

Signature of Convener & Members (CBoS)

19/6/2024

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF GEOGRAPHY
COURSE CURRICULUM

PART-A: Introduction

Program: Bachelor in Arts *(Certificate / Diploma / Degree/Honors)*	Semester - II	Session: 2024-2025

1	Course Code	GO – 02 T	
2	Course Title	Fundamental of Human Geography	
3	Course Type	DSC	
4	Pre-requisite(if, any)	*As per the program*	
5	Course Learning. Outcomes(CLO)	At the end of this course the student will e have an ability to 1- Gain knowledge about major themes of human Geography. 2- Acquire knowledge on the history and evolution of humans. 3- Understand the approaches and processes of Human Geography as well as the diverse patterns of habitat and adaptations. 4- Ability to develop an idea about space and society 5- Understand the evolution of varied types of economic activities. 6- Assess the varied aspects of development and regional disparity, in order to formulate measures of balanced development and sustainable development.	
6	Credit Value	3 Credits	*Credit = 15 Hours -learning & Observation*
7	Total Marks	Max. Marks: 100	Min Passing Marks:40

PART -B: Content of the Course

Total No. of Teaching–learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Introduction to Human Geography** Definition, nature and scope. Fundamental concept in Human Geography . Understanding of man- nature relationship:- Determinism, Possibilism and Neo-determinism. Classification of Human Occupation	12
II	**Population and Settlement -** Growth of population, distribution and density of the world. Socio- economic Pattern of Population – Literacy, Migration:- Causes, and types .Occupational Structure. Theory and Model of population growth:-Concept of Optimum Population, Over Population and Under population.	10
III	**Human Settlement and Races-** Types and characteristics of human settlement- Rural settlement and Urban Settlement. Human Races- Basis of Racial Classification, world distribution. Habitat and economy of selected communities (Gond, Eskimo, Bushmen).	12
IV	**Geography and Development-** Indicators and measures of Regional development ,. Global pattern of development:- inter-regional variations, HDI. Concept of Sustainable Development.	11
Keywords	Determinism, Possibilism, Occupational Structure. Optimum Population, Racial	

Signature of Convener, Members of CBoS :

Dr. B. L. Sao
Dr. R. K. Thakur
M. S. SAHU
Dr C.P. KAND
(5) (6) (7) (8) (9)
10. Dr S. Yadav
11
12
13 Dr. Sophia Ambule

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

10- James, M. Robenstein, An *Introduction to Human Geography,* Prentice Hall, New Jersey, 2001
11- Michael, Can, *New Patterns: Process and Change in Human Geography Nelson,* 1997
12- Hussain Mazid- Human Geography, (Hindi & English Both) Rawat Publication Jaipur
13- Garg H.S. Manav Bhoogol, SBPD Publication, Agra.
14- Haroon Mohammad, Manav Bhoogol, Wisdom Publication
15- Kausik S.D. Manav avam Arthik Bhoogol, Rastogi publication Meerut.
16- Maurya, S.D. Manav Bhoogol, Sharda Pustak Bhavan, Prayagraj.2009
17- Khullar, D. R. Human Geography,(In Hindi) Kalyani Publishers, Ludhiyana, 2016
18- Prasad, Gayatri, Cultural Geography, (In Hindi) Sharda Pustak Bhavan . Prayagraj.

Reference books:

5- Bergwan, Edward E., *Human Geography: Culture. Connections and Landscape,* Prentice Hall, New Jersey. 1995
6- Carr, M., *Patterns, Process and change in Human Geography,* MacMillan Education, London, 1987.
7- Daniels Peter, Bradshaw Michael, Shaw Devil and Side way James, *Human Geography: Issues for the Twenty First Century*, Prentice Hall, New Jersey, 2001
8- Clarke, J I , Population Geography of Developing Country, Pergamon press ,Oxford, 1971

