क्र. १५६० /अका./2019   दुर्ग, दिनांक ०५|०७|२०१७

प्रति,

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

विषयः– स्नातक स्तर भाग–एक के पाठ्यक्रम विषयक।

संदर्भः– संयुक्त संचालक, उच्च शिक्षा विभाग के पत्र क्र. 2456/315/आउशि/सम/2019, दिनांक 16.05.2019 ।

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विषयांतर्गत लेख है कि संदर्भित पत्र के माध्यम से प्राप्त स्नातक स्तर भाग–एक के निम्नलिखित कक्षा/विषयों के परिवर्तित/संशोधित पाठ्यक्रम शिक्षा सत्र 2019–20 से लागू किये जाते हैं:–

1. बी.ए. — आधार पाठ्यक्रम–हिन्दी भाषा, हिन्दी साहित्य, राजनीतिशास्त्र, अर्थशास्त्र, नृत्य, दर्शनशास्त्र, समाजशास्त्र, इतिहास, मानवविज्ञान, संस्कृत, सांख्यिकी, प्राचीन भारतीय इतिहास, भूगोल, मनोविज्ञान, लाईब्रेरी साईंस

2. बी.एस–सी. — आधार पाठ्यक्रम–हिन्दी भाषा, जीव विज्ञान, मानवविज्ञान, बायोटेक्नोलॉजी, कम्प्यूटर साईंस, गणित, भौतिक शास्त्र, प्राणीशास्त्र, सूक्ष्मजीव विज्ञान, वनस्पतिशास्त्र, भूविज्ञान, इलेक्ट्रॉनिक्स, रसायन शास्त्र, सांख्यिकी, भूगोल।

3. बी.एस.सी– (गृह विज्ञान) — आधार पाठ्यक्रम – हिन्दी भाषा एवं गृह विज्ञान।

4. विधि — एल.एल.बी.

5. प्रबंध — बी.बी.ए.

उपरोक्त विषयों को शिक्षा सत्र 2019–20 से संशोधित रूप में स्नातक स्तर भाग–एक के लिए लागू किया जाता है स्नातक स्तर भाग दो एवं तीन के पाठ्यक्रम यथावत रहेंगे।

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

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

संलग्न : उपरोक्तानुसार।

कुलसचिव

B.Sc.Part-I
विषय—सूची

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REVISED ORDINANCE NO. 21
BACHELOR OF SCIENCE

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

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

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

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

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

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

    (i)   Foundation Course:

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

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

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

(iii)   Practical in case prescribed for core subjects.

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

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

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

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

SCHEME OF EXAMINATION

Subject	Paper	Max. Mark	Total Marks	Min. Marks
Environmental Studies		**75**	**100**	**33**
Field Work		**25**		
Foundation Course				
Hindi Language	I	75	75	26
English Language	I	75	75	26

नोट– प्रत्येक खंड में से **2** दो प्रश्न हल करने होंगे। सभी प्रश्नपत्र समान अंक के होगें।

Three Elective Subject:

Subject	Paper	Max. Mark	Total Marks	Min. Marks
1. Physics	I	50		
	II	50	100	33
	Practical		50	17
2. Chemistry	I	33		
	II	33	100	33
	III	34		
	Practical		50	17
3. Mathematics	I	50		
	II	50	150	50
	III	50		
4. Botany	I	50		
	II	50	100	33
	Practical		50	17
5. Zoology	I	50		
	II	50	100	33
	Practical		50	17
6. Geology	I	50		

Subject	Paper	Max. Marks	Total Marks	Min. Marks
	II	50	100	33
	Practical		50	17
7. Statistics	I	50		
	II Practical	50	100	33
			50	17
8. Anthropology	I	50		
	II	50	100	33
	Practical		50	17

Subject	Paper	Max. Marks	Total Marks	Min. Marks
9. Defense Studies	I	50		
	II	50	100	33
	Practical		50	17
10. Micro Biology	I	50		
	II	50	100	33
	Practical		50	17
11. Computer Science	I	50		
	II	50	100	33
	Practical		50	17
12. Information Technology	I	50		
	II	50	100	33
	Practical		50	17
13. Industrial Chemistry	I	34		
	I	33	100	33
	II	33		
	Practical		50	17
14. Bio Chemistry	I	50		
	II	50	100	33
	Practical		50	17
15. Bio Technology	I	50		
	II	50	100	33
	Practical		50	17

USE OF CALCULATORS

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

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

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

MM. 75

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

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

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

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

(अ)   लघु प्रश्नोत्तर   —   25 अंक
(ब)   निबंधात्मक   —   50 अंक

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

उपरोक्त पाठ्यक्रम से संबंधित परीक्षा का आयोजन वार्षिक परीक्षा केसाथ किया जाएगा।पर्यावरण विज्ञान विषय अनिवार्य विषय है, जिसमें अनुत्तीर्ण होने पर स्नातक स्तर भाग—एक के छात्र/छात्राओं को एक अन्य विषय के साथ पूरक की पात्रता होगी। पर्यावरण विज्ञान के सैद्धांतिक एवं फील्ड वर्क के संयुक्त रूप से 33ः (तैंतीस प्रतिशत) अंक उत्तीर्ण होने के लिए अनिवार्य होंगे।

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

UNIT-I   THE MULTI DISCIPLINARY NATUREOF ENVIRONMENTALSTUDIES

Definition, Scope and

Importance Natural Resources:

Renewable and Nonrenewable Resources

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

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

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

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

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

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

(12 Lecture)

UNIT-II   ECOSYSTEM

(a)   Concept, Structure and Function of and ecosystem

-        Producers, consumers and decomposers.

-        Energy flow in thee co system
-        Ecological succession

-        Food chains, food webs and ecological pyramids.

-        Introduction, Types, Characteristics Features, Structure and Function of Forest, Grass, Desert and Aquatic Ecosystem.

(b)   Biodiversity and its Conservation

-        Introduction - Definition: genetic. species and ecosystem diversity

-        Bio-geographical classification of India.

-        Value of biodiversity: Consumptive use. Productive use, social ethics, aesthetic and option values.

-        Biodiversity at global, National and local levels.

-        India as mega-diversity nation.

- Hot spots of biodiversity.

- Threats to biodiversity: habitat loss, poaching of wildlife, man-wild life conflict.

- Endangered and endemic species of India.

- Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.

(12Lecture)

UNIT- III
(a)   Causes, effect and control measures of

- Air water, soil, marine, noise, nuclear pollution and Human population.

- Solid waste management: Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution.

- Disaster Management: floods, earthquake, cyclone and landslides.

(12Lecture)

(b)   Environmental Management

- From Unsustainable to sustainable development.

- Urban problems related to energy.

- Water conservation, rain water harvesting, water shed management.

- Resettlement and rehabilitation of people, its problems and concerns.

- Environmental ethics: Issues and possible solutions.

- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

- Wasteland reclamation

- Environment protection Act: Issues involved in enforcement of environmental legislation.

- Role of Information Technology in Environment and Human Health.

UNIT- IV

General background and historical perspective- Historical development and concept of Human Rights, Meaning and definition of Human Rights, Kind and Classification of Human Rights.

Protection of Human Rights under the UNO Charter, protection of Human Rights under the Universal Declaration of Human Rights, 1948.

Convention on the Elimination of all forms of Discrimination against women.

Convention on the Rights of the Child, 1989.

UNIT-V

Impact of Human Rights norms in India, Human Rights under the Constitution of India, Fundamental Rights under the Constitution ofIndia, Directive Principles of State policy under the Constitution of India, Enforcement of Human Rights in India.

Protection of Human Rights under the Human Rights Act, 1993- National Human Rights Commission, State Human Rights Commission and Human Rights court in India.

