

BACHELOR OF SCIENCE (HONOURS)

Duration: 36 Months (3 Years) Eligibility: 12th Pass from Science with Minimum 60%

COURSE STRUCTURE OF ZOOLOGY (HONOURS) SEMESTER Ist

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3HBHL101H	Ability Enhancement	हिन्दी भाषा और संरचना	50	25	08	10	04	15	06	2	-	-	2
3BCA201H	Ability Enhancement	Basic Information Computer Technology – I	25	13	04	05	02	07	03	1	-	-	1
3SBZO105H	Core Course - 1	Invertebrates & cell biology	100	50	17	20	08	30	12	4	-	-	4
3SBZO106H	Core Course- 2	Principal of ecology	100	50	17	20	08	30	12	4	-	-	4
	Generic Elective -1	(Select From Below Given Specialized Subject)*	100	50	17	20	08	30	12	4	-	-	4
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
3SBZO105H	Practical	Invertebrates & cell biology	50	25	08	25	08	-	-	-	-	2	2
3SBZO106H	Practical	Principal of ecology	50	25	08	25	08	-	-	-	-	2	2
	Practical	(Select From Below Given Specialized Subject)*	50	25	08	25	08	-	-	-	-	2	2
3BCA201H	Practical	Basic Information Computer Technology - I	25	10	04	15	06	-	-	-	-	1	1
Grand Total			550							15	-	07	22

Minimum Passing Marks are equivalent to Grade C

L- Lectures T- Tutorials P- Practical

Major- Term End Theory Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Assignments 50%

*** Generic Elective Specialization: Opted specialization by student in 1st Semester will remain same in IInd, IIIrd and IVth Semester (See the specialisation subject as mentioned below)***

Generic Elective- 1		
Specialisation	Course Code	Subject
Botany	3SBBO103H	Bio-Diversity of microbes and cryptogams
Chemistry	3SBCH104H	Chemistry –I

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Course Details				External Assessment		Internal Assessment				Credit Distribution			Allocated Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3HBEL201H	Ability Enhancement	English Language and Indian Culture	50	25	08	10	04	15	06	2	-	-	2
3MBFE101H	Ability Enhancement	Fundamental of Entrepreneurship	50	25	08	10	04	15	06	2	-	-	2
3SBZO205H	Core Course-3	Vertebrates & development biology	100	50	17	20	08	30	12	4	-	-	4
3SBZO206H	Core Course-4	Molecular biology	100	50	17	20	08	30	12	4	-	-	4
	Generic Elective -2	(Select From Below Given Specialized Subject)*	100	50	17	20	08	30	12	4	-	-	4
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
3SBZO205H	Practical	Vertebrates & development biology	50	25	08	25	08	-	-	-	-	2	2
3SBZO206H	Practical	Molecular biology	50	25	08	25	08	-	-	-	-	2	2
	Practical	(Select From Below Given Specialized Subject)*	50	25	08	25	08	-	-	-	-	2	2
Skill Courses								Sessional					
	Skill Enhancement	Skill Enhancement Elective Course-II	50	-	-	-	-	50	20	1	-	1	2
Grand Total			600							17	-	07	24

Minimum Passing Marks are equivalent to Grade C

L- Lectures T- Tutorials P- Practical

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Assignments 50%

Skill Elective II – Any other course being offered in this semester as per the list given at the end of course structure.

* Generic Elective Specialization: Opted Specialization by student in 1st Semester will remain same in IInd, IIIrd and IVthSemester (See the specialisation subject as mentioned below)*

Generic Elective- 2		
Specialisation	Course Code	Subject
Botany	3SBBO203H	Cell biology and genetics
Chemistry	3SBCH204H	Chemistry –II

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COURSE STRUCTURE OF ZOOLOGY (HONOURS) SEMESTER IIIrd													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3HBHL302H	Ability Enhancement	हिन्दी भाषा सवेधना एवं संचार साधन	50	25	08	10	04	15	06	2	-	-	2
3CBCA502H	Ability Enhancement	Basic Information Computer Technology – II	25	13	04	05	02	07	03	1	-	-	1
3SBZO305H	Core Course-5	Genetics	100	50	17	20	08	30	12	4	-	-	4
3SBZO306H	Core Course-6	Physical controlling and Coordinating system	100	50	17	20	08	30	12	4	-	-	4
	Generic Elective -3	(Select From Below Given Specialized Subject)*	100	50	17	20	08	30	12	4	-	-	4
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
3SBZO305H	Practical	Genetics	50	25	08	25	08	-	-	-	-	2	2
3SBZO306H	Practical	Physical controlling and Coordinating system	50	25	08	25	08	-	-	-	-	2	2
	Practical	(Select From Below Given Specialized Subject)*	50	25	08	25	08	-	-	-	-	2	2
3CBCA502H	Practical	Basic Information Computer Technology – II	25	10	04	15	06	-	-	-	-	1	1
Skill Courses								Sessional					
	Skill Enhancement	Skill Enhancement Elective Course-II	50	-	-	-	-	50	20	1	-	1	2

3HBEL402H	Ability Enhancement	English language and scientific temper	50	25	08	10	04	15	06	2	-	-	2
3HBHP401H	Ability Enhancement	Human Values & Ethics	50	25	08	10	04	15	06	2	-	-	2
3SBZO405H	Core Course - 7	Animal Physiology	100	50	17	20	08	30	12	4	-	-	4
3SBZO406H	Core Course- 8	Biochemistry of metabolic process	100	50	17	20	08	30	12	4	-	-	4
	Generic Elective -4	(Select From Below Given Specialized Subject)*	100	50	17	20	08	30	12	4	-	-	4
Practical Group			Term End Practical Exam			Lab Performance		Sessional					
3SBZO405H	Practical	Animal Physiology	50	25	08	25	08	-	-	-	-	2	2
3SBZO406H	Practical	Biochemistry of metabolic process	50	25	08	25	08	-	-	-	-	2	2
	Practical	(Select From Below Given Specialized Subject)*	50	25	08	25	08	-	-	-	-	2	2
Grand Total			550							16	-	06	22

Minimum Passing Marks are equivalent to Grade C

L- Lectures T- Tutorials P- Practical

Major- Term End Theory Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Assignments 50%

* Generic Elective Specialization: Opted specialization by student in 1st Semester will remain same in IInd, IIIrd and IVth Semester (See the specialisation subject as mentioned below)*

Generic Elective- 4*		
Specialisation	Course Code	Subject
Botany	3SBBO403H	Structure developments reproduction in flowering plant
Chemistry	3SBCH404H	Chemistry –IV

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Duration: 36 Months (3 Years) Eligibility: 12th Pass from Science with Minimum 60%

COURSE STRUCTURE OF ZOOLOGY (HONOURS) SEMESTER Vth													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3SBZO501H	Core Course	Applied Zoology	100	50	17	20	08	30	12	4	-	-	4
3SBZO502H	Core Course	Animal Behaviour & Chronobiology	100	50	17	20	08	30	12	4	-	-	4
3SBZO503H	Core Course-	Comparative Anatomy of Vertebrates	100	50	17	20	08	30	12	4	-	-	4
3SBZO504H	Discipline Specific Elective	Group A	100	50	17	20	08	30	12	4	-	-	4
3SBZO505H	Discipline Specific Elective	Group A	100	50	17	20	08	30	12	4	-	-	4
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
3SBZO501H	Practical	Applied Zoology	50	25	08	25	08	-	-	-	-	2	2
3SBZO502H	Practical	Animal Behaviour & Chronobiology	50	25	08	25	08	-	-	-	-	2	2
3SBZO503H	Practical	Comparative Anatomy of Vertebrates	50	25	08	25	08	-	-	-	-	2	2
3SBZO504H	Practical	Group A	50	25	08	25	08	-	-	-	-	2	2
3SBZO505H	Practical	Group A	50	25	08	25	08	-	-	-	-	2	2
3SBZOH								Sessional					

****	Skill Enhancement	Skill Enhancement Elective Course-II	50	-	-	-	-	50	20	1	-	1	2
Grand Total			800							21	-	11	32

Minimum Passing Marks are equivalent to Grade C L- Lectures T- Tutorials P- Practical

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Assignments 50%

Skill Elective III – Any other course being offered in this semester as per the list given at the end of course structure.

BACHELOR OF SCIENCE (HONOURS)

Duration: 3 Months (3 Years) Eligibility: 12th Pass from Science with Minimum 60%

COURSE STRUCTURE OF ZOOLOGY (HONOURS) SEMESTER VIth

COURSE STRUCTURE OF ZOOLOGY (HONOURS) SEMESTER VIth													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
3SBZO601H	Core Course	Environmental Biology & Evolution	100	50	17	20	08	30	12	4	-	-	4
3SBZO602H	Core Course	Development Biology	100	50	17	20	08	30	12	4	-	-	4
3SBZO603H	Core Course-	Aquatic Biology	100	50	17	20	08	30	12	4	-	-	4
3SBZO604H	Discipline Specific Elective	Group B	100	50	17	20	08	30	12	4	-	-	4
3SBZO605H	Discipline Specific Elective//Project/Dissertation	Group B	100	50	17	20	08	30	12	4	-	-	4
Practical Group				Term End Practical Exam		Lab Performance		Sessional					
3SBZO601H	Practical	Environmental Biology & Evolution	50	25	08	25	08	-	-	-	-	2	2
3SBZO602H	Practical	Development Biology	50	25	08	25	08	-	-	-	-	2	2
3SBZO603H	Practical	Aquatic Biology	50	25	08	25	08	-	-	-	-	2	2
3SBZO604H	Practical	Group B	50	25	08	25	08	-	-	-	-	2	2
3SBZO605H	Practical/Project/Dissertation	Group B	50	25	08	25	08	-	-	-	-	2	2
Grand Total			750							20	-	10	30

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Minimum Passing Marks are equivalent to Grade C L- Lectures T- Tutorials P- Practical

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/Assignments 50%

Compulsory Project/Dessertation with choice in any Disciplinary specific elective. Compulsory one paper presentation certificate in related dicipline.

DISCIPLINE SPECIFIC ELECTIVE

***Note** - Students need to select any two from below mentioned four papers from Each Group Elective's for Fifth and Sixth semester of **B.Sc. Zoology (Honours)**).

ELECTIVES FOR SEMESTER 5 TH			ELECTIVES FOR SEMESTER 6 TH		
Course Code	Course Type	List of Electives	Course Code	Course Type	List of Electives
GROUP ELECTIVE -I			GROUP ELECTIVE -IV		
3SBZO504H	Discipline Specific Elective-I	(Wild life conservation & management)	3SBZO604H	Discipline Specific Elective-I	(Environmental & Public Health)
3SBZO505H	Discipline Specific Elective-II	(Fish & Fishries)	3SBZO605H	Discipline Specific Elective-II	(Aquaculture)
3SBZO506H	Discipline Specific Elective-III	(Industrial Biology)	3SBZO606H	Discipline Specific Elective-III	(Economic Zoology)
3SBZO507H	Discipline Specific Elective-IV	(Insect Vector & Diseases)	3SBZO607H	Discipline Specific Elective-IV	(Biology Insecta)

SKILL ENHANCEMENT ELECTIVE COURSES

Non-Technical			
Elective No.	Department/ Faculty Name		
	Faculty of Information Technology		
I	SCIT 201	Data Entry Operation	2(1+0+1)
II	SCIT 301	Multimedia	2(1+0+1)
III	SCIT 501	Web Designing with HTML	2(1+0+1)
IV	SCMIT 201	Web Development	2(1+0+1)
V	SCMIT 301	LINUX	2(1+0+1)
	Faculty of Management		
I	SMGT 201	Briefing and Presentation Skills	2(1+0+1)
II	SMGT 301	Resolving Conflicts and Negotiation Skills	2(1+0+1)
III	SMGT 802	Entrepreneurship Development	2(1+0+1)
	Faculty of Commerce		
I	SCOM 201	Tally ERP 9	2(1+0+1)
II	SCOM 302	Multimedia	2(1+0+1)

III	SCOM 803	Data Analyst	2(1+0+1)
Faculty of Humanities			
I	SHBA 301	Pursuing Happiness	2(1+0+1)
II	SHBA302	Communication Skill and Personality Development	2(1+0+1)
III	SHMA301	Tourism in M.P	2(1+0+1)
Faculty of Science			
I	SSBI 301	Mushroom Cultivation	2(1+0+1)
II	SSPH 301	House Hold Wiring	2(1+0+1)
III	SSPH 301	Basic Instrumentation	2(1+0+1)
IV	SSPH 301	DTP Operator	2(1+0+1)
V	SSCH 301	Graphic Designing	2(1+0+1)
Faculty of Education			
I	SCBE 403	Understanding of ICTC (Information Communication Technology)	2(1+0+1)
II	SCPE 201	Yoga Education	2(1+0+1)

.COURSE CODE: 3HBHL101H

हिन्दी भाषा और संरचना

पाठ्यक्रम के उद्देश्य:

1. विद्यार्थियों में राष्ट्र प्रेम की भावना का विकास करना।
2. हिन्दी के समृद्ध साहित्य को नयी पीढ़ी तक पहुँचाना।
3. पत्र-लेखन, सार लेखन, भाव पल्लवन एवं साक्षात्कार के कौशल का विकास करना।
4. डायरी, संस्मरण, लेखन, पारिभाषिक, शब्दावली, तत्सम, तद्भव, देशज, विदेशी शब्दों इत्यादि के ज्ञान का परिमार्जन करना।

पाठ्यक्रम

इकाई-1

भारत वंदना) काव्य(
जाग तुझको दूर जाना
स्वतंत्रता पुकारती) काव्य(
हम अनिकेतन) काव्य(
भाषा की महत्ता और उसके विविध रूप
भाषा-कौशल

सूर्यकांत त्रिपाठी निराला
सुश्री महादेवी वर्मा
जयशंकर प्रसाद
बालकृष्ण शर्मा नवीन

इकाई-2

करुणा) निबंध (
समन्वय की प्रक्रिया) निबंध(
बिच्छी बुआ) कहानी(
अनुवाद
हिन्दी की शब्द-संपदा
परिभाषिक शब्दावली