E-Books

- https://web.ung.edu/media/university-press/human-geography.pdf
- https://www.drishtiias.com/hindi/images/pdf/NCERT-Hindi-Class-12-Geography-Part-1.pdf
- http://assets.vmou.ac.in/GE05.pdf-Human Geography
- https://open.umn.edu/opentextbooks/textbooks/870

OnlineResources–(e-Resources/e-books and e-learning portals)

- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.swayam.ac.in**
- **www.internshala.com**

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100 Marks
Continuous Internal Assessment(CIA):30 Marks
End Semester Exam (ESE):70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment/Seminar- **10** Total Marks -**30**	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40Marks**	

Signature of Convener, Members of CBoS :

Dr. Sophia Ambrole - Sophia

10/06/23

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF GEOGRAPHY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Arts *(Certificate / Diploma / Degree/ Honors)*		Semester -II	Session: 2024-2025
1	Course Code	GO – 02 P	
2	Course Title	Practical 2 - Scale and Representation of Relief	
3	Course Type	Practical	
4	Pre-requisite (if, any)	*As per program*	
5	Course Learning. Outcomes (CLO)	At the end of the this course the student will be able to 1- Understand and prepare different kinds of Scales and comprehend the concept of scales . 2- Identify the features of the land form through counters 3- Developed the Relief Map Making skills. 4- Gain in-depth knowledge on Drawing of Contour Features.	
6	Credit Value	1 Credits	*Credit =30 Hours Laboratory or Field learning/Training*
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1- Scale- Methods of representing Scale, Conversion of Scale Type of Linear Scale- Simple Scale, Time Scale, Comparative Scale, Diagonal Scale 2- Representing of Relief- Pictorial, Mathematical and Combine Methods. 3- Contours-Land forms Representing By Contours- Hill, Ridge, Plateau, V shaped Valley, U shaped Valley, Waterfall,	30
Keywords	Scale, Diagonal ,Relief, V shaped Valley, Ridge	

Signature of Convener, Members of CBoS :

Dr B. L. Sori

Dr. R. K. Thakur

M. S. SAHU

Dr C.P. NAND

③ ⑥ ⑦ ⑧ ⑨

Dr. Dr S. Yadav

B.S. Shridhar

12

13. Dr. Sophia Ambrela - Sophia

14. 10/06/24

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books-

1. Sarkar, A.K. (1997): Practical Geography : A Systematic Approach. Orient Publication ,Kolkata.
2. Sharma, J.P. (2001): Prayogik Bhugol., Rastogi Publication, Meerut .
3. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi.
4. Singh, L.R. (2006) : Fundamentals of Practical Geography, Sharda Pustak Bhawan,
5. Haroon, M. , Practical Geography, Mishra Trading Corporation, Varanasi,2010
6. Chauhan, P R. 2005, Practical Geography, Vasundhara Prakashan, Gorakhpur
7. Istiyak.M. 1989,A Textbook of Practical Geography,Heritage Publication New Delhi
8. Mishra R.N. ,P K Sharma, Prayogik Bhoogol Rawat Publication, Jaipur ,2019
9. Khullar , D.R., Prayogatmak Bhoogol, Kalyani Publishers, Ludhiyana.

E books-

1- https://www.slideshare.net/NisarKhand/instrumental-surveying-practical-plane-table-survey
2- https://bbsbec.edu.in/wp-content/uploads/2020/01/com.pdf
3- https://surveyofindia.gov.in/documents/soichapter-v.pdf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Signature of Convener, Members of CBoS :

FOUR YEAR UNDERGRADUATE PROGRAM - (2024-28)