Fundamental Duties under the Constitution of India.

Reference/ Books Recommended

1.   SK Kapoor- Human rights under International Law and IndianLaw.
2.   HO Agrawal- Internation Law and HumanRights
3.   एस.के. कपूर —मानव अधिकार
4.   जे.एन. पान्डेय — भारत का संविधान
5.   एम.डी. चतुर्वेदी —भारत का संविधान
6.   J.N.Pandey - Constitutional Law ofIndia
7.   Agarwal K.C. 2001 Environmental Biology, Nidi pub. Ltd.Bikaner
8.   Bharucha Erach, the Biodiversity of India, Mapin pub. Ltd. Ahmedabad 380013,India, Email:mapin@icenet.net(R)
9.   Bruinner R.C. 1989, Hazardous Waste Incineration. McGraw HillInc.480p
10.   Clark R.S. Marine pollution, Clanderson press Oxford(TB)
11.   Cuningham, W.P.Cooper. T.H.Gorhani, E & Hepworth.M.T,200
12.   Dr. A.K.- Environmental Chemistry. Wiley EasternLtd.
13.   Down to Earth, Center for Science and Environment(R)
14.   Gloick, H.P. 1993 Water in crisis. pacific institute for studies in Deve. Environment& Security. Stockholm Eng. Institute. Oxford University, Press. m473p.
15.   Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai(R)
16.   Heywood, V.H. & Watson, T.T.1995 Global Biodiversity Assessment, Cambridge Univ. Press1140p
17.   Jadhav H. & Bhosale, V.H. 1995 Environmental Protection and Law. Himalayapub. House, Delhi284p
18.   Mckinney M.L.& School R.M.1996, environmental Science systems & solutions,web enhanced edition,639p
19.   Mhadkar A.K. Matter Hazardous, Techno-Sciencepublication(TB)
20.   Miller T.G.Jr. Environment Science, Wadsworth publication co.(TB)
21.   Odum E.P.1971, Fundamentals of Ecology, W.B. Saunders Co.USA,574p
22.   Rao M.N. & Datta, A.K. 1987, Waste water treatment. Oxford & IBH pub.co.pvt.Ltd 345p
23.   Sharma B.K. 2001, Environmental chemistry, Goel pub. House,Meerut
24.   Survey of the Environment, TheHidu(M)
25.   Townsend C. Harper J. And Michael Begon, Essentials of Ecology, Blackwell Science(TB)
26.   Trivedi R.K.Handbook of Environment Laws, Rules, Guidlines, Compliancesand Standards, Vol land II, EnvironmentMedia(R)
27.   Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science publication (TB)
28.   Wanger K.D.1998, Environmental Management. W.B. Saunders Co. Philadelphia,USA 499p

संशोधित पाठ्यक्रम

बी.ए. / बी.एस–सी. / बी.कॉम. / बी.एच.एस.–सी.

भाग – एक (आधार पाठ्यक्रम)

प्रश्न पत्र– प्रथम (हिन्दी भाषा)

(पेपर कोड –0101)   पूर्णांक– 75

नोट :–

1. प्रश्न पत्र 75 अंक का होगा।
2. प्रश्न पत्र अनिवार्य होगा ।
3. इसके अंक श्रेणी निर्धारण के लिए जोड़े जायेंगे।
4. प्रत्येक इकाई के अंक समान होंगे।

पाठ्य विषय :–

इकाई–1

क. पल्लवन, पत्राचार, अनुवाद, पारिभाषिक शब्दावली एवं हिंदी में पदनाम

ख. ईदगाह (कहानी) – मुंशी प्रेमचंद

इकाई–2

क. शब्द शुद्धि, वाक्य शुद्धि, शब्द ज्ञान–पर्यायवाची शब्द, विलोम शब्द, अनेकार्थी शब्द, समश्रुत शब्द, अनेक शब्दों के लिए एक शब्द एवं मुहावरे–लोकोक्तियाँ

ख. भारत वंदना (कविता)– सूर्यकान्त त्रिपाठी निराला

इकाई–3

क. देवनागरी लिपि – नामकरण, स्वरूप एवं देवनागरी लिपि की विशेषताएँ, हिंदी अपठित गद्यांश, संक्षेपण, हिंदी में संक्षिप्तीकरण

ख. भोलाराम का जीव (व्यंग्य) – हरिशंकर परसाई

इकाई–4

क. कम्प्यूटर का परिचय एवं कम्प्यूटर में हिंदी का अनुप्रयोग

ख. शिकागो से स्वामी विवेकानंद का पत्र

इकाई–5

क. मानक हिन्दी भाषा का अर्थ, स्वरूप, विशेषताएँ, मानक, उपमानक, अमानक भाषा

ख. सामाजिक गतिशीलता – प्राचीन काल, मध्यकाल, आधुनिक काल

मूल्यांकन योजना :–

प्रत्येक इकाई से एक–एक प्रश्न पूछा जाएगा। प्रत्येक प्रश्न में आंतरिक विकल्प होगा। प्रत्येक प्रश्न के 15 अंक होंगे । प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमशः 8 एवं 7 होंगे। प्रश्न–पत्र का पूर्णांक 75 निर्धारित है।

पाठ्यक्रम संशोधन का औचित्य :–

व्याकरण के बुनियादी ज्ञान, संप्रेषण, कौशल, सामाजिक संदेश एवं भाषायी दक्षता को ध्यान में रखते हुए यह पाठ्यक्रम प्रस्तावित है।

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FOUNDATION COURSE
PAPER - II
ENGLISH LANGUAGE   M.M. 75
(Paper code - 0792)

</div>

UNIT-1   **Basic Language skills : Grammar and Usage.**

Grammar and Vocabulary based on the prescribed text.
To be assessed by objective / multiple choice tests.

<div align="right">

(Grammar - 20 Marks
Vocabulary - 15 Marks)

</div>

UNIT-2   **Comprehension of an unseen passage.**   05

This should simply not only (a) an understanding of the passage in question, but also.

(b) a grasp of general language skills and issues with reference to words and usage within the passage and (c) the Power of short independent composition based on themes and issues raised in the passage.

To be assessed by both objective multiple choice and short answer type tests.

UNIT-3   **Composition :** Paragraph writing   10

UNIT-4   **Letter writing** (The formal and one Informal)   10

Two letters to be attempted of 5 marks each. One formal and one informal.

UNIT-5   **Texts :**   15

Short prose pieces (Fiction and not fiction) short poems, the pieces should cover a range of authors, subjects and contexts. With poetry if may sometimes be advisable to include pieces from earlier periods, which are often simpler than modern examples. In all cases, the language should be accessible (with a minimum of explanation and reference to standard dictionaries) to the general body of students schooled in the medium of an Indian language.

Students should be able to grasp the contents of each place ; explain specific words, phrases and allusions; and comment on general points of narrative or argument. Formal Principles of Literary criticism should not be taken up at this stage.

To be assessed by five short answers of three marks each.

BOOKS PRESCRIBED -

English Language and Indian Culture - Published by M.P. Hindi Grant Academy Bhopal.

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Dr. M. Chakraborty   D. S. Gupta   DR. MERILY ROY

PHYSICS

OBJECTIVES OF THE COURSE

The undergraduate training in physics is aimed at providing the necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in physics becomes in tune with the changing scenario and incorporate new and rapid advancements and multi disciplinary skills, societal relevance, global interface, self sustaining and supportive learning.

It is desired that undergraduate i.e. B.Sc. level besides grasping the basic concepts of physics should in addition have broader vision. Therefore, they should be exposed to societal interface of physics and role of physics in the development of technologies.