आचार्य रामचन्द्र शुक्ल
रामधारी सिंह दिनकर
डॉ. लक्ष्मण विष्ट बटरोही
परिभाषा प्रकारण महत्व विशेषताएं

इकाई-3

विलायत पहुंच ही गया) आत्मकथांश (
अफसर (व्यंग्य)
तीर्थयात्रा) कहानी(
मकड़ी का जाला) व्यंग्य(
वाक्य- संरचना :तत्समए तद्भव देशज विदेशी

महात्मा गांधी
शरद जोशी
डॉ. मिथिलेश कुमार मिश्र
डॉ. रामप्रकाश सक्सेना

इकाई-4

अप्प दीपो भव) वक्तृत्व कला(
भारत का सामाजिक व्यक्तित्व) प्रस्तावना (
पत्र मैसूर के महाराजा को) पत्र-लेखन (
बनी रहेगी किताबें) आलेख(
पत्र-लेखन:महत्व और उसके विविध रूप
सड़क पर दौड़ते ईहा मृगा) निबंध (

स्वामी श्रद्धानंद
जवाहरलाल नेहरू
स्वामी विवेकानंद
डॉ. सुनीता रानी घोष
डॉ. श्यामसुन्दर दुबे

इकाई-5

योग की शक्ति) डायरी (डॉ. हरिवंश राय बच्चन
कोश के अखाड़े में कोई पहलवान नहीं उतरता)साक्षात्कार (- भाषाविद् डॉ. हरिदेव
बाहरी से प्रो. त्रिभुवननाथ शुक्ल
नीग्रो सैनिक से भेंट) यात्रा-संस्मरण(डॉ. देवेन्द्र सत्यार्थी
यदि वा न होती तो शायद गांधी को यह ऊँचाई न मिलती) साक्षात्कार (कथाकार.
गिरिराज किशोर से सत्येन्द्र शर्मा
सार- लेखनए भाव-पल्लवन साक्षात्कार और कौशल

अपेक्षित परिणाम:

1. विद्यार्थी भारत भूमि से प्रेम व स्नेह के भावों को बढ़ा सकेंगे।
2. विद्यार्थियों की हिन्दी की शब्द संपदा में वृद्धि होगी।
3. पत्र-लेखन ,सार लेखन, भाव पल्लवन साक्षात्कार के कौशल का विकास होगा।
4. डायरी एवं संस्मरण लेखन विद्या का परिमार्जन होगा।
5. हिन्दी के समृद्ध साहित्य कोश से लाभान्वित होंगे।

Chairperson
(Board of Studies)

Dean
(Academic Council)

(Registrar)
Seal

BASIC COMPUTER & INFORMATION TECHNOLOGY-I

COURSE OBJECTIVE:-

To educate students to analyze, design, integrate & manage information systems using information technology.

Syllabus:

UNIT – I Introduction to computer organization History of development of Computer system concepts. Characteristics, Capability and limitations.
Generation of computer. Types of PC's Desktop. Laptop, Notebook. Workstation & their Characteristics.

इकाई – 1 कम्प्यूटर ऑर्गनाइजेशन का परिचय कम्प्यूटर का इतिहास, कम्प्यूटर सिस्टम विचारधारा, विशेषताएं, योग्यता एवं सीमाएं, कम्प्यूटर की पीढ़ियां, पी.सी. के प्रकार, डेस्कटॉप के प्रकार, लेपटॉप के प्रकार, नोटबुक, वर्क स्टेशन आदि की विशेषताएं।

UNIT – II Introduction to computer organization Basic components of a computer system Control Unit, ALU, Input / Output function and Characteristics, memory RAM, ROM, EPROM, PROM.

इकाई – 2 कम्प्यूटर ऑर्गनाइजेशन का परिचय कम्प्यूटर सिस्टम के आधार उपकरण, कंट्रोल युनिट, ए. एल.यू. इनपुट/आउटपुट फंक्शन और विशेषताएं, मेमोरी रेम, रोम, इपी रोम, पी रोम, और अन्य प्रकार की मेमोरी।

UNIT – III Input & output devices Input Devices : Keyboard, Mouse, Trackball. Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen.

Output Devices: Monitors Characteristics and types of monitor, Video Standard VGA, SVGA, XGA,

LCD Screen etc. Printer, Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer. Plotter, Sound Card and Speakers.

इकाई – 3 इनपुट तथा आउटपुट डिवाइसेस **इनपुट डिवाइस:** कीबोर्ड, माउस, ट्रेकबॉल, जॉयस्टिक, डिजिटल टैबलेट, स्कैनर्स, डिजिटल केमरा, एमआईसीआर, ओसीआर, ओएमआर, बार कोड रीडर, आवाज को पहचानने वाला, लाइटपेन, टच स्क्रीन।

इनपुट डिवाइस: मॉनीटर की विशेषताएं एवं मोनीटर के प्रकार, वीडियो स्टैंडर्ड VGA, SVGA, XGA, LCD स्क्रीन आदि, प्रिंटर, डेजी व्हील, डॉट मैट्रिक्स, इंकजेट, लेजर, लाईन प्रिंटर, प्लोटर, साउंड कार्ड्स एवं स्पीकर्स।

UNIT – IV Storage Devices Storage fundamental primary Vs Secondary. Various Storage Devices magnetic Tape. Cartridge Tape, Data Drives, Hard Drives, Floppy Disks, CD, VCD, CD-R, CD-RW, Zip Drive, DVD, DVD-RW.

इकाई – 4 स्टोरेज डिवाइसेस स्टोरेज फंडामेंटल्स प्रईमेरी विरुद्ध भिन्न स्टोरेज डिवाइजेस मेग्नेटिक टेप, कार्टरेज टेप, डाआ ड्राईव्स, हार्ड डिस्क ड्राईव्स फ्लोपी डिस्कस, सी.डी., वी.सी.डी., सी.डी. –आर.सी.डी– आर. डब्ल्यू जीप ड्राईव, डी.वी.डी., डी.वी.डी., – आर. डब्ल्यू।

UNIT – V Operating System Introduction to operating systems, its functioning and types. Basic commands of dos & Windows operating System.

इकाई – 5 ऑपरेटिंग सिस्टम का परिचय ऑपरेटिंग सिस्टम का परिचय, उसके लक्षण एवं प्रकार, डॉस एवं विन्डोस का मूल कमांड।
डॉस बेसिक्स–

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INVERTEBRATES & CELL BIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for the salient features of all Invertebrates, cell organization and cell division.

Syllabus:

UNIT- I Classification of Non Chordates upto classes according to Parker and Heswell.(7th Edition)

1. Classification of lower Invertebrates.
2. Classification of higher invertebrates.
3. Protozoa – Type study of Plasmodium.
4. Porifera – Type study of Sycon.

UNIT- II

1. Coelenterata – Type study of Obelia.
2. Helminthes – Type study of Liver Fluke.
3. Annelida – Type study of Earthworm, Metamerism, Trochophore Larva.

UNIT- III

1. Arthropoda – Type study of Prawn.
- 2 Mollusca – Type study of Pila.
- 3.Echinodermata – External Features of Star Fish and Echinoderm Larvae.

UNIT- IV

1. The cell – History of Cell Biology, Cell theory, Prokaryotic and Eukaryotic cell.
2. Microscopy : Compound and Electron Microscopy.

UNIT – V

1. Nuclear Organization of cell.
2. Extra nuclear organization of cell.
3. Cell reproduction – Amitosis, mitosis, meiosis.

COURSE OUTCOME:-

The student have a knowledge of Classification and life cycle of invertebrates and cell division.

PRACTICALS:-

The Practical's work will be based on theory syllabus and the candidates will be required to show knowledge of the following –

1. Study of Museum Specimens, slides relevant to the type study in theory
2. Mounting (Temporary)
 - a. Mouth parts of insects
 - b. Statocyst of Prawn
 - c. Ctenidium and Osphradium of Pila
 - d. Scales of Teleost fish
 - e. Mounting Material
3. Major Dissection
 - a. Earthworm: Digestive system, nervous system and reproductive system.

- b. Cockroach : Digestive system, Nervous system, .
 - c. Prawn : Nervous System, Appendages.
- 4 Minor Dissection

- a. Hastate plate and appendages of Prawn.
 - b. Salivary glands of Cockroach.
 - c. Radula of Pila.
5. Cell Biology
- a. Study of Prokaryotic and eukaryotic cell.
 - b. Study of DNA and RNA models.
 - c. Squash preparation of chromosomes from onion root tip.
 - d. study of meiosis in grasshopper testis.

PRACTICAL:-

1. Major Dissection
2. Minor Dissection
3. Mounting
4. Spotting (Representative of Each phylum)
5. Cytological exercise (any two)
6. Viva
7. Record & Collection

Reference Books : -(All latest editions)

- Jordan, E.I., and Verma, P.S. : Invertebrate Zoology, S. Chand & Co. Ltd., Ram Nagar, New Delhi.
- Parker and Haswell : Text Book of Zoology, Vol.1, (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi-110051.
- Kotpal, Agarwal&Khetrapal : Modern text book of Zoology :Invertebrate, Rastogi Publications.
- Nigam, H.C. : Biology of Non-Chordates, ShobamLalNagin Chand& Co.
- . Rastogi, V.B. : Invertebrate Zoology, KedarnathRamnath.

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PRINCIPLES OF ECOLOGY

- UNIT-1** **Introduction to Ecology :** History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of physical factors
- UNIT- II** **Population :** Unitary and Modular populations Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion Exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors Population interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for ompetition and Predation, functional and numerical responses
- UNIT - III** **Community:** Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Ecotone and edge effect; Ecological succession with one example Theories pertaining to climax community
- UNIT - IV** **Ecosystem:** Types of ecosystems with one example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with one example of Nitrogen cycle Human modified ecosystem
- UNIT- V** **Applied Ecology:** Ecology in Wildlife Conservation and Management

PRACTICALS

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO₂
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary

SUGGESTED READINGS

- Colinvax, P. A. (1993). Ecology. II Edition. Wiley, John and Sons, Inc.
- Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.

- Odum, E.P., (2008). Fundamentals of Ecology. Indian Edition. Brooks/Cole
- Robert Leo Smith Ecology and field biology Harper and Row publisher
- Ricklefs, R.E., (2000). Ecology. V Edition. Chiron Pres

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BIO-DIVERSITY OF MICROBES AND CRYPTOGRAMS

COURSE OBJECTIVES:-

- To make the student know the outline of origin and evolution of life. Understand the structure of Bacteria & viruses and plant diseases caused by Bacteria & viruses and their control
- To make students learn the general characters and economic importance of Algae & Fungi.
- To make the students understand the vegetative and reproductive features of different algae and fungi through the study of representative types of various classes.
- To help the students identify and understand plant diseases caused by fungi and their Control measures.
- To make the students know the formation of lichens and their economic and ecological importance.
- To help the students know the systematic position of the two Cryptogamic groups (Bryophyta & Pteridophyta) and their classification.
- To make the students understand the life histories of Bryophyta & Pteridophyta through the study of representative types.
- To enable the students to assess the phylogenetic aspects of the above two groups.
- To help the students to get an insight into the geological past, extinct plants and their preservation

Syllabus:

- UNIT – I** Viruses, Mycoplasma and Bacteria : characteristics of viruses and mycoplasma, general account of TMV and T4 bacteriophage. Bacterial structure, nutrition, reproduction and economic importance; general account of Cyanobacteria.
- UNIT-II** Algae : General characters, classification and economic importance; important features and life history of Chlorophyceae- volvox, oedogonium, Charophyceae-chara Xanthophyceae - vaucheria, Phaeophyceae - ectocarpus, sargassum, Rhodophyceae - polysiphonia.
- UNIT-III** Fungi: general characters, classification and economic importance, important features and life history of Mastigomycotina- Phytophthora, Zygomycotina- Mucor. Asco mycotina : Aspergillus, Peziza, Basidomycotina - puccinia, Deuteromycotina- Cercospora, Colletotrichum, general account of lichens.
- UNIT-IV** Bryophyta : classification, study of morphology, anatomy, reproduction of Hepaticopsida Riccia, Marchantia, Anthocerotopsida Anthoceros, Bryopsida- Polytrichum
- UNIT-V** Pteridophyta : Important characters and classification. Stelar organization. Morphology and anatomy of Rhynia. Structure, anatomy and reproduction in Lycopodium, Selaginella, Equisetum and Marsilea.

COURSE OUTCOME:-

- Study of Pteridophytes and Gymnosperms will help the students understand the connecting link between the lower and higher organisms in the plant kingdom.
- The anatomy imparts a thorough knowledge about the internal structure and relationship between tissues and evolution.
- Most of the techniques in biotechnology uses bacteria, viruses and fungi. This course will make the students adept in the structure and functions of these microbes which in turn will give them confidence to work using these organisms.

PRACTICAL:-

- Study of volvox by preparing temporary slide.
- Study of oedogonium by preparing temporary slide.
- Study of chara by preparing temporary slide.
- Study of vaucheria by preparing temporary slide.
- Study of external morphology of sargassum.
- Study of polysiphonia by preparing temporary slide.
- Study of phytophthora by preparing temporary slide.
- Study of mucor by preparing temporary slide.
- Study of Aspergillus by preparing temporary slide.
- Study of peziza by preparing temporary slide.
- Study of puccinia by preparing temporary slide.
- Study of cercospora by preparing temporary slide.
- Study of colletotricum by preparing temporary slide.
- Study of external morphology and internal structure of lichen thallus.
- To study external morphology of ricciathallus.
- To study thallus anatomy by preparing temporary slide.
- To study external morphology of Marchantiathallus.
- To study internal structure and thallus anatomy by preparing temporary slide.
- Study of morphology and anatomy of Rhynia.
- Study of external morphology and anatomy of seleginella. Study of external morphology and anatomy of Lycopodium.
- Plant disease.
 - (a) Tobacco mosaic disease.
 - (b) Leaf curl disease of papaya.
 - (c) Late blight disease of potato.
 - (d) Tikka disease of ground nut.
 - (e) Red rot of sugarcane

References Books:

- Singh Panday Jain.
- Smith G, M. Cryptogamic Botany Vol-1 Tata Mc Graw Hill publishing co. Ltd Bombay, New Delhi.
- Parihar, N.S. 1996 Biology and morphology of pteridophytes, Central book depot Allahabad.