DEPARTMENT OF **HINDI**

COURSE CURRICULUM

PART -A : Introduction				
Program: Bachelor in Arts Certificate/Diploma/Degree/Honors		Semester - I		Session: 2024-25
1	Course Code	AEC-03		
2	Course Title	हिन्दी भाषा–1		
3	Course Type	Ability Enhancement Course		
4	Pre-requisite (if any)	As per requirement		
5	Course Learning Outcome (CLO)	1. विद्यार्थी हिन्दी भाषा एवं व्याकरण संबंधी ज्ञान से समृद्ध होंगे। 2. भाषा ज्ञान के माध्यम से भारतीय संस्कृति एवं भावनात्मक एकता के महत्व को समझने की क्षमता विकसित हो सकेगी। 3. मुहावरे एवं लोकोक्तियों का महत्व समझ सकेंगे। 4. व्यंग्य, निबंध एवं कविता विधा से परिचित होंगे। 5. निबंध लेखन एवं अपठित गंद्याश के माध्यम से विद्यार्थियो का बौद्धिक विकास हो सकेगा।		
6	Credit Value	2 Credits	(01 Credit = 15 Hours - learning & Observation)	
7	Total Marks	Maximum Marks : 50		Minimum Passing Marks : 20

PART -B : Content of the Course		
Total No. of Teaching-Learning Periods (01 Hr. Per Period) - 30 Periods (30 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	**रचनाएं** भारत वंदना – सूर्यकांत त्रिपाठी 'निराला' (कविता) भोलाराम का जीव – हरिशंकर परसाई (व्यंग्य) चोरी और प्रायश्चित – महात्मा गांधी (निबंध)	8
II	**हिन्दी व्याकरण एवं शब्द रचना** उपसर्ग, प्रत्यय, संधि, समास पर्यायवाची शब्द, विलोम शब्द, अनेकार्थी शब्द, समश्रुत शब्द, अनेक शब्दों के लिए एक शब्द	7
III	**हिन्दी व्याकरण एवं रचना पक्ष** मुहावरे एवं लोकोक्तियां पारिभाषिक शब्दावली एवं हिन्दी में पदनाम, शब्द शुद्धि, वाक्य शुद्धि	8
IV	**रचनात्मक लेखन** निबंध लेखन अपठित गद्यांश (नोट विद्यार्थी को किसी एक विषय पर निबंध व प्रदत्त गद्यांश का शीर्षक तथा सारांश लिखना होगा।)	7
Keywords		

Signature of Convener & members (CBoS):

11/6/2024 11/6/2024 11/6/24 11-06-2024

PART -C : Learning Resource
Text Books, Reference Books and Others
1. भारतीयता के अमर स्वर – डॉ. धनंजय वर्मा, मध्यप्रदेश हिन्दी अकादमी 2. आधुनिक हिन्दी व्याकरण और रचना – डॉ. वासुदेव नंदन 3. हिन्दी भाषा और व्यवहार – डॉ. गंगा चरण त्रिपाठी 4. हिन्दी व्याकरण माला – डॉ. के.आर. गहिया, डॉ. विमलेश शर्मा 5. हिन्दी व्याकरण – कामता प्रसाद गुरू
Online Resources -
1 www.bookspace.in 2 https://libgmm.com 3 https://www.gkexams.com

PART -D : Assessment And Evaluation		
	Suggested Continuous Evaluation Methods : Maximum Marks : 50 Marks Continuous Internal Assessment (CIA) : 15 Marks End Semester Exam (ESE) : 35 Marks	
Coninuous Internal Assessment : (CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 10 & 10 Marks Assignment/Seminar+Attendance - 05 Total Marks 15	Better marks out of the two Text/Quiz obtained marks in assignment shall be considered against 15 Marks
End Semester Exam (ESE) :	Two Section - A&B Section A : Q1 Objective - 05X1=05 Marks Section A : Q2 Short Answer Type - 5X2=10 Marks Section B : Descriptive Answer Type Qts. 1 out of 2 From Each Unit - 4X5=20 Marks Total =35 Marks	