EXAMINATION SCHEME:

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each groups as listed in the list of experiments.
4. Practical examination will be of 4 hours duration- one experiment to be completed in 2 hours.
   The distribution practical marks as follows:
Experiment	:	15+15=30
Viva voce	:	10
Internal assessment	:	10
5. The external examiner should ensure that at least 16 experiments are in working order at the time of examination and submit a certificate to this effect.

B.Sc. Part-I
Paper-I
MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER
(Paper code 0793)

Unit-1 Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's laws. Effect of Centrifugal and Coriolis forces due to earth's rotation, Center of mass (C.M.), Lab and C.M. frame of reference, motion of C.M. of system of particles subject to external forces, elastic, and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum, Conservation of energy.

Unit-2 Rigid body motion, rotational motion, moments of inertia and their products, principal moments & axes, introductory idea of Euler's equations. Potential well and Periodic Oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations: spring and mass system, simple and compound pendulum, torsional pendulum.

Unit-3 Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, damped harmonic oscillator, case of different frequencies. Power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.

Unit-4 E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity, Transverse B field, 180° deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields: velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.

Unit-5 Elasticity: Strain and stress, elastic limit, Hooke's law, Modulus of rigidity, Poisson's ratio, Bulk modulus, relation connecting different elastic- constants, twisting couple of a cylinder (solid and hallow), Bending moment, Cantilever, Young modulus by bending of beam.

Viscosity: Poiseulle's equation of liquid flow through a narrow tube, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseulle's law, Coefficient of viscosity, Stoke's law, Surface tension and molecular interpretation of surface tension, Surface energy, Angle of contact, wetting.

TEXT AND REFERENCE BOOKS:

1. E M Purcell, Ed Berkely physics course, vol. Mechanics (Mc. Gr. Hill) R P Feynman.
2. R B Lighton and M Sands, the Feynman lectures in physics, vol I (B) publications, Bombay, Delhi, Calcutta, Madras.
3. D P Khandelwal, Oscillations and waves (Himalaya Publishing House Bombay).
4. R. K. Ghosh, The Mathematics of waves and vibrations (Macmillan 1975).
5. J.C. Upadhyaya- Mechanics (Hindi and English Edition.)
6. D.S. Mathur- Mechanics and properties of matter.
7. Brijlal and Subramanium- Oscillations and waves. Resnick and Halliday- Volume I
8. Physics Part –1: Resnick and Halliday.

Paper-II
ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Unit-1 Repeated integrals of a function of more than one variable, definition of a double and triple integral. Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, and their geometrical interpretation, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stoke's theorem and their physical significance. Kirchoff's law, Ideal Constant-voltage and Constant-current Sources. Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem and Maximum Power Transfer theorem.

Unit-2 Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field.
Gauss's law and its application: E due to (1) an Infinite Line of Charge, (2) a Charged Cylindrical Conductor, (3) an Infinite Sheet of Charge and Two Parallel Charged Sheets, capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field.

Unit-3 Dielectric constant, Polar and Non Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P, Electric displacement vector D. Relation between three electric vectors, Dielectric susceptibility and permittivity, Polarizability and mechanism of Polarization, Lorentz local field, Clausius Mossotti equation, Debye equation,

Ferroelectric and Paraelectric dielectrics, Steady current, current density J, non-steady currents and continuity equation, rise and decay of current in LR, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an a AC circuit, power factor.

Unit-4 Magnetization Current and magnetization vector M, three magnetic vectors and their relationship, Magnetic permeability and susceptibility, Diamagnetic, paramagnetic and ferromagnetic substances. B.H. Curve, cycle of magnetization and hysteresis, Hysteresis loss.

Biot-Savart's Law and its applications: B due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms).

Unit-5 Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.

TEXT AND REFERENCE BOOKS:
1. Berkeley Physics Course, Electricity and Magnetism, Ed. E.M. Purcell (Mc Graw - Hill).
2. Halliday and Resnik, Physics, Vol. 2.
3. D J Grifith, Introduction to Electrodynamics (Prentice-Hall of India).
4. Raitz and Milford, Electricity and Magnetism (Addison-Wesley).
5. A S Mahajan and A A Rangwala, Electricity and Magnetism (Tata Mc Graw-hill).
6. A M Portis, Electromagnetic fields.
7. Pugh & Pugh, Principles of Electricity and Magnetism (Addison-Wesley).
8. Panofsky and Phillips, Classical Electricity and Magnetism, (India Book House).
9. S S Atwood, Electricity and Magnetism (Dover).

PRACTICALS

Minimum 16 (Eight from each group)

Experiments out of the following or similar experiments of equal standard

GROUP-A

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Moment of inertia of Fly wheel.
3. Moment of inertia of irregular bodies by inertia table.
4. Study of conservation of momentum in two dimensional oscillations.
5. Study of a compound pendulum.
6. Study of damping of a bar pendulum under various mechanics.
7. Study of oscillations under a bifilar suspension.
8. Study of modulus of rigidity by Maxwell's needle.
9. Determination of Y, k, η by Searl's apparatus.
10. To study the oscillation of a rubber band and hence to draw a potential energy curve from it.
11. Study of oscillation of a mass under different combinations of springs.
12. Study of torsion of wire (static and dynamic method).
13. Poisson's ratio of rubber tube.
14. Study of bending of a cantilever or a beam.
15. Study of flow of liquids through capillaries.
16. Determination of surface tension of a liquid.
17. Study of viscosity of a fluid by different methods.

GROUP-B

1. Use of a vibration magnetometer to study a field.
2. Study of magnetic field B due to a current.
3. Measurement of low resistance by Carey-Foster bridge.
4. Measurement of inductance using impedance at different frequencies.
5. Study of decay of currents in LR and RC circuits.
6. Response curve for LCR circuit and response frequency and quality factor.
7. Study of waveforms using cathode-ray oscilloscope.
8. Characteristics of a choke and Measurement of inductance.
9. Study of Lorentz force.
10. Study of discrete and continuous LC transmission line.
11. Elementary FORTRAN programs, Flowcharts and their interpretation.
18. To find the product of two matrices.
19. Numerical solution of equation of motion.
20. To find the roots of quadratic equation.

TEXT AND REFERENCE BOOKs:

1. B saraf et al Mechanical Systems(Vikas publishing House,New Delhi).
2. D.P. khandelwal, A Laboratory Manual of Physics for Undergraduate classes (Vani Publication House,New Delhi).
3. C G Lambe Elements of statistics (Longmans Green and Co London New York, Tprpnto).
4. C Dixon, Numerical analysis.
5. S Lipsdutz and A Poe, schaum's outline of theory and problems of programming with Fortran (MC Graw-Hill Book Company, Singapore 1986).

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)
NEW CURRICULUM OF B.Sc. PART I
Session 2019-20
CHEMISTRY

The new curriculam will comprise of three theory papers of 33, 33 and 34 marks each and practical work of 50 marks. The curriculam is to be completed in 180 working days as per the UGC norms & conforming to the directives of the Govt. of Chhattisgarh.The theory papers are of 60 hrs each duration and the practical work of 180 hrs duration.

PAPER I
INORGANIC CHEMISTRY

60Hrs. M.M.33

UNIT-I
A. ATOMIC STRUCTURE

Bohr's theory, its limitation and atomic spectrum of hydrogen atom. General idea of de-Broglie matter-waves, Heisenberg uncertainty principle, Schrödinger wave equation, significance of Ψ and Ψ^2, radial & angular wave functions and probability distribution curves, quantum numbers, Atomic orbital and shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's Multiplicity rule, electronic configuration of the elements.