- Bhatnager, S.P. and Moitra, A.1996; Gymnosperm. New age International,Pvt.Ltd New Delhi
- Singh,H.1978 Embryology of Gymnosperms,Gebruder Bortager,Berlin
- Mehrotra,R.S. and Aneja,R.S.1998;An introduction to mycology. New age Intermediate Press
- Unified practical botany Dr.S.B Agarwal & Dr.Esha Agarwal

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COURSE CODE: 3SBCH104H
CHEMISTRY-I

Syllabus:

- UNIT - I** A. Mathematical Concepts : Logarithmic relations, curves stretching, linear graphs and calculation of slopes, Differentiation of functions like Kx , ex , xn , $\sin x$, $\log x$; maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions; permutations and combinations. Factorials, Probability. B. Gaseous States : Deviation from ideal behaviour, van der Waals equation of state. Critical phenomenon : PV isotherms of ideal gases, continuity of states, the isotherms of van der Waals equations, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of states. C. Molecular Velocities : Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision numbers, mean free path and collision diameter. Liquefaction of gases (based on Joule-Thomson effect).
- UNIT - II** A. Liquid State : Intermolecular forces, structure of liquids (a qualitative description) Liquid crystals: Difference between liquid crystal, solid and liquid. Classification, structure of nematic and cholestric phases. Thermography and seven segment cell.
B. Colloidal State : Definition of colloids, classification of colloids. Solids in liquids (sols): properties- kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze law, gold number. Liquids in liquids (emulsions) : types of emulsions, preparation. Emulsifier. Liquids in solids (gels): classification, preparation and properties, inhibition, general applications of colloids.
C. Solid State : Definition of space lattice, Unit cell, Laws of crystallography - (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Laws of symmetry, Symmetry elements in crystals. Diffraction : X-ray diffraction by crystals, Derivation of Bragg's equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).
- UNIT - III** Chemical Kinetics : Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction concentration, temperature, pressure, solvent, light and catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions- zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction - differential method, method of integration, method of half life period and isolation method.
Experimental methods of chemical kinetics - conductometric, potentiometric, optical methods- polarimetry and spectrophotometry. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis) Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
- UNIT - IV** A. Structure and Bonding : Hybridizations, Bond lengths and bond angles, bond energy : Localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance,

hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

B. Mechanism of Organic reactions : Curved arrow notations, drawing electron movements with arrows, half-headed and double headed arrows, homolytic and heterolytic bond breaking.

C. Types of Reagents : Electrophiles and nucleophiles. Types of organic reactions. Energy consideration. Reactive intermediates- carbocations, carbanions, free radicals and carbenes. Methods of determination of reaction mechanism.

UNIT - V

Stereochemistry : Concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centres, optical activity, properties of enantiomers, chiral and

achiral molecules with two stereogenic centres, diastereomers, mesocompounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configurations, sequence rule, D & L , R & S systems of nomenclature. E and Z system of Nomenclature geometrical isomerism in alicyclic compounds. Conformation, conformational analysis of ethane and n-butane. Conformations of cyclohexanes, axial and equatorial bonds, Newman projection and Sawhorse formulae, Fischer and Flying wedge formulae. B. Alkanes and Cycloalkanes : IUPAC nomenclature, classification, isomerism in alkanes, sources and methods of preparation (with special reference to Wurtz, Kolbe, Corey-House reactions and decarboxylation of carboxylic acids). Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes Cycloalkanes : nomenclature, methods of preparations, chemical reactions. Baeyer's strain theory and its limitations. ring strain in cyclopropane and cyclobutanes. Theory of strainless rings.

PRACTICAL:-

Physical chemistry

(Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Calibration of thermometer
2. Determination of melting point
3. Determination of boiling point
4. Determination of mixed melting point
5. Preparation of solutions of various concentrations, NaOH, HCl, H₂SO₄.

(Any one experiment will be asked in examination form the following carrying 12 Marks)

1. To determine the velocity constant (specific reaction rate) of hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature.
2. To study the effect of acid strength on the hydrolysis of an ester.
3. To compare the strength of HCl and H₂SO₄ by studying the kinetics of hydrolysis of ester.
4. To study kinetically the reaction rate of decomposition of iodide by H₂O₂.
5. Determination of surface tension / percentage composition of given organic mixture using surface tension method.
6. Determination of viscosity / percentage composition of given organic mixture using viscosity method.

Organic chemistry

(Any one experiment will be asked in examination form the following carrying 12 Marks)

1. Distillation
2. Crystallization
3. Decolourisation and crystallization using charcoal
4. Sublimation

Viva: 6 marks

Records: 8 marks

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ENGLISH LANGUAGE AND INDIAN CULTURE

COURSE OBJECTIVES:-

- To Study the basic concept and Language Skills of English Language.
- Comprehensive study of different kinds of vocabulary in English Language.
- To Study the different era in every story and moods in poems.

Syllabus:

UNIT – I

Amalkanti: Nirendranath Chakrabarti

1. Sita: Toru Dutt
2. Tryst with Destiny: Jawaharlala Nehru
3. Delhi in 1857: Mirza Ghalib
4. Preface to the Mahabharata: C. Rajagopalachari
5. Where the Mind is Without Fear: Rabindranath Tagore
6. A Song of Kabir: Translated by Tagore
7. Satyagraha: M.K. Gandhi
8. Toasted English: R.K. Narayan
9. The Portrait of a Lady: Khushwant Singh
10. Discovering Babasaheb: Ashok Mahadevan

UNIT – II

Comprehension

UNIT – III

Composition and Paragraph Writing (Based on expansion of an idea).

UNIT – IV

Basic Language Skills : Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, Speech Skill.

UNIT – V

Basic Language Skills : Grammar and usage – The Tense Forms, Propositions, Determiners and Countable/Uncountable Nouns, Verb, Articles, Adverbs.

COURSE OUTCOMES:-

1. Students will be able to understand the basic concept and Language Skills of English Language.
2. Students will be able to understand the different use of vocabulary in their sentences.
3. Students will be able to understand the varieties of stories on different issues and on different format.

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FUNDAMENTALS OF ENTREPRENEURSHIP

COURSE OBJECTIVE:-

Syllabus: Understanding basic concepts of entrepreneurship and key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

UNIT – I Entrepreneurship-Definition, Characteristics and importance, Types and functions of an entrepreneur, merits of a good entrepreneur motivational factors of entrepreneurship.

UNIT – II Motivation to achieve targets and establishment of ideas. Setting targets and facing challenges. Resolving problems and creativity. Sequenced planning and guiding capacity, Development of self confidence. Communication skills, Capacity to influence, leadership.

UNIT – III Project Report- Evaluation of selected process. Detailed project report - Preparation of main part of project report pointing out necessary and viability.
Selecting the form of Organization: Meaning and characteristics of sole Proprietorship, Partnership and cooperative committees, elements affecting selection of a form of an organization.
Economic management -Role of banks and financial institutions banking, financial plans, working capital-evaluation and management, Cost and Price determination, Calculation of Profits, keeping of accounts.

UNIT – IV Production management - Methods of purchase. Management of movable assets/goods. Quality management. Employee management. Packing.
Marketing management Sales and the art of selling. Understanding the market and market policy. Consumer management. Time management.

UNIT - V Role of regulatory institutions - district industry centre, pollution control board, food and drug administration, special study of electricity development and municipal corporation.
Role of development organizations, khadi & village Commission/ Board, State Finance Corporation, scheduled banks, MP Women's Economics Development Corporation.
Self-employment-oriented schemes, Prime Minister's Employment schemes, Golden Jubilee Urban environment scheme, Rani Durgavati Self-Employment scheme, Pt. Deendayal Self- employment scheme.
Various grant schemes - Cost-of-Capital grant, interest grant, exemption from entry tax, project report, reimbursement grant, etc.
Special incentives for women entrepreneurs, prospects & possibilities.
Schemes of Tribal Finance Development Corporation, schemes of Antyavasai Corporation, schemes of Backward Class and Minorities Finance Development Corporation.

COURSE OUTCOME:-

Understanding basic concepts in the area of entrepreneurship, understanding the stages of the entrepreneurial process, adopting of the key steps in the elaboration of business ideas, Developing personal creativity and entrepreneurial initiative.

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VERTEBRATES & DEVELOPMENTAL BIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for the salient features of all Vertebrates. and developmental biology

Syllabus:

- UNIT – I**
1. Origin of Chordates. Classification of phylum Chordata upto orders according to Parker and Haswell (Latest edition).
 2. Hemichordata – External features and affinities of Balanoglossus.
- UNIT – II**
1. Urochordata – Type study of Herdmania (excluding Development). Cephalochordata – Type study of Amphioxus. Affinities of Amphioxus.
- UNIT – III**
1. Comparison between Petromyzon and Myxine.
 2. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals).
- UNIT – IV**
1. Parthenogenesis.
 2. Gametogenesis.
 3. Fertilization, Patterns of cleavage
- UNIT – V**
1. Frog and chick embryology upto the formation of three germinal layers.
 - 2 Fate map construction in frog & chick Gastrulation in frog and chick upto the formation of germinal layers.
 3. Concept of competence, determination and differentiation.
 4. Extra embryonic membranes in chick.
 5. Concept of regeneration

COURSE OUTCOME:-

The student have a knowledge of Classification and life cycle of Vertebrates, gametogenesis and formation of three germinal layers

PRACTICALS:-

- 1.The practical work will be based on theory syllabus and the candidates will be required to show knowledge of the following :
- 2 Study of museum specimens and slides relevant to theory paper.
- 3 Osteology
 - a. Girdles and limb bones of : Frog, Varanus, Fowl and Rabbit
- 4 Cell Biology:Study of DNA and RNA Models.
 - a. Preparations of Polytene chromosome in chironomous larva
 - b. Squash preparation of chromosome from Onion root tip.
 - c. Study of Meiosis in Grasshopper testis.
- 4 Embryology : Study of different developmental stages of frog and chick – whole mounts and sections.

PRACTICAL:-

Major Dissection
Spotting
Embryology
Viva
Practical Record/Collection

Reference Books:

- Introduction to Chordates - Majupuria
- Modern text book of zoology vertebrate- R.L.Kotpal
- R.P.Unified – Zoology Dr. S.N.Saxena
- Unified Zoology – U.K. Tiwari and V.K. Singh
- Unified Practical Zoology – Dr. A.K. Kushrestha
- Laboratory Techniques by Swaroop, Arora&Pathak
- Development Biology – VeerbalaRastogi
- Pranivigyan Books of Hindi Granth Academy
- Fundamentals of Zoology – Ghosh& Manna

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MOLECULAR BIOLOGY

- UNIT- I** Nucleic acids : DNA as the carrier of genetic information. The Structures of DNA and RNA / Genetic Material DNA Structure:, DNA structure, , Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA- Prokaryotes, Viruses, Eukaryotes.RNA StructureOrganelle DNA -- mitochondria and chloroplast DNA.The Nucleosome ,Chromatin structure- Euchromatin, Heterochromatin
- UNIT- II** The replication of DNA , RNA priming; Various models of DNA replication, Enzymes involved in DNA replication Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)
- UNIT- III** Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes: transcription factors
- UNIT- IV** Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.
- UNIT- V** Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis;

PRACTICAL

1. Preparation of medium and raising E.Coli.
2. Isolation of genomic DNA from E.Coli.
3. DNA isolation .
4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.
5. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication).
6. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs.
7. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)
8. Study of the following through photographs: Assembly of Spliceosome machinery; Splicing mechanism in group I & group II introns; Ribozyme and Alternative splicing.

SUGGESTED READINGS

1. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons Inc., U.S.A. 5th edition.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings. U.S.A. 9th edition.
4. Russell, P. J. (2010). i-Genetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.
5. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.

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CELL BIOLOGY AND GENETICS

COURSE OBJECTIVES:-

- Outline the structure of the biomolecules found in all living organisms.
- Describe the function and structure of cells including the metabolic reactions that occur in cells.
- Explain the process of inheritance.
- Describe how RNA, DNA and proteins are synthesized.
- Explain the process of cell division in both somatic and germ cells.
- Explain the processes by which animals acquire nutrients, water and oxygen, eliminate wastes, protect against foreign substances, acquire information about their environment and reproduce.
- Generate a hypothesis from a set of observations and then design experiments to

Syllabus:

- UNIT – I** The cell envelops; plasma membrane, bilayer lipid structure,function of the cell wall. Structure and function of cell organells: Golgibodies,ER, Peroxisome, Vacuole, Chloroplast and Mitochondrion.
- UNIT - II** Ultrastructure and function of nucleus: Nuclear membrane, Nucleolus, Extranuclear genome, Presence and functions of mitochondrial and plastid-DNA,Plasmids. chromosomal organization; morphology ,centromere and telomere, special types of chromosome, Mitosis and Meiosis
- UNIT – III** Variations in chromosomes structure : Deletions, duplications translocations. inversions; variation in chromosome number, aneuploidy, polyploidy, DNA the genetic material, DNA structure and replication, the nucleosome model, satellite and repetitive DNA.
- UNIT – IV** Structure of gene, genetic code, transfer of genetic information; trascription, translation, protein syntesis, tRNA, and ribosomes. Regulation of gene expression in prokaryotes and eukaryotes.
- UNIT – V** Genetic inheritance; Mendelism; laws of segregation and independent assortment; linkage analysis; interactions of genes. Genetic variations; mutations, spontaneous and induced; transposable elements; DNA damage and repair.

COURSE OUTCOME:-

- The course aims to develop students understanding of three areas of widely used and advanced scientific methods – spectroscopic tools, molecular imaging and bioinformatics. This is achieved via lectures,
- classes, seminars and a bioinformatics problem based learning exercise.
- To help students develop successful strategies for learning how to learn and communicate complex information in cell biology, we developed a quarter-long cell biology class based on team projects.
- Each team researches a particular human disease and presents information about the cellular structure or process affected by the disease, the cellular and molecular biology of the disease, and recent research focused on understanding the cellular mechanisms of the disease process.