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF MICROBIOLOGY
COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Certificate/Diploma/Degree)		**Semester - II/ IV/V/VI**	**Session: 2024-25**
1	**Course Code**	**MBSEC-01**	
2	**Course Title**	**Mushroom Cultivation**	
3	**Course Type**	**Skill Enhancement Course (SEC)**	
4	**Prerequisite (If Any)**	**As per Program**	
5	**Course Learning Outcomes (CLO)**	**At the end of this course, the students will be able to –** ➢ explain nutritional and medicinal values of mushroom ➢ relate the types of mushrooms and their spawn preparation ➢ examine the methods of cultivation and economic aspects ➢ attain expertise using different Agro-residues for cultivation of mushrooms ➢ observe post-harvest management of mushrooms	
6	**Credit Value**	**02 Credits (1C + 1C)**	***Credit = 15 Hrs. Theoretical Learning and = 30 Hrs. Laboratory or field learning/ Training***
7	**Total Marks**	**Max. Marks: 50**	**Minimum Passing marks: 20**

PART – B: Content of the Course		
Total No. of Teaching-Learning Periods: **Theory – 15 Periods (15 Hrs.) and Lab. or Field Learning / Training 30 Periods (30 Hours)**		
Module	**Topics (Course Contents)**	**No. of Period**
Theory Contents	**Introduction and Life cycle:** Classification and identification of edible and nonedible mushrooms. Nutritional and medicinal value of mushroom, Scope of mushroom cultivation. Taxonomic position and Life cycle of mushroom. Types of mushrooms; Button mushroom (Agaricus biporus), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus sajor kaju*) and paddy straw mushroom (*Volvariella volvacea*). (Observation). **Principles and Requisites:** Sterilization and disinfection of substrates, growth medium, isolation, spawn production and maintenance. (Observation) **Techniques of Cultivation:** Structure and construction of low-cost mushroom huts, layout of Traditional and Green house method. Maintenance of proper condition in mushroom huts, Composting, bed and polythene bag preparation, Spawning-casing-cropping. (Observation).	**15**
Lab./Field Training Contents	1.Preparation of laboratory Glassware (Chemical washing, cleaning and drying). 2.Basic information about autoclave, hot air oven, laminar air flow 3.Sterilization and sanitation of mushroom house, instruments etc. 4.Identification of edible and poisonous mushrooms. 5.Preparation of Mother Culture. Spawn- media preparation, Inoculation, and incubation. 6.Preparation of different types of bed for cultivation. 7.Cultivation of Mushroom using compost/ paddy straw/agricultural wastes. 10.Harvesting and post-harvest management of crops. (Observation & Practice)	**30**
Key Words	**Mushroom, Spawning, Compost, Harvesting**	

Name and Signature of Convener and Members of CBoS

10/6/24 10/6/24 10.6.24 Roshni 10-6-24 10.6.24 Dr. Nethra Dr. Swetha

Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Nita Bhal. (2000). Hand book on Mushrooms. 2nded. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Tewari, S. C., Pankaj Kapoor, (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
3. Biotechnology, V. Kumaresan.

Reference Books:

1. Stamets, Paul, and J.S. Chilton. 1983. The Mushroom Cultivator. Agarikon Press, Olympia, WA. 415 p.

Online Resources – e-Resources/ e-Books and e- learning portals

- **https://nios.ac.in/media/documents/vocational/mushroom_production_(revised)(618)/Lesson-01.pdf**
- **https://agriportal.cg.nic.in/horticulture/PDF/Download/Mushroom%20Project_Part%201.pdf**
- **http://nhb.gov.in/pdf/Cultivation.pdf**

PART: D ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	**Internal Test/ Quiz – (2): 10 & 10** **Assignment/ Seminar + Attendance: 05** **Total Marks: 15**	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against **15** Marks

End Semester Exam (ESE):	**Laboratory/ Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work – 20 Marks** **B. Spotting based on tools & technology (written) - 10 Marks** **C. Viva-voce (based on principle/ technology) – 05 Marks**	**Managed by Coordinator as per skilling**

Name and Signature of Convener and Members of CBoS

10.6.24 10.6.24 10.6.24 Dr. Nelson Xess

10/6/24 10-6-24 Dr. Swetha Nag. J

10/6/24