B. PERIODIC PROPERTIES

Detailed discussion of the following periodic properties of the elements, with reference to s and p-block. Trends in periodic table and applications in predicting and explaining the chemical behavior.

   a) Atomic and ionic radii,
   b) Ionization enthalpy,
   c) Electron gain enthalpy,
   d) Electronegativity, Pauling's, Mulliken's, Allred Rochow's scales.
   e) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

UNIT-II

CHEMICAL BONDING I

Ionic bond: Ionic Solids - Ionic structures, radius ratio & co-ordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy Born- Haber cycle, Solvation energy and solubility of ionic solids, polarising power & polarisabilitry of ions, Fajans rule, Ionic character in covalent compounds: Bond moment and dipole moment, Percentage ionic character from dipole moment and electronegatiity difference, Metallic bond-free electron, Valence bond & band theories.

B.Sc.-I

UNIT-III

CHEMICALBONDING II

Covalent bond: Lewis structure, Valence bond theory and its limitations, Concept of hybridization, Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O, NH_3, PCl_3, PCl_5, SF_6. H_3O^+, SF_4, ClF_3, and ICl_2^- Molecular orbital theory. Bond order and bond strength, Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, F_2, CO, NO.

UNIT-IV
A. s-BLOCK ELEMENTS
General concepts on group relationships and gradation properties, Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals

B. p-BLOCK ELEMENTS

General concepts on group relationships and gradation properties. Halides, hydrides, oxides and oxyacids of Boron, Aluminum, Nitrogen and Phosphorus. Boranes, borazines, fullerenes, graphene and silicates, interhalogens and pseudohalogens.

UNIT-V

A CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure, bonding in xenon compounds

B. THEORETICAL PRINCIPLES IN QUALITATIVE ANALYSIS (H_2S SCHEME)
Basic principles involved in the analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.

REFERENCE BOOKS:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Puri, B. R., Sharma, L. R. and Kalia, K. C., Principles of Inorganic Chemistry, Milestone Publishers/ Vishal Publishing Co.; 33rd Edition 2016
7. Madan, R. D. Modern Inorganic Chemistry, S Chand Publishing, 1987.

B.Sc.-I

PAPER: II
ORGANIC CHEMISTRY

UNIT-I   BASICS OF ORGANIC CHEMISTRY

Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Electrophiles and Nucleophiles; Nucleophilicity and basicity; Homolytic and Heterolytic cleavage, Generation, shape and relative stability of Carbocations, Carbanions, Free radicals, Carbenes and Nitrenes. Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

UNIT-II   INTRODUCTION TO STEREOCHEMISTRY

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Diastereoisomers, meso compounds, Relative and absolute configuration: Fischer, Newmann and Sawhorse Projection formulae and their interconversions; Erythrose and threose, D/L, d/l system of nomenclature, Cahn-Ingold-Prelog system of nomenclature (C.I.P rules), R/S nomenclature. Geometrical isomerism: cis–trans, syn-anti and E/Z notations.

UNIT-III   CONFORMATIONAL ANALYSIS OF ALKANES

Conformational analysis of alkanes, ethane, butane, cyclohexane and sugars. Relative stability and Energy diagrams. Types of cycloalkanes and their relative stability, Baeyer strain theory: Theory of strainless rings, Chair, Boat and Twist boat conformation of cyclohexane with energy diagrams; Relative stability of mono-substituted cycloalkanes and disubstituted cyclohexane.

UNIT-IV   CHEMISTRY OF ALIPHATIC HYDROCARBONS

A. Carbon-Carbon sigma (σ) bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reaction, Free radical substitutions: Halogenation-relative reactivity and selectivity.

B. Carbon-Carbon Pi (л) bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

B.Sc.-I

Reactions of alkenes: Electrophilic additions and mechanisms (Markownikoff/Anti -Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-V   AROMATIC HYDROCARBONS

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.

REFERENCE BOOKS:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.
5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.
6. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
7. Organic Chemistry, Paula Y. Bruice, 2nd Edition, Prentice-Hall, International Edition (1998).
8. A Guide Book of Reaction Mechanism by Peter Sykes.

B.Sc.-I

PAPER - III
PHYSICAL CHEMISTRY   M.M.34

UNIT-I

MATHEMATICAL CONCEPTS FOR CHEMIST

Basic Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs, Properties of straight line, slope and intercept, Functions, Differentiation of functions, maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; Permutation and combination and probability theory, Significant figures and their applications.

UNIT-II

GASEOUS STATE CHEMISTRY

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path; Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Joule Thomson effect, Liquification of Gases.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor (Z), and its variation with pressure and temperature for different gases. Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

UNIT-III

A.   LIQUID STATE CHEMISTRY

Intermolecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension.

B.   COLLOIDS and SURFACE CHEMISTRY

Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotrophy, Application of colloids.

Physical adsorption, chemisorption, adsorption isotherms (Langmuir and Freundlich). Nature of adsorbed state. Qualitative discussion of BET.

B.Sc.-I

UNIT-IV

SOLID STATE CHEMISTRY

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Crystal defects.

UNIT-V

A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions.

Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of catalyst, Enzyme catatysed reactions, Micellar catatysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS:

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 10th Ed., Oxford University Press (2014).
2. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
4. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).
5. Engel, T. & Reid, P. Physical Chemistry 3rd Ed. Pearson (2013).
6. Puri, B.R., Sharma, L. R. and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co., 47th Ed. (2016).
7. Bahl, A., Bahl, B.S. and Tuli, G.D. Essentials of Physical Chemistry, S Chand Publishers (2010).
8. Rakshit P.C., Physical Chemistry, Sarat Book House Ed. (2014).
9. Singh B., Mathematics for Chemist, Pragati Publications.

B.Sc.-I

PAPER - IV
LABOBATORY COURSE

INORGANIC CHEMISTRY

A. Semi-micro qualitative analysis (using H_2S or other methods) of mixtures - not more than four ionic species (two anions and two cations, excluding interfering, insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Na^+

Anions : CO_3^{2-} , S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, NO_2^-, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}

(Spot tests may be carried out wherever feasible)

B. Acid-Base Titrations

- Standardization of sodium hydroxide by oxalic acid solution.
- Determination of strength of HCl solution using sodium hydroxide as intermediate.
- Estimation of carbonate and hydroxide present together in mixture.
- Estimation of carbonate and bicarbonate present together in a mixture.
- Estimation of free alkali present in different soaps/detergents

C. Redox Titrations

- Standardization of $KMnO_4$ by oxalic acid solution.
- Estimation of Fe(II) using standardized $KMnO_4$ solution.
- Estimation of oxalic acid and sodium oxalate in a given mixture.
- Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

D. Iodo / Iodimetric Titrations

- Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution iodimetrically.
- Estimation of (a) arsenite and (b) antimony iodimetrically.
- Estimation of available chlorine in bleaching powder iodometrically.
- Estimation of Copper and Iron in mixture by standard solution of $K_2Cr_2O_7$ using sodium thiosulphate solution as titrants.

ORGANIC CHEMISTRY

1. Demonstration of laboratory Glasswares and Equipments.
2. Calibration of the thermometer. 80º–82º (Naphthalene), 113.5º–114º (Acetanilide), 132.5º-133º (Urea), 100º (Distilled Water).)

3. Purification of organic compounds by crystallization using different solvents.
   - Phthalic acid from hot water (using fluted filter paper and stemless funnel).
   - Acetanilide from boiling water.
   - Naphthalene from ethanol.
   - Benzoic acid from water.

B.Sc.-I

4. Determination of the melting points of organic compounds.

   Naphthalene 80°–82°, Benzoic acid 121.5°–122°, Urea 132.5°–133° Succinic acid 184.5°–185°, Cinnamic acid 132.5°–133°, Salicylic acid 157.5°–158°, Acetanilide 113.5°–114°, m-Dinitrobenzene 90°, p-Dichlorobenzene 52°, Aspirin 135°.