PRACTICAL:-

- To prepare the temporary slide of onion membrane and to study the plant cell.
 - To study the cell structure of onion hydrilla and spirogyra.
 - To study the cyclosis in tradescantia stamial cell.
 - To study the plastid distribution in plants.
 - To examine the electron micrograph of an eukaryotic cell.
 - To examine the electron micrograph of an chloroplast.
 - To examine the electron micrograph of an endoplasmic reticulum.
 - To examine the electron micrograph of an Golgibody.
 - To examine the electron micrograph of an Ribosome.
 - To examine the electron micrograph of an Nucleus.
 - To make a temporary acetocarmine stained slides of root tip of onion and to study various stages of mitosis.
 - To make a temporary acetocarmine stained slides of Floral bud of onion and to study various stages of meiosis.
 - Cytological examination of lampbrushchromosome.
 - Cytological examinationofPolytene chromosome.
 - Cytological examination of barr body.
 - To demonstrate the phenomenon of segregation by yellow and green colour pea seeds.
- To demonstrate the independent assortment by various type of pea seeds.

Reference Books:

- Cell biology and genetics p.k.gupta.
- Beerbala Rastogi cell biology book.
- Rastug S.C. 1992 cell biology.
- S.P. Singh & B.S. Tomar cell biology
- R.P. meyyar 2000 Genetics
- Dr.S.B.Agarwal&Dr.Amit Agarwal

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Chemistry –II**Syllabus:**

- UNIT - I**
- A.** Atomic Structure : Idea of de Broglie's matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of n and l , quantum numbers, radial and angular wave functions and probability distribution curves, effective nuclear charge.
- B.** Periodic Properties : Atomic and ionic radii, ionization energy, electron affinity and electronegativity : definition, method of determination, trends in periodic table and applications.
- C.** Chemical Bonding : Covalent bond- valence bond theory and its limitations, directional characteristic of covalent bond. Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH_3 , SF_4 , ClF_3 , ICl_2 - and H_2O .
- UNIT - II**
- A.** Molecular Orbital theory for homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and the bond energy, % ionic character from dipole moment and electronegativity difference. Weak interactions, hydrogen bonding, van der Waals forces.
- B.** Ionic Solids : Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, Lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability of ions. Fajan's rule, Metallic bond, free electron, Valence bond and Band theories.
- C.** Noble Gases : Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.
- UNIT - III**
- A.** s-Block Elements : Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.
- B.** p-Block Elements : Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13-16.
Hydrides of boron-diborane and higher boranes. Borazine, borohydrides. Fullerenes, carbides, fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens.
- UNIT – IV**
- A.** Arenes and Aromaticity : Nomenclature of benzene derivatives. The aryl group, Aromatic nucleus and side chain structure of benzene, molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure. MO picture. Aromaticity the Huckel rule, aromatic ions. Aromatic electrophilic substitution, general pattern of the mechanism, role of s and p complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction. Methods of formation and chemical reactions of

alkylbenzenes and biphenyl.

B. Alkenes : Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, regio-selectivity in alcohol dehydration. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes, mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction, Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with KMnO_4 , polymerization of alkenes, Substitution at the allylic and vinylic positions of alkenes, Industrial applications of ethylene and propene.

UNIT – V

A. Cycloalkenes, Dienes and alkynes : Methods of formation, conformation and chemical reactions of cycloalkenes, nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions - 1,2 and 1,4 additions, Diels-Alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroborationoxidation and polymerization.

B. Alkyl and Aryl Halides : Nomenclature and classes of alkyl halides, methods of formation, chemical reactions; mechanisms of nucleophilic substitution reaction of alkyl halides, $\text{S}_{\text{N}}2$ and $\text{S}_{\text{N}}1$ reactions with energy profile diagrams.

Polyhalogen compounds: chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition reactions mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides versus allyl, vinyl and aryl halides. Synthesis and uses of DDT, BHC and Freon.

PRACTICAL:-

Max. Marks 50

Duration of practicals during the entire semester: 90 hours

Duration of practical during the semester examination: 4 hours

Inorganic chemistry

Inorganic mixture analysis 12 Marks

Macro/Semi-micro Analysis- Cation analysis, separation and identification of ions from

group I-VI, anion analysis

Separation of cations by paper chromatography. 4 marks

Preparation of ferrous alum. 8 marks

Organic Chemistry: (12 marks)

1. Detection of elements (N, S and halogens) 2 elements, 4 marks

2. Functional groups (phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and aniline) in simple organic compounds.

2 functional groups: 8 marks

Viva: 6 marks

Records: 8 marks

Course Outcome:-Upon successful completion of this course, students will understand theories of chemical bonding and determine the molecular geometry of molecules using VSEPR theory. Understand the general and physical properties of matter.

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ENTREPRENEURSHIP DEVELOPMENT

COURSE OBJECTIVE:-

The content will be multidisciplinary with the view to cover a whole range of issues pertaining to entrepreneurship and small scale industry.

Syllabus:

- UNIT- I Entrepreneur and Entrepreneurship** –Meaning, definition, significance, need, characteristics, qualities, pre- requisites function, types.
- UNIT- II Industries and Business Organization-** Classification of industries, forms of business organization, procedures, lifecycle, motivation, environment factors, problems
- UNIT- III Institutional Assistance-** Infrastructural, information, guidance, training, technical, financial, marketing, quality control
- UNIT- IV Planning and growth-** Project report, feasibility study, factory location, demand analysis, market potential, project cost, working capital requirement, profit and tax planning.
- UNIT- V Govt. support & promotional agencies-** Regulatory institutions, development organization, self- employment- oriented schemes, grant schemes, special incentives for women, and scheme for backward class, govt. & non govt. project

Practicals:

1. To identify a project and conduct market survey of it.
2. Prepare a project report of yours choice.
3. To collect various formats used in industries/departments or institutions working in the field of entrepreneurship.
4. To collect details of various schemes run by the government for self-employment and entrepreneurship.
5. Develop logical and analytical approach of purchasing the raw material/finished goods.
6. Collect information about market rates, quality and quantity of goods of your choice.
7. Collect information about few small-scale industries situated in city, nearby industrial area.
8. Discuss the problems of small-scale industries.
9. To prepare chart to show various factors affecting entrepreneurship.
10. To prepare case study of successful entrepreneurs.

COURSE OUTCOME: -

After completion of this course the students would be able to understand the relevance of entrepreneurship as a means of management practice in the context of a fast changing organizational structure in a global environment.

COURSE CODE: SMT 802

Text Books:

- Udhymita Vikas : U.C Gupta (Kailash Prakashan)
- Udhymita Vikas (H) : Entrepreneurship Development / by Tribhuvannath Shukl Bhopal : Madhya Pradesh Hindi Granth Academy,
- Varshney, G.K. (2010).Fundamental Of Entrepreneurship, SahityaBhawan Publications
- Agrawal and Mishra (2017) Fundamental Of Entrepreneurship, SahityaBhawan Publications.
- Fundamentals of Entrepreneurship by G.K. Varshney Agra Sahitya Bhawan
- Fundamentals of Entrepreneurship (H) by Avnish Kumar Mishra Agra Sahitya Bhawan
- Fundamentals of Entrepreneurship by H. Nandan New Delhi PHI Learning
- Fundamentals of Entrepreneurship and Small Business Management by Vasant Desai Mumbai Himalaya Publishing House
- Fundamentals of Entrepreneurship : Principles, Policies and Programmes by K.K. Patra Mumbai Himalaya Publishing House
- Fundamentals of Entrepreneurship by Sangram Keshari Mohanty New Delhi PHI Learning

Reference Books:

- Entrepreneurial Development: Dr. S.S. Khanka (S. Chand)
- Entrepreneurship Development: D. Acharya (Himalaya Publication House)
- Entrepreneurship: New Venture Creation by David H. Holt New Delhi PHI Learning

हिन्दी भाषा संवेदना एवं संचार साधन

पाठ्यक्रम के उद्देश्य—

- विद्यार्थियों को भारतीय संवेदना, संस्कृति, वैश्विक चेतना से परिचित कराना।
- धर्म, दर्शन, न्याय, नीति, साहित्य की प्राचीन व नवीन मान्यताओं से परिचित करवाना।
- संचार संसाधनों से परिचित करवाना।

पाठ्यक्रम:

- सिनेमा, रंगमंच, संगीत, चित्रकला इत्यादि से परिचित करवाना।

इकाई -1

1. भारतीय संस्कृति
2. भारतीय समाज व्यवस्था
3. सभ्यता एवं संस्कार
4. वैश्विक चेतना
5. समन्वयीकरण भारतीय एवं अंतर्राष्ट्रीय संदर्भ में

इकाई – 2

1. धर्म
2. न्याय
3. दर्शन
4. नीति
5. साहित्य

इकाई – 3

1. संचार संसाधन रू संपर्क के नए क्षितिज
2. समाचार पत्र
3. भारतीय प्रेस परिषद्
4. रेडियो
5. दूरदर्शन

इकाई – 4

1. सिनेमा
2. रंगमंच
3. संगीत
4. चित्र, मूर्ति, स्थापत्य कला
5. शिल्प कला

इकाई – 5

1. कम्प्यूटर

2. दूरभाष सौगात विज्ञान की
3. मंत्र रू,कहानीद्ध प्रेमचंद
4. मातृ भूमिगुप्त मैथिलीशरण रू,कविताद्ध
5. साहित्यकार का दायित्व डॉ. भारती प्रेम ष

अपेक्षित परिणाम:

1. विद्यार्थी आधुनिक संचार संसाधनों के प्रयोग में कुशल हो सकेंगे।
2. भारत की धर्म,दर्शन , नीति,संस्कृति,सभ्यता, संस्कारों इत्यादि के प्रति ज्ञान प्राप्त कर कुशल एवं संवेदनशील नागरिक बन सकेंगे।

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BASIC COMPUTER & INFORMATION TECHNOLOGY-II

Course Objective:

To educate students to analyze , design , integrate & manage information systems using information technology.

Syllabus:

UNIT – I: Word Processing: Word

- MS Word: features, Creating, Saving and Operating Multi document windows, Editing Text selecting, Inserting, deleting moving text.
- Previewing documents, Printing document to file page. Reduce the number of pages by one.
- Formatting Documents: paragraph formats, aligning Text and Paragraph, Borders and shading, Headers and Footers, Multiple Columns.

इकाई—1: वर्डप्रोसेसिंग

- वर्डप्रोसेसिंग का परिचय
- एम. एस वर्ड: फीचर्स, क्रीएटिंग, सेविंग एवं ओपनिंग, मल्टी डॉक्यूमेंट विंडोस, एडिटिंग टेक्स्ट सिलेक्टिंग, इंसर्टिंग, डिलीटिंग टेक्स्ट ।
- प्रीव्यूविंग डॉक्यूमेंट्स, प्रिंटिंगडॉक्यूमेंट फ्रॉम दि स्टेण्डर्ड टूलबार, प्रिंट डॉक्यूमेंट फ्रॉम दि स्टेण्डर्ड टूलबार, डॉक्यूमेंट को मीनू द्वारा प्रिंट करना, थ्रिकिंग ए डॉक्यूमेंट इन ए फाइल पेज, पेजों को कम करना ।
- फॉरमेटिंग डॉक्यूमेंट्स: पैराग्राफ फारमेट, अलाइनिंग टेक्स्ट एंड पैराग्राफ, बार्डर एवं हेडर्स एवं फुटर्स, मल्टीपल कॉलम्स ।

UNIT – II: Introduction to Excel& Worksheet

- Worksheet basic.
- Creating worksheet, entering data into worksheet, heading information, data text, dates, alphanumeric, values, saving & quitting worksheet.
- Opening and moving around in an existing worksheet.
- Toolbars and Menus, keyboard shortcuts.
- Working with single and multiple workbook coping, renaming, moving, adding and deleting. coping entries and moving between workbooks.
- Working with formulas & cell referencing.
- Autosum.
- Coping formulas
- Absolute & Relative addressing.

इकाई—2: एक्सेल एवं वर्कशीट का परिचय

- एक्सेल एंड वर्कशीट

- वर्कशीट का आधार, वर्कशीट बनाना, वर्कशीट में डाटा एंटर करना, हेडिंग इंफॉर्मेशन, डाटा टेक्स्ट डेट, अल्फा न्यूमेरिक, वेल्यूज, सेविंग और वर्कशीट छोड़ना।
- पहले बनी हुई वर्कशीट को खोलना तथा चलाना।
- टूलबार मीनू और कीबोर्ड के शॉर्टकट।
- एक एवं अनेक वर्कशीट पर काम करना, कॉपी, रिनेमिंग, मूविंग, एडिंग एंड डिलीटिंग, एन्टीज को कॉपी तथा विभिन्न वर्कशीट में ले जाना।
- फॉर्मूला एवं सेल रिफ्रेसिंग के साथ काम करना।
- ऑटो सम फॉर्मूला को कॉपी करना, एक्सल्यूट एंड रिलेटिव एड्रेसिंग।

UNIT – III: INTRODUCTION TO POWER POINT

- Features and various versions.
- Creating presentation using Slide master and template in various colour scheme.
- Working with slides make new slide move, copy, delete, duplicate, lay outing of slide, zoom in or out of a slide.
- Editing and formatting text: Alignment, editing, inserting, deleting, selecting, formatting of text, find and replace text.