5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.

   - Urea – Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1).

6. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method).

   - Ethanol 78°, Cyclohexane 81.4°, Toluene 110.6°, Benzene 80°.

   i. Distillation (Demonstration)

      - Simple distillation of ethanol-water mixture using water condenser.
      - Distillation of nitrobenzene and aniline using air condenser.

   ii. Sublimation

      - Camphor, Naphthalene, Phthalic acid and Succinic acid.

   iii. Decolorisation and crystallization using charcoal.

      - Decolorisation of brown sugar with animal charcoal using gravity filtrations crystallization and decolorisation of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo red using 1 g of decolorizing carbon) from ethanol.

7. Qualitative Analysis

   Detection of elements (N, S and halogens) and functional groups (Phenolic, Carboxylic, CarbonyI, Esters, Carbohydrates, Amines, Amides, Nitro and Anilide) in simple organic compounds.

PHYSICAL CHEMISTRY

1. Surface tension measurements.

   - Determine the surface tension by (i) drop number (ii) drop weight method.
   - Surface tension composition curve for a binary liquid mixture.

2. Viscosity measurement using Ostwald's viscometer.

   - Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature.

B.Sc.-I

- Study of the variation of viscosity of sucrose solution with the concentration of solute.
- Viscosity Composition curve for a binary liquid mixture.

3. Chemical Kinetics
   - To determine the specific rate of hydrolysis of methyl/ethyl acetate catalysed by hydrogen ions at room temperature.
   - To study the effect of acid strength on the hydrolysis of an ester.
   - To compare the strengths of HCl & H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

4. Colloids
   - To prepare colloidal solution of silver nanoparticles (reduction method) and other metal nanoparticles using capping agents.

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

B.Sc.-I

PRACTICAL EXAMINATION

05 Hrs. M.M. 50

Three experiments are to be performed

1. Inorganic Mixture Analysis, four radicals two basic & two acid (excluding insoluble, Interfering & combination of acid radicals) OR Two Titrations (Acid-Bases,Redox and Iodo/Iodimetry)
   12 marks
2. Detection of functional group in the given organic compound and determine its MPt/BPt.
   8 marks

   O R

   Crystallization of any one compound as given in the prospectus along with the Determination of mixed MPt.
   O R

   Decolorisation of brown sugar along with sublimation of camphor/ Naphthlene.
3. Any one physical experiment that can be completed in two hours including calculations.
   14 marks
4. Viva **10 marks**
5. Sessionals **06 marks**

In case of Ex-Students two marks will be added to each of the experiments

REFERENCE TEXT:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Ahluwalia, V. K., Dhingra, S. and Gulati, A. College practical Chemistry, University Press.
3. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
4. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
6. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
7. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

B.Sc.-I

Hemchand Yadav Vishwavidyala, Durg (C.G.)
Zoology
B.Sc. Part I (2019-20)
Paper I
(Cell Biology and Non-chordata)

Unit:I

1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear
   Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit:II

1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit:III

- General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.
2. Protozoa: Type study - Paramecium,
2. Porifera: Type study - Sycon.
3. Coelenterata: Type study - Obelia
   .

Unit: IV

- General characters and classification of Phylum Platyhelminthes, Nemathelminthes, Annelida and Arthropoda up to order.
2. Platyhelminthes and Nemathelminthes: Type Study – Fasciola, Ascaris
3. Annelida: Type Study - Pheretima.
4. Arthropoda: Type Study - Palaemone.

Unit:V

- General characters and classification of Phylum Mollusca and Echinodermata up to order.
2. Mollusca: Type Study - Pila.
3. Echinodermata- Type Study- Asterias (Starfish).

Zoology
B.Sc. Part I (2019-20)
Paper II
(Chordata and Embryology)

Unit:I

1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

Unit-II

1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit-:III

1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV

1. **Fertilization**
2. Gametogenesis, Structure of gamete and Typesof eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V

1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

Zoology
B.Sc. Part I (2019-20)
Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-
- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)
- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam	Time: 3hrs
1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Excersice based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

B.Sc.– I (BOTANY) PAPER-I

BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

UNIT-I

VIRUSES: General characteristics, types of viruses based on structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle. Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages. Mycorrhiza-Types and Significance.

UNIT –II

BACTERIA: General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and Gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, *Rhizobium, Azatobactor, Anabena.*

UNIT-III

FUNGI: General account of habit and habitat, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi. Heterothallism and Parasexuality. Outlines of classification of fungi. Economic importance of fungi. Life cycles of *Saprolegnia, Albugo,, Aspergillus, Peziza, Agaricus, Ustilago, Puccinia, Alternaria and Cercospora.* VAM Fungi

UNIT-IV

ALGAE: Algae: General characters, range of thallus organization, Gaidukov phenomenon, reproduction, life cycle patterns and economic importance.Classification, Systematic position, occurrence, structure and life cycle of following genera : *Nostoc, Gloeocaspsa, Volvox,, Oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia.*

UNIT –V

Lichens- General account, types, structure, nutrition, reproduction and economic importance. Mycoplasma: Structure and importance. Blue Green Algae (BGA) in nitrogen economy of soil and reclamation of Ushar land.Mushroom Biotechnology

Books Recommended:

Dubey R.C. and Maheshwari D.K. *A text book of Microbiology,* S. Chand Publishing, New Delhi

Presscott, L. Harley, J.and Klein, D. *Microbiology*, 7th edition, Tata Mc Graw-Hill Co.New Delhi.

Sharma P.D., *Microbiology and Plant pathology,* Rastogi Publication. New Delhi.

Alexopolous, C.J. Mims, C.W. and Blackwell, MM. *Introduction to Mycology,* John Wiley & Sons.

Dubey H.C. *An Introduction to Fungi,* Vikas Publishing, New Delhi

Mehrotra R.S. & Agrawal A., *Plant Pathology,* Tata McGraw, New Delhi

Sharma P.D. *Plant Pathology*, Rastogi Publishers, Meruth.

Sristava, H.N. *Fungi*, Pradeep Publications, Jalandhar

Webster, J. & Weber, R. *Introduction to Fungi*, Cambridge University Press, Cambridge

Kumar H.D. *Introduction to phycology*, Aff. East-west Press, New Delhi

Lee RE, *Phycology*, Cambridge University Press U.K.

Srivastava, H.N., *Algae*, Pradeep Publications, Jalandhar

Pandey S.K. Quick *Concept of Botany*, Lambert Academic publishing, Germany

Pandey S.N., Mishra S,P. & Trivedi P.S. *A Text Book of Botany* (Vol.-I), Vikas Publishing, New Delhi

Singh, Pandey and Jain, *A Text book of Botany,* Rastogi Publication, Meerut.

(Dr. J.N. Verma)

Proff. & Head

Govt. D.B. Girls PG College

Raipur, (C.G.)

(Dr. Rekha Pimpalgaonkar)

Proff. & Head

Govt. N PG Science College

Raipur, (C.G.)

(Dr.Ranjana Shristava)

Proff. & Head

Govt. VYTPG Science College

Raipur, (C.G.)

(Mrs. Sanchal Moghe)

Govt. Bilasa Girls College, Bilaspur

(Mr. Shivakant Mishra)

(Mr Sudheer Tiwari)

B.Sc.-I (BOTANY) PAPER –II

(BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY)

UNIT –I

BRYOPHYTA: General characteristics, affinities, range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in *Riccia, Marchantia, Pellia, Anthoceros, Funaria.* Vegetative reproduction in Bryophytes, Evolution of sporophytes.