इकाई-3: पॉवरपाइंट का परिचय-1

- फीचर्स एंड विभिन्न वर्जन्स
- प्रजेन्टेशन तैयार करना स्लाइड मास्टर एवं टेम्प्लेट इन वेरियस कलर स्कीम।
- पॉवरपाइंट के भिन्न व्यूस के साथ काम करना एवं पॉवरपाइंट के मेन्यू।
- स्लाइड्स के साथ काम करना, नये स्लाइड तैयार करना एवं मूव करना, कॉपी करना, डिलीट करना, डुपलीकेट स्लाइड तैयार करना, ले-आउटिंग करना, जूम इन और आउट करना।
- एडिटिंग एवं फॉरमेटिंग टेक्स्ट: अलाइनमेंट, एडिटिंग, इनसर्टिंग, डिलीटिंग, सिलेक्टिंग, फॉरमेटिंग ऑफ टेक्स्ट, फाईन्ड एवं रिप्लेस टेक्स्ट।

UNIT – IV: POWER POINT – II

- Bullets , footer, paragraph formatting, spell checking.
- Printing presentation Print slides, notes, handouts and outlines.
- Inserting objects Drawing and Inserting objects using Clip Arts picture and charts.
- Slide sorter, slide transition effect and animation effects.
- Presenting the show making stand alone presentation, Pack and go wizards.

इकाई-4: पॉवरपाइंट का परिचय-2

- बुलेट्स, फुटर, पैराग्राफ फॉरमेटिंग, स्पेल चेकिंग।
- प्रिंटिंग प्रजेन्टेशन, प्रिंट स्लाइड्स, नोट्स, हेडआउट एवं आउट लाईन्स।
- इंसर्टिंग आब्जेक्ट, ड्राइंग एवं इंसर्टिंग ऑब्जेक्ट्स क्लिपआर्ट पिक्चर्स एवं चार्ट्स का प्रयोग करना।
- स्लाइड्स सोर्टर, स्लाइड ट्रांजिशन के प्रभाव एवं अन्य ऐनिमेशन प्रभाव।
- प्रेजेंटिंग शो मेकिंग स्टैंड अलोन प्रजेन्टेशन, पके एवं गोविजार्ड।

UNIT – V: INTRODUCTION OF INTERNET

Evolution, Protocol, concept, Internet, Dial-up connectivity, leased line, VSAT, Broad band, URLs, Domain names, Portals. E-mail, Pop & web based Email. Basic of sending and receiving Emails, Email

COURSE CODE: IBBC602

& Internet Ethics, Computer virus, Antivirus software wage, Web Browsers.

इकाई—5: इंटरनेट का परिचय:

इवोल्युशन, प्रोटोकॉल, विचारधारा, इंटरनेट, डायल अप कनेक्टिविटी, डीज्डलाइन, वीएसटी, ब्रोडबैंड, यू.आर.एल्स., डोमेननेम्स, पोसटल्स, ई-मेल, पॉप एवं वेब बेस्डई-मेल, बेसिक्स ऑफ सेडिंग एवं रिसीविंग इमेल्स, ई-मेल एवं इंटरनेट एथिक्स, कम्प्यूटर वायरस, एंटी वायरस सॉफ्टवेयर, वेब ब्राउसर।

PRACTICALS:

MS- Power Point:

Creating new slide, formatting slide layout, slide show & sorter, Inserting new slide, slide no., date, time, chart, formatting slide, tool operation.

List of suggested practical work:

- Under standing of a dial up connection through modern.
- Configuring a computer for an e-mail and using outlook Express or Netscape Messenger.
- Registration an e-mail address.
- Understanding of e-mail drafting.
- Understanding of address book maintenance for e-mail.
- Understanding of different mail program tools.
- Send and receive functions of e-mail.

Course outcome:

Student will be able to use computer system easily and they will get knowledge about how to use different type of operating system.

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GENETICS

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Genetics and applied Genetics.

Syllabus:

- UNIT - I:** Heredity & Variation, Gene and Genetic Material
1. Chromosome: The Physical basis of heredity and transmitters of heredity.
 2. Types of chromosomes: Lampbrush, salivary gland and Beta Chromosomes.
 3. Nucleocytoplasmic interactions : Ultra structure of nucleus, nucleolus, Role of nucleus and nucleolus in nucleocytoplasmic interactions including Synthesis & Export of RNA, transport of Proteins
 4. Heredity and Variation : Sources of variation, Genotype, phenotype and environmental variations (elementary idea), Mendel's laws of heredity, Kinds of variations, Genetic basis of variation.
 - 5 (a) Chemistry of Gene ; Nucleic Acids and their structure.
(b)Concept of DNA replication.
(c)Nucleosome (Solenoid model).
(d)Split genes, overlapping genes and Pseudo genes.
(e)Genetic Code.
- UNIT - II:** Cytoplasmic Inheritance, Gene Expression and Regulation
1. Cytoplasmic inheritance: Maternal effect on limnea (Shell Coiling), Kappa particles in Paramecium.
 2. Transcription in Prokaryotes and Eukaryotes
 3. Translation in Eukaryotes
 4. Gene Expression: Regulation of protein synthesis, transcription in Prokaryotes and Eukaryotes.
 - 5: Gene Expression: Operon model
- UNIT - III:** Linkage and Chromosomal Aberrations
1. Gene Linkage: Kinds and Theories of linkage, significance of linkage.
 2. Gene linkage, Mechanism of genetic recombination.
 3. Sex Chromosomes System: Sex differentiation, chromosome theory of sex determination.
 4. Sex linked inheritance (Haemophilia, Colour blindness)
 5. Structural changes in chromosomes.
 6. Numerical changes in chromosomes.
- UNIT - VI:** Mutation and Applied Genetics
1. Types of Mutation.
 2. Causes of mutation.
 3. Mutagens- classification, Types & effects.
 4. Gene therapy.

5. DNA finger printing.

UNIT - V: Human Genetics & Genetic Engineering

1. Human chromosomes, Elementary idea of Human Genome Project
2. Common genetic diseases in man (Autosomal syndromes, sex chromosome syndromes, diseases due to mutation-Sickle cell anaemia, Albinism & Alkaptonuria.
3. Multiple factors and blood groups.
4. Twins- physical traits, mental traits.
5. Techniques used in recombinant DNA technology. Construction of Chimeric DNA, Elementary idea of plasmids & vectors.
6. Gene cloning and Polymerase Chain Reaction (PCR) ,Gel Electrophoresis, Northern & Southern Blotting.

COURSE OUTCOME:-

The student have a knowledge of Gene, genetic code ,diseases and

PRACTICAL:-

1. Identification of spots related to theory.
2. Squash preparation of onion root tip / Chironomous larva salivary gland/grass hopper testis.
3. Study of instruments techniques related to applied genetics – PCR, Gel electrophoresis, DNA fingerprinting etc.
4. Problems based on genetics.

SCHEME OF PRACTICAL EXAMINATION

1. Spotting (5) Spots
2. Squash preparation
3. Study of instruments / techniques related to applied genetics
4. Problems on Genetics
5. Viva-Voce
6. Practical Record and Collection.

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PHYSICAL CONTROLLING AND COORDINATING SYSTEMS

- UNIT- I** **Tissues, Bone and Cartilage** Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue Structure and types of bones and cartilages, Ossification, bone growth and resorption.
- UNIT- II** **Nervous System** Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc; Physiology of hearing and vision.
- UNIT- III** **Muscle** Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus
- UNIT- IV** **Reproductive System** Histology of testis and ovary; Physiology of male and female reproduction; Puberty, Methods of contraception in male and female
- UNIT- V** **Endocrine System** Histology of endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas, adrenal; hormones secreted by them and their mechanism of action; Classification of hormones; Regulation of their secretion; Mode of hormone action, Signal transduction pathways for steroidal and non-steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system; Placental hormones

ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS PRACTICALS

1. Recording of simple muscle twitch with electrical stimulation (or Virtual)
2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)
3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells
4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid
5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues

SUGGESTED BOOKS

- Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Herculourt Asia PTE Ltd. /W.B. Saunders Company.
- Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition John Wiley & sons

- Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations. XII Edition. Lippincott W. & Wilkins

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BIO-DIVERSITY & SYSTEMATIC OF SEED PLANT

COURSE OBJECTIVES:-

- Discuss the type of seeds produced by gymnosperms, as well as other characteristics of gymnosperms.
- State which period saw the first appearance of gymnosperms and explain when they were the dominant plant life.
- List the four groups of modern-day gymnosperms and provide examples of each.
- To appreciate the fantastic commonness existing among organisms.
- The student will be able to appreciate the uniqueness of different groups and the way they are classified
- To develop curiosity in observing and identifying different types of gymnosperms.
- To observe and differentiate the variations existing in the internal structure of plants.
- To create interest in plant anatomy and to appreciate the function of a particular tissue or organ correlated with its structure.
- To enable the student understand the anatomical features within the system
- Instead of merely memorizing the technical terms and the text book figures.

Syllabus:

- UNIT – I** Characteristics and Classification of Gymnosperms, Heterospory and Origin of Seed Habit, Evolution and Diversity of Gymnosperms, Geological Time Scale, and Fossilization. Fossil Gymnosperms: Lyginopteris and Lagenostoma.
- UNIT – II** Morphology, Anatomy Reproduction and life cycle of Cycas, Pinus and Ephedra.
- UNIT – III** Origin and Evolution of Angiosperms, Fundamental components of 6, 7, 8 taxonomy, Plant Identification, Principles and rules of Botanical Nomenclature, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Hutchinson, Modern trends in Taxonomy.
- UNIT – IV** Diagnostic characteristics and Economic Importance of Families –Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apiaceae.
- UNIT – V** Diagnostic characteristics & Economic Importance of Families – Asteraceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae.

COURSE OUTCOME:-

- An understanding of major patterns in the evolution of seed plants
- Study of Gymnosperms will help the students understand the connecting link between the lower and higher organisms in the plant kingdom. The anatomy imparts a thorough knowledge about the internal structure and relationship between tissues and evolution.
- An appreciation of seed plant diversity.
- A basic understanding of the principles of phylogenetic systematic.
- An overview of the diagnostic characters of the main lineages of seed plants.
- An understanding of the methods and principles of classification and nomenclature

PRACTICAL:-

- Study of microscope.
- Study of prepared slide of T.S. of young root Cycas.
- Study of prepared slide of T.S. of stem Cycas.
- Study of prepared slide of V.S of leaflets cycas.
- Study of prepared slides of T.S of young root pinus.
- Study of prepared slide of T.S. of young stem pinus.
- Study of prepared slide of T.S of dwarf shoot of pinus.
- Study of prepared slide of T.S. of root Ephedra.
- Study of prepared slide of T.S of stem Ephedra.
- Study of prepared slide of V.S of leaf Ephedra.
- Study of permanent slides of cycas, pinus and Ephedra.
- Study of different types of inflorescence and flowers. Method of Describing a flowering plant in botanical language Floral for mula of plants and economic importance.
- Study of Bracaceae family (*Brassica Campestris*) up to family level.
- Study of Malvaceae family (*Hibiscus rosasinensis*) up to family.
- Study of Papilionaceae family (*Pisum sativum*) up to family.
- Study of family Asclepiadaceae (*Calotropis procera*) up to family level . Study of family solanaceae (*Solanum nigrum*) up to family level.
- Study of family Lamiaceae (*Ocimum Sanctum*) up to family level.
- Study of family Asteraceae (*Helianthus annus*) up to family level.

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Chemistry –III

Syllabus:

Physical Chemistry

- UNIT – I** Thermodynamics-1 Definition of thermodynamic terms: System, surrounding, Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's Law: Joule Thomson coefficient and inversion temperature. Calculation of w , q , dU and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process. Thermochemistry: Standard state, standard enthalpy of formation: Hess's Law of heat summation and its application. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchoff's equation. Second Law of Thermodynamics- Need for the law, different statements of the law, Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature.
- UNIT – II** Thermodynamics-II (a) Concept of entropy: Entropy as a state function, entropy as a function of P&T, entropy change in physical change, Clausius inequality, entropy as criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helmholtz functions, Gibbs function (G) and Helmholtz function(A) as a thermodynamic quantities, A and G as a criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.
- (b) Chemical equilibrium Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Le Chateliers's principle. Reaction isotherm and reaction isochore: Clapeyron equation and Clausius- Clapeyron equation, applications.
- (c) Buffers: Mechanism of buffer action, Henderson-Hazel equation, Hydrolysis of salts.
- (d) Corrosion: types, theories and methods of combating it.

Inorganic Chemistry

- UNIT – III** Chemistry of elements of I transition series: Characteristic properties of d-block elements. Properties of the elements of the first transition series, their binary compounds such as carbides, oxides and sulphides. Complexes illustrating relative stability of their oxidation states, coordination number and geometry chemistry of elements of II and III transition series: General characteristics, comparative

treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behaviour, spectral properties and stereochemistry

- UNIT – IV**
- (a) Coordination Compounds: Werner's coordination theory and its experimental verification, EAN Concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, VBT of transition metal complexes.
- (b) Oxidation and Reduction: Use of redox potential data, analysis of redox cycle, redox stability in H₂O: Frost, Latimer and Pourbaix diagram. Principles involved in the extraction of elements.

Organic Chemistry

- UNIT – V**
- (a) Electromagnetic Spectrum: Absorption Spectra; UV absorption spectroscopy: Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones. IR absorption spectroscopy; molecular vibrations, Hook's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.
- (b) Alcohols: Classification and nomenclature. Monohydric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding, acidic nature, reactions of alcohols. Dihydric alcohols: nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)₄ and HIO₄] and pinacole-pinacolone rearrangement. Trihydric alcohols-nomenclature and methods of formation, chemical reactions of glycerol
- (c) Phenols: Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols: resonance stabilization of phenoxide ion. Reactions of phenols: electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction
- (d) Ethers and Epoxides Nomenclature of ethers and methods of their formation, physical properties. Chemical reactions: cleavage and auto oxidation. Ziesel's method. Synthesis of epoxides. Acid and base-catalysed ring opening of epoxides, orientation of epoxide ring opening, reaction of Grignard and organolithium reagents with epoxides.

PRACTICAL:-

Time: 6 hours

Inorganic Chemistry 18 marks

Calibration of the fractional weights, pipettes and burettes. Preparation of standard solutions. Dilution of 0.1 M to 0.001 M solutions.

Quantitative analysis -Volumetric analysis.

- (a) Determination of acetic acid in commercial vinegar using NaOH.

- (b) Determination of alkali content- antacid tablet using HCl.
- (c) Estimation of calcium content in chalk as calcium oxalate by permagnometry.
- (d) Estimation of hardness of water by EDTA

Gravimetric analysis:

Barium as barium sulphate

Organic Chemistry Laboratory Techniques 18 marks

A. Thin layer chromatography

Determination of R_f values and identification of organic compounds.

- (a) Separation of green leaf pigments (spinach leaves may be used).
- (b) Preparation and separation of 2,4-dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:6).
- (c) Separation of a mixture of dyes using cyclohexane and ethylacetate (8:5:1.5). B. Paper chromatography: Ascending and Circular Determination of R_f values and identification of organic compounds
 - (a) Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid. Spray reagent ninhydrin.
 - (b) Separation of a mixture of DL-alanine, glycine and L-leucine using nbutanol: acetic acid: water (4:1:5). Spray reagent ninhydrin.
 - (c) Separation of monosaccharides- a mixture of D-galactose and Dfructose using n-butanol: acetone: water (4:1:5). Spray reagent-aniline hydrogen phthalate.

COURSE OUTCOME:-

Upon successful completion of this course, students will understand kinetics, equilibrium, LeChatelier's principle, acid and base reactions, pH, buffers, colligative properties, and electrochemical applications in an undergraduate laboratory.

Understand the first law of thermodynamics and the role of energy and enthalpy in chemical reactions and perform thermochemical calculations.

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DATA ENTRY OPERATIONS

Course Objective:-

- 1 To understand the basic knowledge of computer
- 2 To understand the assembly-level programming
- 3 To understand the input output devices, storage media, and memory

Syllabus:

Theory :

UNIT-1

Basics of Computer: Computer Organization, Input and Output Devices, System Software and Application Software, Computer Language, Compiler and Assembler.

Operating System: Elements of Windows XP, Desktop Elements, Locating Files and Folders, Changing System Setting, File Management in Windows, Installation of Software and Hardware.

UNIT-2

Basics of Word Processing: Starting Word Program, Word Screen Layout ,Typing Screen Objects, Managing Documents, Protecting and Finding Documents, Printing Documents

Formatting Documents: Working with text, Formatting Text, Formatting Paragraphs, Bulleted and Numbered Lists, Copying and Moving Text, Spelling and Grammar, Page Formatting, Creating Tables, Mail Merge.

UNIT-3

Types of document in Mail merge: Creating data Source, Creating Mailing Labels, Creating Mailing Labels, Merging Data into Main Document.

Basics of Spreadsheet: Selecting, Adding and Renaming Worksheets, Modifying a Worksheet, Resizing Rows and Columns, Workbook Protection.

UNIT-4

Formatting Worksheets: Formatting Toolbar, Formatting Cells, Formatting Rows and Columns, Formatting Worksheets Using Styles, Protect and Unprotect Worksheets.

Formulas, Functions and Charts: Formulas and Functions, Copying a Formula, Types of Functions, Types of Charts, Auto Shapes and Smart art.

UNIT-5

Creating Presentation: Creating Slides, Slide Sorter View, Changing Slide Layouts, Moving Between Slides.

Introduction to Internet: Getting Connected to Internet, Types of Internet Connections, Internet Terminology, Understanding Internet Address, Web Browser and Internet Services.

Course Outcomes:-

After studying this student will be able to know about terms and concepts of Microsoft suite completely.(like MS-word, power-point-excel sheets, outlook express)

Practicals

1. To study the features of MS-Office 2007 such as MS-Word, MS-Excel, MS-Power point and MS-Access
2. To create a document using mail merge in MS-Word.
3. To create a document for type the mathematical equation in MS-Word.
4. To create a employees work detail list using MS-Excel
5. To calculate student mark details using MS-Excel.
6. To Import External Data, Sort and Filter using MS-Excel.
7. To create a database using MS-Access.
8. To generate report using MS-Access.
9. To create a presentation text and images with effects using MS-Power point.
10. To create a presentation with effects using animation and sound effects.
11. To create a document using mail merge in MS-Word.

Reference Books:

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ENGLISH LANGUAGE AND SCIENTIFIC TEMPER

COURSE OBJECTIVES:-

- To Study the basic language skills (speaking, listening, reading, and writing) and grammar.
- Comprehensive study of different kinds of letters and applications.

Syllabus:

UNIT – I

1. Tina Morris : Tree
2. Nissim Ezekiel : Night of the Scorpion
3. C.P. Snow : Ramanujan
4. Roger Rosenblatt : The Power of WE
5. George Orwell : What is Science?
6. C.Rajagopalachari : Three Questions
7. Desmond Morris : A short extract from the Naked Ape
8. A.G. Gardiner : On the rule of the road

UNIT – II Comprehension of an unseen passage.

UNIT – III Letter Writing : Formal Letters, Informal letters, Applications.

UNIT – IV Report Writing.

UNIT – V Language Skills

Correction of common errors in sentence structure : usage of pronouns, subject/ verb agreement word order, gender; compound nouns, collective nouns, possessives, articles and prepositions. (advanced)

COURSE OUTCOMES:-

- Student will be able to understand correct use of grammar and language skills.
- Student will be familiar with different prose and poetry.
- Student should be able to write analytically in a variety of formats, including essays, report writing and application.

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HUMAN VALUES AND ETHICS

COURSE OBJECTIVES:-

- To help students understand the basic guidelines, content and process of Human value and value crisis in contemporary Indian Society
- To help students understand the meaning of happiness and prosperity for a human being.
- To help students reflect critically on gender violence .

Syllabus:

UNIT – I: Concept of value and value crisis in contemporary Indian Society.

1. Concept of value
2. Value crisis at- individual level
3. Value crisis at- Cultural level
4. Value crisis at- Societal level
5. The Indian concept of value.
6. Modern Approach to the study of Values.

UNIT – II: Moral and Ethical Human values.

1. Bases for Moral Judgment
2. Some Canons of Ethics
3. Ethics of Duty
4. Ethics of Responsibility
5. Factors to be considered in making Ethical Judgments.
6. Continuous Happiness and Prosperity- A look at basic Human Aspirations.

UNIT – III: Moral Values in Profession.

1. What is Profession?
2. Professional Ethos
3. Code of Professional Ethics
4. Corporate social Responsibility

UNIT – IV: Gender sensitization.

1. Socialization of Women
2. Demographic consequences
3. Domestic Violence
4. Women's work, its politics and economics , fact and fiction ,Unrecognized and unaccounted work

UNIT – V: Co- Curricular Activities and value Education.

1. Games and sports
2. Literary and cultural Activities
3. NSS, NCC activities
4. A New Approach to Human Value Freedom, Creativity Love & Wisdom

COURSE OUTCOMES:-

On completion of this course, the students will be able to:

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Understand the value of harmonious relationship based on trust and respect in their life and profession.
3. Students will develop a sense of appreciation of women in all walks of life .
4. Understand the role of a human being in ensuring harmony in society and nature.

On completion of this course, the students will be able to:

5. Understand the significance of value inputs in a classroom and start applying them in their life and profession
6. Understand the value of harmonious relationship based on trust and respect in their life and profession.
7. Students will develop a sense of appreciation of women in all walks of life .
8. Understand the role of a human being in ensuring harmony in society and nature.

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ANIMAL PHYSIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for animal physiology viz digestion ,respiration ,excretion, nervous and endocrine function

Syllabus:

- UNIT - I** Nutrition, Metabolism
1. Physiology of digestion in mammals
 2. Protein Metabolism-Deamination, decarboxylation.Transamination of amino acids, and Ornithine cycle.
 3. Carbohydrate metabolism- Glycogenesis, Glycogenolysis, glycolysis, The Citric acid cycle, Gluconeogenesis.
 4. Lipid Metabolism-Beta oxidation of fatty acids.
- UNIT - II** Respiration
1. Organs of respiration in mammals
 2. Mechanism of respiration in mammals.
 3. Physiology of respiration (transport of gases, chloride shift).
 4. Properties and function of respiratory pigments.
- UNIT - III** Regulatory Mechanisms and Enzymes
1. Osmoregulation.
 2. Physiology of Excretion- urea and urine formation in mammals.
 3. Thermoregulation.
 4. Definition and nomenclature of enzymes, classification of enzymes.
 5. Mechanism of enzyme action.
- UNIT - IV** Neuromuscular Co- ordination.
1. Structure and properties of nervous tissue.
 2. Physiology of nerve impulse conduction.
 3. Types of muscles and their properties.
 4. Theory of muscle contraction and its biochemistry.
- UNIT - V** Endocrine system.
1. Structure and functions of Pituitary Gland.
 2. Structure and functions of Thyroid Gland.
 3. Structure and functions of Adrenal Gland.
 4. Structure and functions of Parathyroid, Thymus and Islets of langerhan's.

COURSE OUTCOMES:-

The student have a knowledge of physiological diseases and treatment

PRACTICAL:-

1. Detection of protein, carbohydrate and lipid.
2. Study of Human salivary enzyme activity in relation to pH.
3. Detection of nitrogenous waste products – Ammonia & Urea
4. Use of Kymograph
5. Exercise on Haematology – Counting of RBC /WBC and Blood grouping in blood samples.
6. Estimation of Haemoglobin in blood samples.
7. Histological study of various endocrine glands –T. S. of Thyroid, T. S. of Pituitary gland , T. S. of Adrenal gland , T. S. of Testis, T. S. of Ovary.
8. Histological study of Alimentary canal & various digestive organs – T.S of Stomach , T.S of Intestine , T.S of Pancreas, and T. S. of liver.
9. Histological study of Visceral organs - T.S of Lungs, L.S. of Kidney
10. Histological study of Muscles – Striated, Unstriated & Cardiac muscle.

PRACTICAL:-

1. Spotting
2. Biochemical test
3. Physiological experiment
4. Exercise on enzyme activity
5. Viva
6. Practical record/collection

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BIOCHEMISTRY OF METABOLIC PROCESSES

UNIT- I Overview of Metabolism 10

Catabolism vs Anabolism, Stages of catabolism, Compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as "Energy Currency of cell"; coupled reactions; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanisms

UNIT- II Carbohydrate Metabolism

Sequence of reactions and regulation of glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis

UNIT- III Lipid Metabolism

β -oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis

UNIT- IV Protein Metabolism

Catabolism of amino acids: Transamination, Deamination, Urea cycle; Fate of C-skeleton of Glucogenic and Ketogenic amino acids

UNIT- V Oxidative Phosphorylation

Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

PRACTICALS (CREDITS 2)

1. Estimation of total protein in given solutions by Lowry's method.
2. Detection of SGOT and SGPT or GST and GSH in serum/ tissue
3. To study the enzymatic activity of Trypsin and Lipase.
4. Study of biological oxidation (SDH) [goat liver]
5. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
6. Dry Lab: To trace the labelled C atoms of Acetyl-CoA till they evolve as CO₂ in the TCA cycle

SUGGESTED READINGS

- Cox, M.M and Nelson, D.L. (2008). *Lehninger Principles of Biochemistry*, V Edition, W.H. Freeman and Co., New York.
- Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007). *Biochemistry*, VI Edition, W.H. Freeman and Co., New York.
- Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). *Harper's Illustrated Biochemistry*, XXVIII Edition,

International Edition, The McGraw-Hill Companies Inc.

• Hames, B.D. and Hooper, N.M. (2000). *Instant Notes in Biochemistry*, II Edition, BIOS Scientific Publishers Ltd., U.K.

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STRUCTURE, DEVELOPMENT & REPRODUCTION IN FLOWERING PLANT

COURSE OBJECTIVES:-

- The anatomy of a flower
- The life cycle of flowering seed plants
- The anatomy of a seed
- The role of pollination and seed dispersal in the angiosperm life cycle
- Identify the characteristics of flowering plants
- Describe the structure of a flower and the difference between perfect and imperfect flowers
- Summarize the life cycle of a flowering plant, identifying the sporophyte, the gametophytes, and when mitosis/meiosis/fertilization occur
- Diagram the process of double fertilization
- Explain the importance of pollen and the different types of pollination seen in this group
- Describe the role of the seed, its relationship to fruit, the different types of seeds, and seed dispersal mechanisms

Syllabus:

- UNIT – I** The Root system: Root apical meristems, Differentiation of primary and secondary tissues and their roles, Anatomy of Monocot and Dicot roots, Morphological modification of root for storage, respiration, reproduction and interaction with microbes.
- UNIT – II** The Shoot system: Shoot apical meristem and histological organization, Anatomy of primary stem in Monocotyledons and Dicotyledons, Secondary growth in stem and root – Vascular cambium and its functions, Characteristics of growth rings, Sapwood and Heart wood, Secondary Phloem, Cork Cambium and Periderm.
- UNIT – III** The Leaf system: Origin, Development, Diversity in size, shape and arrangement, Internal structure of Dicot and Monocot leaf in relation to photosynthesis and water loss, Adaptations to water stress, senescence and abscission.
- UNIT – IV** The Flower system: Concept of flower as a modified shoot, Structure of Anther, Microsporogenesis and Male Gametophyte, Structure of Pistil, Ovules, Megasporogenesis and Development of Female Gametophyte (Embryo Sac) and its types, Pollination –Mechanism and Agencies of Pollination, Pollen Pistil interactions and Self incompatibility.
- UNIT – V** Double Fertilization, Development and types of Endosperm and its morphological nature, Development of Embryo in Monocots and Dicots, Fruit development and maturation. Seed structure and dispersal, Vegetative Propagation.

COURSE OUTCOMES:-

1. Sexual Reproduction in Flowering Plants

1. Recognize that flowering plants exhibit an alternation of generations even though they produce two types of spores and two types of gametophytes.
2. Identify the reproductive parts of a flower and describe the function of each part.
3. Diagram and describe the development of male and female gametophytes and the development of the sporophyte of flowering plants.

2. Growth and Development

1. Recognize the developmental steps of a eudicot embryo and compare the function of its cotyledons to that of a cotyledon in monocots.
2. Identify different types of fruits.
3. Label seed structure and describe germination and dispersal.

3. Asexual Reproduction and Genetic Engineering in Plants

1. Recognize how asexual reproduction in plants differs from sexual reproduction.
2. Describe how plants are propagated in tissue culture.
3. Explain how genetic engineering can be used to alter plant traits.