UNIT-II

PTERIDOPHYTES: General characteristics, affinities, economic importance and classification, Heterospory and seed habit, stellar system in Pteridophytes, Aposory and apogamy, Telome theory, *Azolla* as Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of *Psilotum, Lycopodium, selaginella, Equisetum, Marsilea.*

UNIT-IV

Gymnosperm: General characteristics, affinities, economic importance and classification, Morphology, anatomy and reproduction in *Cycas, Pinus* and *Ephedra.*

UNIT-V

PALAEOBOTANY: Geological time scale, types of fossils and fossilization, Rhynia, study of some fossil gymnosperms. *Lygenopteris*

Books Recommended:

Parihar, N.S. *The Biology and Morphology of Pteridophytes,* Central Book Depot, Allahabad.

Parihar,N.S. *An introduction to Bryophyta Vol.I:Bryophytes* Central Book Depot, Allahabad.

Sambamurty,AVSS, *A textbook of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany*, IK International Publishers.

Pandey SN, Mishra SP and Trivedi PS *A text Book of Botany (Vol.II)*, Vikas Publishing, New Delhi

Bhatanagar, SP and Moitra, A. *Gymnosperm*, New Age International (P) Ltd., Publishers, New Delhi

Biswas C. and Johri BM, *The Gymnosperms*, Springer-Verlag, Germany.

Srivastava, HN, *Palaeobotany*, Pradeep Publications Jalandhar

Srivastava, HN, Bryophyta, Pradeep Publications Jalandhar

Singh, Pandey and Jain, *A Text Book of Botany*, Rastogi Publication, Meerut

Sristava, HN, *Fundamentals of Pteridophytes,* Pradeep Publications, Jalandhar

B.Sc. I (BOTANY)

PRACTICAL

Study of external (Morphorgical) and internal (microscopic/anatomical) features of representative gerera given in the theory.
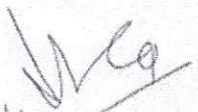
1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachosperrmum
2. Gram staining
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria
5. Pteridophyta: Lycopodium, Selaginella, Equsetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Epherda.

PRACTICAL SCHEME

TIME: 4 Hrs.   **M.M. : 50**

1.	Algae/Fungi/Gram Staining	10
2.	Bryophyta/Pteridophyta	10
3.	Gymnosperm	10
4.	Spotting	10
5.	Viva-Voce	05
6.	Sessional	05
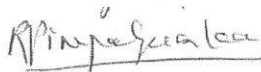
(Dr. J.N. Verma)   (Dr. Rekha Pimpalgaonkar)   (Dr.Ranjana Shristava)

Proff. & Head   Proff. & Head   Proff. & Head

Govt. D.B. Girls PG College   Govt. N PG Science College   Govt. VYTPG Science College
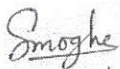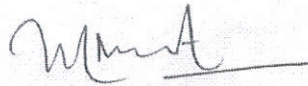
Raipur, (C.G.)   Raipur, (C.G.)   Raipur, (C.G.)
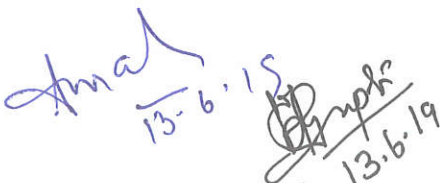
(Mrs. Sanchal Moghe)   (Mr. Shivakant Mishra)   (Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-I
MATHEMATICS
PAPER - I
ALGEBRA AND TRIGONOMETRY

UNIT-I   Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigenvalues, eigenvectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.

UNIT-II   Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations. Theorems on consistency of a system of linear equations. Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardons method), Biquadratic equation.

UNIT-III   Mappings, Equivalence relations and partitions. Congruence modulo n. Definition of a group with examples and simple properties. Subgroups, generation of groups, cyclic groups, coset decomposition, Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Normal subgroups. Quotient group, Permutation groups. Even and odd permutations. The alternating groups An. Cayley's theorem.

UNIT-IV   Homomorphism and Isomorphism of groups. The fundamental theorems of homomorphism. Introduction, properties and examples of rings, Subrings, Integral domain and fields Characteristic of a ring and Field.

TRIGONOMETRY :

UNIT-V   De-Moivre's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrical functions. Gregory's series. Summation of series.

TEXT BOOK :

1. I.N. Herstein, Topies in Algebra, Wiley Eastern Ltd., New Delhi, 1975
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd.New Delhi, 2000.
3. Chandrika Prasad, Text-Book on Algebra and Theory of equations, Pothishala Private Ltd., Allahabad.
4. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.

REFERENCES :

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, First Course in linear Algebra, Wiley Eastern, New Delhi, 1983.
2. P.B. Bhattacharya, S.K.Jain and S.R. Nagpaul, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
3. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
4. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
5. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala Pvt. Ltd., Allahabad.

B.Sc. Part-I
MATHEMATICS
PAPER - II
CALCULUS

DIFFERENTIAL CALCULUS :

UNIT-I $\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuties. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

UNIT-II   Asymptotes. Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in cartesian and polar coordinates.

INTEGRAL CALCULUS:

UNIT-III   Integration of transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

ORDINARY DIFFERENTIAL EQUATIONS :

UNIT-IV   Degree and order of a differential equation. Equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.

UNIT-V   Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.

TEXT BOOK :

1. Gorakh Prasad, Differential Calculaus, Pothishala Private Ltd. Allahabad.

2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd. Allahabad.

3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.

2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co. New York.

3. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.

4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.

5. G.F. Simmons, Differential Equations, Tata Mc Graw Hill, 1972.

6. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentics Hall of India, 1961.

7. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishe & Distributors, Dehli, 1985.

8. W.E. Boyce and P.O. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.

12. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley and Sons, 1999.

B.Sc. Part-I
MATHEMATICS
PAPER - III
VECTOR ANALYSIS AND GEOMETRY

VECTOR ANALYSIS :

UNIT-I   Scalar and vector product of three vectors. Product of four vectors. Reciprocal Vectors. Vector differentiation. Gradient, divergence and curl.

UNIT-II   Vector integration. Theorems of Gauss, Green, Stokes and problems based on these.

UNIT-III   General equation of second degree. Tracing of conics. System of conics. Confocal conics. Polar equation of a conic.

UNIT-IV   Sphere. Cone. Cylinder.

UNIT-V   Central Conicoids. Paraboloids. Plane sections of conicoids. Generating lines. Confocal Conicoids. Reduction of second degree equations.

TEXT BOOKS :

1.   N. Saran and S.N. Nigam, Introduction to vector Analysis, Pothishala Pvt. Ltd. Allahabad.

2.   Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.

3.   R.J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Machmillan India Ltd. 1994.

REFERENCES :

1.   Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.

2.   Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.

3.   Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.

4.   Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co., New Delhi.

5.   S.L. Loney, The Elements of Coordinate Geometry, Macmillan and Company, london.

6.   P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd., 1994.

7.   P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wiley Eastern Ltd., 1999.

8.   N. Saran and R.S. Gupta, Analytical Geometry of three Dimensions, Pothishala Pvt. Ltd. Allahabad.

MICROBIOLOGY

BSc-1ˢᵗ

Paper- I: General Microbiology & Basic Technique

UNIT-1: Fundamental, History & Developments

Introduction to major groups of microorganisms and fields of Microbiology; Historical development, Contributions of Pioneers (Louis Pasteur, Edward Jenner, Anton Von Leewenhoeck and Alexander Flemming). Beneficial and harmful microbes and its role in daily life.

UNIT-2: Basic Microbial Techniques

Methods of studying microorganism; Sterilization Techniques (Physical & Chemical Sterilization). Pure culture isolation Technique: Streaking,Waksman serial dilution and plating methods. cultivation, maintenance and preservation of pure cultures. Culture media & conditions for microbial growth. Staining technique: simple staining, Differential (gram staining), negative staining and acid fast staining.