4. Control of Growth and Responses

1. Explain the importance of plant hormones.
2. Identify the various types of plant hormones and their function.
3. Recognize how plants respond to stimuli.

PRACTICAL:-

- Study of anatomy of t.s. of dicot root helianthus annuus. Study of anatomy of t.s. of dicot root cicer and ranunculus.
- Study of anatomy of t.s. of monocot roots asparagus. Study of anatomy of t.s. of monocot roots zeamays and orchid.
- Study of anatomy of t.s. of dicot stem cucurbita and xanthium.
- Study of anatomy of t.s. of monocot stem triticumaestivum and asparagus.
- Study of v.s. of isobilateral monocot leaf zemays and bambusa.

- Study of prepared slide of l.s. of shoot apex.
- Study of prepared slide of l.s. of root apex
- Study of different types of ovules.
- Study of pneumatophore or respiratory root

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Chemistry-IV

Syllabus:

Physical Chemistry

- UNIT – I** Phase equilibrium Statement and the meaning of the terms: phase component and the degree of freedom, derivation of the Gibbs phase rule. Phase equilibria of one component system: water, CO₂ and S system. Phase equilibria of two component system: solid liquid equilibria, simple eutectic: Bi-Cd, Pb-Ag system, desilverisation of lead.
- Solid solutions: compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H₂O) (FeCl₃-H₂O) and (CuSO₄-H₂O) system. Freezing mixtures, acetone-dry ice.
- Liquid-liquid mixtures: Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system azeotropes: HCl-H₂O and ethanol water systems.
- Partial miscible liquids: Phenol-water, trimethylamine-water and nicotine-water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation, Nernst distribution law: thermodynamic derivation, applications.
- UNIT – II** Electrochemistry Electrical transport- conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific conductance and equivalent conductance with dilution.
- Migration of ions and Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number: Definition and determination by Hittorf method and moving boundary method. Application of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salt, conductometric titrations.
- Types of reversible electrodes: gas-metal ion, metal-metal ion, metal- insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F and single electrode potential, standard hydrogen electrode- reference electrodes-standard electrode potential, sign conventions, electrochemical series and its significance. Electrolytic and Galvanic cells, reversible and irreversible cells. Conventional representation of electrochemical cells.
- EMF of a cell and its measurements. Computation of cell EMF. Calculation of thermodynamic quantities of cell reaction (G , H and K), polarization, over potential and hydrogen over voltage.
- Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient,

potentiometric titration. Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods.

- UNIT - III** (a) Chemistry of Lanthanides Elements: electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.
- (b) Chemistry of Actinides: General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Similarities between the later actinides and later lanthanides.
- (c) Acids and Bases: Arrhenius, Brønsted-Lowry, Lux-Flood, Solvent system and Lewis concepts of acids and bases.
- (d) Non-aqueous Solvents: Types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid NH₃ and liquid SO₂

Organic Chemistry

- UNIT – IV** (a) Aldehydes and ketones: Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes and ketones from acid chlorides, synthesis of aldehydes and ketones using 1,3-dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction. Meerwein-Ponndorf-Verley (MPV), Clemmensen, Wolf-Kishner, LiAlH₄ and NaBH₄ reductions, Halogenation of enolizable ketones. An introduction of alpha, beta unsaturated aldehydes and ketones
- (b) Carboxylic Acids: Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids, reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of formation and effect of heat and dehydrating agents. Methods of formation and chemical reactions of halo acids, hydroxyl acids, malic, tartaric and citric acids.
- Carboxylic acid derivatives Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reactions. Mechanism of esterification and hydrolysis (acidic and basic).
- UNIT – V** Organic Compounds of Nitrogen Preparation of nitroalkanes and nitroarenes. Chemical reaction of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid. Halonitroarenes: reactivity, structure and nomenclature. Structure and nomenclature of amines, physical properties and stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features

affecting basicity of amines. Amine salt as phase transfer catalysts. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalamide reaction, Hoffmann bromamide reaction, Reactions of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid. Synthetic transformation of aryl diazonium salts, azo coupling.

PRACTICAL:-

Time: 6 hour

Organic Chemistry 12 marks

Qualitative analysis

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

Physical Chemistry 12 marks

Transition temperature

1. Determination of transition temperature of given substance by thermometric, dilatometric method (e.g.) ($MnCl_2 \times 4H_2O/SrBr_2 \times 2H_2O$).

Phase equilibrium

1. To study the effect of solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquid (e.g., phenol water system) and to determine the concentration of that soluble in phenol water system.

2. To construct the phase diagram of two component (e.g., diphenyl amine benzophenone) by cooling curve method.

1. To determine the enthalpy of neutralization of weak acid/weak base versus strong acid/ strong base and determine the enthalpy of ionization of the weak acid/ base.

Inorganic chemistry-Quantitative Volumetric Analysis

1. Estimation of ferrous and ferric by dichromate method.

2. Estimation of copper using thiosulphate.

Viva 6 Marks

Sessional 8 Marks

Course outcome :- Upon successful completion of this course students will describe the bonding and properties of transition metal coordination compounds

Chairperson
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Seal

ZOOLOGY (HONOURS) SEMESTER Vth

CC -I (V) Applied Zoology

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Aquaculture, Economic Entomology, toxicology and lab techniques.

Syllabus:

- UNIT - I** Aquaculture
- Definition and scope of aquaculture.
 - Prawn culture –(Culture of fresh water prawn, Methods of prawn fishing, preservation and processing of prawns)
 - Pearl culture and Pearl Industry.
 - By products of fishing industry.
 - Frog culture, Breeding and selection.
- UNIT - II** Pisciculture
- General account of Edible fresh water fishes.
 - Carp culture: Management of ponds, Preservation and processing of fishes.
 - Maintenance of Aquarium
 - Plankton and their role in Fisheries.
 - Elementary knowledge of polyculture.
- UNIT - III** Economic Entomology
- Sericulture: Species of silkworm, life history of Bombyx mori, Sericulture Industry in India.
 - Apiculture –life cycle and species Methods of bee keeping, Products of bees, enemies of bees.
 - Lac culture: Lifecycle, Host Plant cultivation.
 - Common Pest: Stored Grains Sitophilus oryzae and Tribolium Castanaeum, Vegetable pest Piers brassicae and Dacus cucurbitae..
 - Biological control of insect pests.
- UNIT - IV** Toxicology
- Toxicology: Basic concepts,
 - Heavy metal toxicity- Pb, Cd, Hg.
 - Toxicity testing, LC 50, LD 50, acute and chronic toxicity.
 - Pesticide and their toxicological effect.
 - Occupational health hazards and their control
- UNIT - V** Lab Techniques
- pH- Definition, Study of pH- meter, determination of pH.
 - Chromatography: Principles & Types of chromatography (Paper Chromatography).
 - Types of microtome and their uses.
 - General ideas of some common fixatives, stains and reagents.
 - Museum keeping, preservation and skeleton preparation, taxidermy(Bird)

COURSE OUTCOMES:-

The student have a knowledge of different culture Skill to develop own Business, lab Techniques and self employment.

PRACTICAL:-

1. Study of museum specimen of fresh water edible fishes.
2. Study of pH of Water and soil.
3. Study of Chromatography (Paper Chromatography).
4. Study of working instrument : Microtome.
5. Study of different techniques for Museum Keeping..
6. Maintenance of aquarium.
7. Study of pests-
Stored grain pests- Sitophilus Oryzae & Tribolium castanaeum.
Vegetable pests- Pieris brassicae & Dacus cucurbitae
8. Study of Plankton – Euglena, Paramoecium, Cyclops, Mysis, Da

CC-II (V)- ANIMAL BEHAVIOUR AND CHRONOBIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Animal Behaviour , Patterns of Behaviour, : Introduction to Chronobiology & : Biological Rhythm

Syllabus:

Unit 1: Introduction to Animal Behaviour Origin and history of Ethology; Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen, Proximate and ultimate causes of behaviour, Methods and recording of a behaviour

Unit 2: Patterns of Behaviour Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour Social Behaviour: Concept of Society; Communication and the senses; Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance. Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Introduction to Chronobiology Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period. Adaptive significance of biological clocks

Unit 5: Biological Rhythm Types and characteristics of biological rhythms: Short- and Long-term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin. Unit 8: Biological Clocks Relevance of biological clocks; Chronopharmacology, Chronomedicine, Chronotherapy.

PRACTICAL

1. To study nests and nesting habits of the birds and social insects.
2. To study the behavioural responses of wood lice to dry and humid conditions.
3. To study geotaxis behaviour in earthworm.
4. To study the phototaxis behaviour in insect larvae.
5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.
6. Study and actogram construction of locomotor activity of suitable animal models.
7. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

SUGGESTED READINGS

- David McFarland, *Animal Behaviour*, Pitman Publishing Limited, London, UK
- Manning, A. and Dawkins, M. S., *An Introduction to Animal Behaviour*, Cambridge, University Press, UK.
- John Alcock, *Animal Behaviour*, Sinauer Associate Inc., USA. • Paul W. Sherman and John Alcock, *Exploring Animal Behaviour*, Sinauer Associate Inc., Massachusetts, USA
- Insect Clocks D.S. Saunders, C.G.H. Steel, X., Afopoulou (ed.)R.D. Lewis. (3rdEd) 2002 Barends and Noble Inc. New York, USA • *Biological Rhythms*: Vinod Kumar (2002) Narosa Publishing House, Delhi/ Springer-Verlag, Germany.

CC-III (V) COMPARATIVE ANATOMY OF VERTEBRATES

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Comparative Anatomy of Vertebrates

Syllabus:

Unit 1: Integumentary System & Structure, functions and derivatives of integument, Skeletal System axial and appendicular skeleton, Jaw suspensorium, Visceral arches

Unit 2: Digestive System -Alimentary canal and associated glands, dentition ,Respiratory System -Skin, gills, lungs and air sacs; Accessory respiratory organs

Unit 3: Circulatory System & General plan of circulation, evolution of heart and aortic arches, Urinogenital System -Succession of kidney, Evolution of urinogenital ducts,

Unit 4: Nervous System & Comparative account of brain Autonomic nervous system, Spinal cord, Cranial nerves in mammals,

Unit 5: Sense Organs Classification of receptors Brief account of visual and auditory receptors in man

PRACTICAL

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
2. Disarticulated skeleton of Frog, Varanus, Fowl, Rabbit
3. Carapace and plastron of turtle /tortoise
4. Mammalian skulls: One herbivorous and one carnivorous animal
5. Dissection of rat to study arterial and urinogenital system(subject to permission)
6. Study of structure of any two organs (heart, lung, kidney, eye and ear)
from video recording (may be included if dissection not permitted)
 1. Project on skeletal modifications in vertebrates (may be included if dissection not permitted)

SUGGESTED READINGS

- Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education
- Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
- Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons
- Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House

Discipline Specific Elective- Group A-(V)

Wild Life Conservation

COURSE OBJECTIVE:-

This paper is aimed to introduce wildlife conservation ,endangered species , sanctuaries biosphere reserve Project Tiger and. Gir Lion..

Syllabus:

UNIT – I

1. Wild Life of India.
2. Types of Wild Life.
3. Value of Wild Life.
4. Positive negative of Wild Life.

UNIT – II

1. Wild Life protection act.
2. Conservation of wild Life in India.
3. Endangered species in India.

UNIT – III

1. Wild Life conservation.
2. National park in India.
3. Santuries in C.G & M.P.

UNIT – IV

1. Project Tiger.
2. National animal and their conservation.
3. Project Gir Lion.

UNIT – V

1. Wild Life in M.P & C.G with references to mammals.
2. Biosphere reserves.
3. Bird santuries in India.

COURSE OUTCOME:-

The student have a knowledge of different biosphere reserve, santuries ,wildlife conservation Skill to develop employment in Zoo.

PRACTICAL:-

1. Wild life : Endangered and threatened species.
2. National animal and their conservation
3. Achanakmar Project Tiger.
4. Zoo Visit Kannan Pendari

5. Crocodile Project, National park in India.
6. Bird sanctuaries in India.
7. Butterfly identification, Sanctuaries ,Biospher Reserve

Discipline Specific Elective- Group A (V)

FISH AND FISHERIES THEORY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for the salient features of Fish and Aquaculture

Syllabus:

UNIT 1: Introduction and Classification: General description of fish; Account of systematic classification of fishes (upto classes); Classification based on feeding habit, habitat and manner of reproduction.

UNIT 2: Morphology and Physiology: Types of fins and their modifications; Locomotion in fishes; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in Elasmobranchs; Reproductive strategies (special reference to Indian fishes); Electric organs; Bioluminescence; Mechanoreceptors; Schooling; Parental care; Migration

UNIT 3: Fisheries Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations

Unit 4: Aquaculture Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products

UNIT 5: Fish in research Transgenic fish, Zebrafish as a model organism in research

PRACTICAL

1. Morphometric and meristic characters of fishes
2. Study of *Petromyzon*, *Myxine*, *Pristis*, *Chimaera*, *Exocoetus*, *Hippocampus*, *Gambusia*, *Labeo*, *Heteropneustes*, *Anabas*

3. Study of different types of scales (through permanent slides/ photographs).
4. Study of crafts and gears used in Fisheries
5. Water quality criteria for Aquaculture: Assessment of pH, conductivity, Total solids, Total dissolved solids
6. Study of air breathing organs in Channa, Heteropneustes, Anabas and Clarias
7. Demonstration of induced breeding in Fishes (video) 8. Demonstration of parental care in fishes (video)
9. Project Report on a visit to any fish farm/ pisciculture unit

SUGGESTED READINGS

- C.B.L. Srivastava, Fish Biology, Narendra Publishing House
- J.R. Norman, A history of Fishes, Hill and Wang Publishers
- S.S. Khanna and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing House

Discipline Specific Elective- Group A (V)

Industrial Biology

COURSE OBJECTIVE:-

This paper is aimed to introduce micro-organism used in Fermentation. Vitamin, Enzyme Antibiotics, Alcohol, dairy products and other pathogenic treatment.

Syllabus:

UNIT – I

1. Vitamin.- Commercial production of vitamin.
2. Fermentation techniques
3. Microorganism used in alcohol.

UNIT – II

1. Antibiotics their importance
2. Antibiotics and their Producing companies.
3. Chemical nature of Penicillin.

UNIT – III

1. Biofertilizers
2. Vermi composting
3. Enzymes and their properties.
4. Industrial uses of enzymes.

UNIT – IV

1. Microbiology of domestic water and sewage.
2. Microbiology of milk and milk products.
3. Industrial microbiology.

UNIT – V

1. Brief introduction to pathogenic Nemetodes.
2. Brief account, Life history and Pathogenicity of *Entamoeba, Trypanozoma, Giardia*.
3. Vector insects

COURSE OUTCOME:-

The student have a knowledge of different micro-organism used for drug, alcohol vitamine, antibiotics, enzyme, dairy production Skill to develop own Business, marketing and self employment.

PRACTICAL:-

1. Study of Micro-organism from soil.
2. Study of *Entamoeba, Trypanozoma, Giardia*.
3. Study of Microorganism used in alcohol.

4. Study of Microbiology of domestic water and sewage.
5. Study of Biofertilizers, Vermi composting
6. Study of Vector insect

Discipline Specific Elective- Group A (V)
INSECT VECTORS AND DISEASES

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for the salient features of Insects ,Concept of V Diseases

Syllabus:

Unit I: Introduction to Insects General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits

Unit II: Concept of Vectors Brief introduction of Carrier and Vectors (mechanical and biological vector),Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity

Unit III: Insects as Vectors Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit IV: Dipteran as Disease Vectors Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly Study of house fly as important mechanical vector, Myiasis, Control of house fly : Siphonaptera as Disease Vectors Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas :

Unit V: Siphunculata as Disease Vectors Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis; Control of human louse , Hemiptera as Disease Vectors Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

PRACTICAL

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs: Aedes, Culex, Anopheles, Pediculus humanus capitis, Pediculus humanus corporis, Phthirus pubis, Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica, through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors Submission of a project report on any one of the insect vectors and disease transmitted

SUGGESTED READINGS

- Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK

- Chapman, R.F. (1998). *The Insects: Structure and Function*. IV Edition, Cambridge University Press, UK
- Pedigo L.P. (2002). *Entomology and Pest Management*. Prentice Hall Publication
- Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases*. Wiley-Blackwell

Communication Skill & Personality Development

Objective: To make the students understand the basics of personality, public speaking, language, Listening, conversation & writing skills, along with the communication process Syllabus

THEORY –

Unit- I:

Basics of Personality, Do's and Don't's in Personality, Salutations and Greetings, Presenting Yourself, Proper Introduction of Oneself.

Unit- II:

Administration- your work style, Overcoming Phobias, Public Speaking, General Etiquettes and Mannerism, Time Management, Attire, Attitude, Self Actualization, Magic of Positive Thinking.

Unit- III :

Tips of Preparing CV, Interviews tips.

Unit-IV:

Language Skill, Writing Skill, Speaking Skill, Listening Skill, Conversation Practice, Mysticism of Body Language, Basics of Grammar.

Unit- V :

Communication- Meaning, Functions, Channels, Process, Barriers and Interpersonal Skills.

PRACTICAL –

1. To present self introduction of yours.
2. Mock interview.
3. Group discussions.
4. SWOT analysis of self.
5. Extempore.
6. Debate.
7. Preparation of CV.
8. Role play.
9. Present a speech.
10. Make a power point presentation of communication.

Reference Books:

1. Business Communication, Universal Pub. Agra – Dr. Ramesh Mangal
2. English Grammar- Wren & Martin
3. Putting your best foot forward- Lt. Co. (Dr.) Pramod Deogirikar

Chairperson

Dean (Academics)

(Board of studies)

(Academic Council)

(Registrar) Seal

Outcome- After the completion of this subject the learners will understand the basics of personality, public speaking, language, Listening, conversation & writing skills, along with the communication process.

ZOOLOGY (HONOURS) SEMESTER VI th.

CC -I Zoology – VI (Environmental Biology & Evolution)

COURSE OBJECTIVE:-

This paper is aimed to introduce Ecology ,Origin of life and evolution, Palaeontology and distribution

Syllabus:

- UNIT – I** Concept of Ecology
- Abiotic and Biotic Factors
 - Energy flow in ecosystem
 - Food chain and Food web
 - Biogeochemical cycle: CO₂, N and P
 - Population Concept- Characteristics of population. Factors affecting population growth.
 - Community Concept-Succession, Periodicity ,Indicators
- UNIT – II** Habitat Ecology
- Fresh water habitat – Factors and classification.
 - Marine habitat- Factors and classification
 - Terrestrial habitat – Factors and classification.
 - Ecological divisions of India.
 - Natural resources and their Conservation with special reference to forests
- UNIT – III** Man and Environment
- Wild life conservation (Laws, National Parks and Sanctuaries of MP)
 - Environmental degradation and pollution.
 - Thermal and Noise pollution
 - Radiation Ecology ,Global Warming and Green House Effect
 - Urbanisation and effect of human population on environment.
- UNIT – IV** Origin of life and evolution
- Origin of life- modern concept only
 - Lamarckism, Darwinism.
 - Modern Synthetic theory :Variations Mutations, Isolation & Speciation
 - Adaptations and Mimicry
 - Micro, macro Evolution and Mega evolution.
- UNIT – V** Palaeontology and distribution
- Fossils, Methods of fossilisation, Determination of age of Fossils.
 - Study of Extinct forms: Dinosaurs and Archaeopteryx
 - Zoogeographical distribution of animals
 - Evolution of man.

PRACTICAL:-

1. Study of Fresh water, Marine and Terrestrial Fauna .
 2. Water analysis – Oxygen, Chloride.
 3. Pond ecosystem.
 4. Wild life : Endangered and threatened species.
 5. Study of specimen related with Micro , Mega evolution ,Commensalisms
Symbiosis , Mimicry , Parasitism and colouration .
- Study of various fossils: Living fossil, Limulus, Latimera, dinosaurs, Archaeopteryx,.

CC-II Zoology VI DEVELOPMENTAL BIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Phases of development & Embryonic Development

Syllabus:

Unit 1: Introduction Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division

Unit 2: Early Embryonic Development Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers

Unit 3: Late Embryonic Development Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)

Unit 4: Post Embryonic Development Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories

Unit 5: Implications of Developmental Biology Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis

PRACTICALS

1. Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages)
2. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
3. Study of the developmental stages and life cycle of *Drosophila* from stock culture
4. Study of different sections of placenta (photomicrograph/ slides)
5. Project report on *Drosophila* culture/chick embryo development

SUGGESTED READINGS • Gilbert, S. F. (2010). Developmental Biology, IX Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA • Balinsky B. I. and Fabian B. C. (1981). An Introduction to Embryology, V Edition, International Thompson Computer Press • Carlson, R. F. Patten's Foundations of Embryology • Kalthoff (2008). Analysis of Biological Development, II Edition, McGraw-Hill Publishers • Lewis Wolpert (2002). Principles of Development. II Edition, Oxford University Press

CC-III Zoology VIAQUATIC BIOLOGY

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Aquatic Biomes, Freshwater Biology , Marine Biology & Management of Aquatic Resources

Syllabus

UNIT 1: Aquatic Biomes Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.

UNIT 2: Freshwater Biology Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico-chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous. Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.

UNIT 3: Marine Biology Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT 4: Management of Aquatic Resources Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations)

UNIT 5:, Sewage treatment Water quality assessment- BOD and COD.

PRACTICAL

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/Fisheries Institutes.

SUGGESTED READINGS •

- Anathakrishnan : Bioresources Ecology 3rd Edition • Goldman : Limnology, 2nd Edition
- Odum and Barrett : Fundamentals of Ecology, 5th Edition
 - Pawlowski: Physicochemical Methods for Water and Wastewater Treatment, 1st Edition
 - Wetzel : Limnology, 3rd edition
 - Trivedi and Goyal : Chemical and biological methods for water pollution studies
 - Welch : Limnology Vols. I-II

Discipline Specific Elective- Group B (VI)

ENVIRONMENT AND PUBLIC HEALTH

COURSE OBJECTIVE:-

This paper is aimed to introducing the students for Sources of Environmental hazards, Climate Change, Pollution, Waste Management Technologies & Causes Of Diseases and symptoms

Syllabus

UNIT I:

Introduction Sources of Environmental hazards, hazard identification and accounting, fate of toxic and persistent substances in the environment, dose Response Evaluation, exposure Assessment.

UNIT 2 :

Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit 3 :

Pollution Air, water, noise pollution sources and effects, Pollution control

Unit 4 :

Waste Management Technologies Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants, Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.

Unit 5 :

Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid

PRACTICAL - To determine pH, Cl, SO₄, NO₃ in soil and water samples from different locations.

SUGGESTED BOOKS •

Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.

• Kolluru Rao, Bartell Steven, Pitblado R and Stricoff “Risk Assessment and Management Handbook”, McGraw Hill Inc., New York, 1996

. • Kofi Asante Duah “Risk Assessment in Environmental management”, John Wiley and sons, Singapore, 1998.

• Kasperson, J.X. and Kasperson, R.E. and Kasperson, R.E., Global Environmental Risks, V.N. University Press, New York, 2003

. • Joseph F Louvar and B Diane Louver Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey 1997.

DSE Group- B -(VI) **Aquaculture**

COURSE OBJECTIVE:-

This paper is aimed to introduce fresh water Prawn, Fish and Pearl Culture.

Syllabus:

- UNIT - I** Aquaculture: history, definition, scope & importance. Abiotic & biotic factors of water necessary for fish life. Ecological characteristics of pond.
- UNIT - II** Fish culture :- Mono, Poly, Fish culture. Fresh water prawn culture, pearl culture. Sewage fed fish culture.
- UNIT - III** Fish breeding in natural conditions. Transport of live fish & seed. Different types of crafts & gears used for fish catching, induced breeding.
- UNIT - IV** Fresh water fish farm: different types of fish ponds. preservation and processing byproducts of fish Industry & their utility.
- UNIT - V** Water pollution and its effects on fisheries and their control. Common fish diseases & their control. Biochemical composition and nutritional value of fish. cultivable species of fishes in india.

COURSE OUTCOME:-

The student have a knowledge of different culture Skill to develop own Business, marketing and self employment.

PRACTICAL:-

1. Study of Fresh water, Marine and Terrestrial Fauna.
2. Water analysis – Oxygen, Chloride.
3. Pond ecosystem.
4. Study of specimen of fresh water fishes.
5. Study of slide preparation from fish scale.

Discipline Specific Elective
DSE Group B (VI) Economic Zoology

COURSE OBJECTIVE:-

This paper is aimed to introduce Pearl Culture, Lac –Culture , Sericulture and Poultry keeping. Protozoa, rats, mites, insect diseases and control.

Syllabus:

UNIT – 1

1. Protozoa and human diseases
2. House hold insect.
3. Mites and their control.

UNIT – II

1. Toxicology: Basic concepts,
2. Heavy metal toxicity- Pb, Cd, Hg.
3. Toxicity testing, LC 50, LD 50, acute and chronic toxicity.
4. Pesticide and their toxicological effect.
5. Pest of Pulse crops, Vegetables and Paddy

UNIT – III

1. Chemical control of pest.
2. Natural control of pest.
3. Physical control of pest.
4. Biological control of insect pests.

UNIT – IV

1. Economic importance of mammals.
2. Poultry keeping.
3. Rats and their control.

UNIT - V

1. Pearl culture:
2. Sericulture
3. Lac culture.
4. Apiculture
5. Snake venom.

COURSE OUTCOME:-

The student have a knowledge of different culture Skill and diseases and their control to develop own Business, marketing and self employment.

PRACTICAL:-

1. Study of Life cycle of Silk worm
2. Study of Bee culture

3. Study of pests- Stored grain pests- *Sitophilus Oryzae* & *Tribolium castaneum*.
4. Study of Vegetable pests- *Pieris brassicae* & *Dacus curbitae*
5. Study of Plankton – *Euglena*, *Paramecium*, *Cyclops*, *Mysis*, *Daphnia*
6. Study of Protozoa and diseases.

DSE Group – B (VI) **Biology Of Insecta**

COURSE OBJECTIVE:-

This paper is aimed to introduce General Features of Insects , Physiology of Insects, :
Insect Society & : Insects as Vectors.

Unit I: Introduction General Features of Insects Distribution and Success of Insects on the Earth
Unit II: Insect Taxonomy 4 Basis of insect classification; Classification of insects up to orders

Unit III: General Morphology of Insects 8 External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat Abdominal appendages and genitalia

Unit IV: Physiology of Insects 28 Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system Sensory receptors Growth and metamorphosis

Unit IV: Insect Society Group of social insects and their social life Social organization and social behaviour (w.r.t. any one ezz
Unit V: Insect Plant Interaction 4 Theory of co-evolution, role of allelochemicals in host plant mediation Host-plant selection by phytophagous insects, Insects as plant pests

Unit VI: Insects as Vectors -Insects as mechanical and Biological vectors, Brief discussion on houseflies and mosquitoes as important insect vectors

PRACTICAL

-) 1. Study of one specimen from each insect order
2. Study of different kinds of antennae, legs and mouth parts of insects
3. Study of head and sclerites of any one insect
4. Study of insect wings and their venation.
5. Study of insect spiracles
6. Methodology of collection, preservation and identification of insects.
7. Morphological studies of various castes of Apis, Camponotus and Odontotermes
8. Study of any three insect pests and their damages

9. Study of any three beneficial insects and their products Field study of insects and submission of a project report on the insect diversity

SUGGESTED READINGS

- A general text book of entomology, Imms , A. D., Chapman & Hall, UK
- The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK
- Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA
- Introduction to the study of insects, Borror, D. J., Triplehorn, C. A., and Johnson, N. F., M Saunders College Publication, USA
- Host Selection by Phytophagous insects, Bernays, E. A., and Chapman, R. F., Chapman and Hall, New York, USA
- Insect Physiology and Biochemistry, Nation, J. L., CRC Press, USA