UNIT-3: Virology & Bacteriology

Diversity of microbial world; Principle and classification of Viruses and Bacteria. Structure, Multiplication and Economic importance of viruses (TMV, Influenza virus & T_4-Phage). Structure & Functional organization of Bacteria, Cell wall of Gram Positive & Gram Negative bacteria; Economic importance of Bacteria.

UNIT-4: Mycology

General characteristics and classification of Fungi; Structure and Reproduction of fungi (*Rhizopus, Penicillium, Aspergillus, Yeast & Agaricus*). Common fungal disease of crops (Late & Early blight of potato, Smut of Rice, Tikka and Red rot of Sugarcane). Structure, reproduction and economic aspect of Lichens.

UNIT-5: Phycology & Protozoology

General characteristics and classification of Algae and Protozoa; General account & economic importance of Cyanobacteria (*Microcystis, Ocillitoria, Nostoc & Anabaena)* and Protozoa *(Amoeba, Paramoecium, Euglena and plasmodium).*

Oscillatoria

Text Books Recommended:

1. General microbiology; Vol I & II, Powar C. B. and Daginawala H. I., Himalaypub.house, Bombay.
2. A textbook of Microbiology; Dubey &Maheshwari.
3. Microbiology: An Introduction; G. Tor tora, B. Funke, C. Benjamin Cummings.
4. General Microbiology; Seventh edition by Hans G Schlegel, CambridgeUniversity Press.
5. Practical Microbiology; Dubey and Maheshwari.
6. Handbook of Microbiology; Bisen P.S., Varma K., CBS Publishers and Distributors, Delhi. GeneralMicrobiology by Brock.
7. General Microbiology by Pelzar et al.
8. Introduction on Microbial Techniques by Gunasekaran.

Paper- II: Biochemistry and Physiology

UNIT-1: CARBOHYDRATES AND PROTEINS

Structure, classification and properties of Carbohydrates – Monosaccharide, Oligosaccharides (Disaccharides) and Polysaccharides. Structure, classification and properties of Protein - Amino acids, peptides and Proteins (Primary, Secondary, Tertiary and Quaternary structure).

UNIT-2: LIPIDS AND NUCLEIC ACIDS

Structure, classification and properties of Lipids; Saturated and Unsaturated fatty acids. Structure and properties of Nucleotides. Structure and forms of DNA; Replication of DNA. Types, Structure and Function of RNA.

UNIT-3: ENZYMES

Structure, Nomenclature, Classification and Properties of Enzymes. Mechanism of enzyme action, Enzyme kinetic: Michaelis-Menten. Equation & derivation, Enzyme inhibition, Lineweaver-Burk Plot (LB plot). Co-enzymes and their role; Allosteric enzymes and Isoenzyme. Extracellular enzymes and their role.

UNIT-4: MICROBIAL METABOLISM

Bacterial photosynthesis and Chemosynthesis: Glycolysis, TCA cycle and Oxidative Phosphorylation. Anaerobic catabolism of glucose; Fat Biosynthesis,alpha and beta oxidation of fatty acids. Deamination, trasns-amination and Urea cycle.

UNIT-5: GROWTH PHYSIOLOGY & TRANSPORT SYSTEM

Bacterial cell division, Genome replication and Growth Phases, Conditions for growth. Plasma membrane & Transport system, types of transport (Passive and active). Diffusion (simple & facilitated), Concept of Uniport, Antiport and Symport;

Text Books Recommended:

1. General Biochemistry by A.C. Deb.
2. Biochemistry by Lehninger (Kalyani publication)
3. Biochemistry by U. Satyanarayan.
4. Microbiology by Anantanarayan and Panikar.
5. Fundamentals of Biochemistry; J L Jain, Sunjay Jain, Nitin Jain; S. Chand & Company Ltd
6. Practical Biochemistry: Principles and Techniques; *5th Edition*; Keith Wilson and John Walker
7. Biophysical Biochemistry: Principles and Techniques; AvinashUpadhyay, KakoliUpadhyay and Nirmalendu Nath; Himalaya Publishing House.

PRACTICAL

M. M. 50

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Basic information about autoclave, hot air oven, laminar air flow and other laboratory instruments
Preparation of solid/liquid culture media.
Isolation of single colonies on solid media.
Enumeration of bacterial numbers by serial dilution and plating.
Simple and differential staining.
Measurement of microorganism (micrometry) and camera Lucida drawing of isolated organism.
Determination of bacterial growth by optical density measurement.
General and specific qualitative test for carbohydrates
General and specific qualitative test for amino acids
General and specific qualitative test for lipids
Estimation of protein
Estimation of blood glucose
Assay of the activity of amylases
Assay of the activity of Phosphates

Scheme of Practical Examination

Time - 4 hours   M.M. 50

1. Exercise on Microbiological methods	10
2. Exercise on Biochemical tests	10
3. Exercise on staining method	05
4. Spotting (1-5)	10
5. Viva-Voce	05
6. Sessional	10

Total 50

- - - - - - - - -

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)

Scheme of Examination
B.Sc. Part-01 Geology

कक्षा	प्रश्नपत्र	विषय समूह	सैद्धा. अंक	प्रायो. अंक	योग
BSc. I year	I	भूगतिकी एवं भू–आकृति विज्ञान (Geodynamics & Geomorphology)	50	50	150
	II	खनिज एवं क्रिस्टल विज्ञान (Mineralogy & Crystallography)	50		
BSc. II year	I	शैलिकी (Petrology)	50	50	150
	II	संरचनात्मक भूविज्ञान (Structural Geology)	50		
BSc. III year	I	जीवाश्म विज्ञान एवं संस्तर विज्ञान (Palaeontology & Stratigraphy)	50	50	150
	II	भूसंसाधन एवं व्यावहारिक भूविज्ञान (Earth Resources & Applied Geology)	50		

-: Note :-

प्रत्येक वर्ष के विद्यार्थियों हेतु पाठ्यक्रम में उल्लेखित भूवैज्ञानिक क्षेत्रीय अध्ययन अनिवार्य होगा।

भूगतिकी एवं भूआकृति विज्ञान
(Geodynamics & Geomorphology)

इकाई– 01	(i) भूविज्ञान एवं परिप्रेक्ष्य; सौरमण्डल में सूर्य की स्थिति ; परिमाण, आकार, संहति, घनत्व।
	(ii) पृथ्वी की उत्पत्ति
	(iii) पृथ्वी की आंतरिक संरचना, भूपर्पटी, प्रवार एवं क्रोड
	(iv) पृथ्वी की आयुः निर्धारण की विधियाँ, रेडियोधर्मी विधि
	(v) वायुमण्डल, जलमण्डल एवं जैवमण्डल का निर्माण एवं संगठन
इकाई– 02	(i) प्लेटविवर्तनिकी का प्रारंभिक अध्ययन
	(ii) महाद्वीपीय विस्थापन की अवधारणायें एवं सिद्धान्त
	(iii) समस्थैतिकी की अवधारणायें एवं सिद्धान्त
	(iv) समुद्रतल विस्तारण का साक्ष्य
	(v) समुद्र, महाद्वीप एवं पर्वतों की उत्पत्ति
इकाई– 03	(i) भूकम्पः भूकम्प की पट्टियाँ, भूकम्प की तीव्रता
	(ii) ज्वालामुखीः प्रकार एवं वितरण
	(iii) अंतः समुद्रीपर्वतों, चापाकार द्वीपमालाओं एवं खाइयों का उद्भव, वितरण एवं महत्व
	(iv) महाद्वीपीय तटीय क्षेत्रों की विवर्तनिकी : सक्रिय तट एवं सीमांतीय द्रोणियाँ
	(v) नवविवर्तनिकी : सक्रियभ्रंश, अपवाह परिवर्तन
इकाई– 04	(i) भूआकृति विज्ञान की मूलभूत धारणायें
	(ii) भूआकृतिक कारक एवं शैल अपक्षय की प्रक्रियायें,
	(iii) नदी के भूवैज्ञानिक कार्य एवं नदीय भूआकृतियाँ
	(iv) वायु के भूवैज्ञानिक कार्य एवं वायुजनित भूआकृतियाँ
	(v) हिमनदों के भूवैज्ञानिक कार्य एवं हिमनदजनित भूआकृतियाँ
इकाई– 05	(i) समुद्र के भूवैज्ञानिक कार्य एवं तटीय भूआकृतियाँ
	(ii) भूमिगत जल के भूवैज्ञानिक कार्य एवं कार्स्टस्थलाकृति
	(iii) ज्वालामुखीय भूआकृतियाँ
	(iv) पृथ्वी का उष्मा बजट एवं वैश्विक जलवायु परिवर्तन
	(v) भारत का भूआकृतिक विभाजन

प्रायोगिक कार्य –

(1) भूआकृतिक संरचनाओं को प्रदर्शित करने वाले प्रादर्शों का अध्ययन

(2) स्थलाकृतिक मानचित्रों का अध्ययन एवं विभिन्न पैमानों पर सूचक–निर्धारण की जानकारियाँ

(3) भूआकृतिक–मानचित्रों में विभिन्न भूआकृतियों एवं प्रवाह प्रणालियों का अध्ययन

(4) भारत के रेखित–मानचित्र में मुख्य पर्वतों, झीलों एवं नदियों को अंकित करना

(5) भारत के रेखित मानचित्र में भूकम्प प्रेक्षणालयों को अंकित करना

(6) भारतीय महाद्वीपों में आये भूकम्पों के अधिकेन्द्र एवं तीव्रता को मानचित्र में अंकित करना।

(7) आकारिमितिक विश्लेषण

Suggested Readings:-

भौतिक–भूविज्ञान	–	डॉ. मुकुल घोष–
भौतिक–भूविज्ञान	–	जे.पी. तिवारी एव बी.के. सिंह–
भूआकृति–विज्ञान	–	डॉ. सविन्द्र सिंह
भूविज्ञान एक परिचय	–	डॉ. विद्यासागर दुबे
Physical Geology	-	Miller
Principles of physical geology	-	A. Holmes
An introduction to physical geology-		A.K. Dutta
Principles of Geomorphology	-	W.D. Thornbury
Principles of Geomorphology	-	A.F. Ahmed

Unit:1	(i)	Geology & it perspectives. Earth in the solar system; size, shape, mass & density.
	(ii)	Origin of Earth.
	(iii)	Internal structure of Earth, Crust, Mantle and Core.
	(iv)	Age of Earth: with special emphasis on Radioactive dating.
	(v)	Formation & composition of Hydrosphere, Biosphere & Atmosphere.
Unit:2	(i)	Elementary idea about Plate-Tectonics.
	(ii)	Concept & theories of continental-drift
	(iii)	Concept & theories of Isostasy.
	(iv)	Evidences of Sea-floor spreading.
	(v)	Origin of oceans, continents & mountains.
Unit:3	(i)	Earthquakes, Earthquake Belts, measurement of Earthquakes.
	(ii)	Volcanoes: Types & distribution.
	(iii)	Mid –oceanic- ridges, trenches & island arc; origin, distribution & importance.
	(iv)	Tectonics of continental margins; Active margins & marginal basins.
	(v)	Neo-tectonics; active faults, drainage changes.
Unit:4	(i)	Fundamental concepts of Geomorphology.
	(ii)	Geomorphic agents & processes of rock-weathering.
	(iii)	Geological work of rivers; fluvial landforms.
	(iv)	Geological work of wind; Aeolian landforms.
	(v)	Geological work of Glaciers; glacial landforms.
Unit:5	(i)	Geological work of oceans; coastal landforms.
	(ii)	Geological work of Ground water. Karst topography.
	(iii)	Volcanic landforms.
	(iv)	Earth's heat budget & global climatic changes.
	(vi)	Physiographic divisions of India.

PRACTICALS:

     (1)   Study of models showing various Geomorphic features.

     (2)   Numbering, Indexing of topographic maps on various scales.

     (3)   Interpretation of various Geomorphic landforms & drainage pattern on topographic maps.

     (4)   Plotting of major mountain Ranges, Lakes & rivers on outline map of India.

     (5)   Plotting of seismic observatories on outline map of India.

     (6)   Plotting of epicenters & magnitude of major earthquakes of Indian subcontinent.

     (7)   Morphometric analysis.

Suggested Readings:-

भौतिक–भूविज्ञान	–	डॉ. मुकुल घोष–
भौतिक–भूविज्ञान	–	जे.पी. तिवारी एव ंबी.के. सिंह
भूआकृति–विज्ञान	–	डॉ. सविन्द्र सिंह
भूविज्ञान एक परिचय	–	डॉ. विद्यासागर दुबे
Physical Geology	-	Miller
Principles of physical geology	-	A. Holmes
An introduction to physical geology-		A.K. Dutta
Principles of Geomorphology	-	W.D. Thornbury
Principles of Geomorphology	-	A.F. Ahmed

इकाई– 01   (i)   खनिज एवं क्रिस्टल की परिभाषा।

           (ii)   क्रिस्टल संरचना एवं यूनिट सेल।

           (iii)   क्रिस्टल के तत्व, क्रिस्टल रूप।

           (iv)   क्रिस्टलीय अक्ष एवं अक्षीय कोण।

           (v)   क्रिस्टल नोटेशन, अन्तःखण्डीय अनुपात एवं सूचकांक

इकाई– 02   (i)   क्रिस्टल विज्ञान के नियम।

           (ii)   क्रिस्टलीय सममिति।

           (iii)   क्रिस्टलों का वर्गीकरण। क्रिस्टल समुदायों के सामान्यवर्ग की सममिति।

           (iv)   सामान्य वर्ग के रूप।

           (v)   क्रिस्टलों में यमलन।

इकाई– 03   (i)   प्रकाश की प्रकृति, प्रकाश का परावर्तन एवं अपवर्तन।

           (ii)   अपवर्तनांक, क्रांतिक कोण, पूर्ण आंतरिक परावर्तन एवं बेके प्रभाव।

           (iii)   द्वि–अपवर्तन, निकॉल प्रिज्म की रचना एवं कार्य प्रणाली।

           (iv)   ध्रुवण सूक्ष्मदर्शी : अवयव एवं कार्यप्रणाली।

           (v)   खनिजों के प्रकाशीय गुण।

इकाई– 04   (i)   सिलिकेट संरचनाएं

           (ii)   खनिजों में बंध।

           (iii)   समाकृतिकता, बहुरूपता एवं कूटरूपता।

           (iv)   ठोस–विलयन

           (v)   खनिजों के भौतिक गुण।

इकाई– 05   निम्नलिखित खनिज समूहों के संगठन, भौतिक एवं प्रकाशकीय गुणों का अध्ययन–

           (i)   ऑलिवीन्, गार्नेट एवं अभ्रक समूह।

           (ii)   पायरॉक्सीन।

           (iii)   एम्फीबोल।

           (iv)   फेल्सपार।

           (v)   सिलिका।

प्रायोगिक कार्य–

(1) क्रिस्टल मॉडल में सममिति तत्वों का अध्ययन।

(2) सातों क्रिस्टल समुदायों की सामान्य वर्ग की मूल आकृतियों का अध्ययन।

(3) यूलर प्रमेय का सत्यापन।

(4) प्रमुख शैलकर खनिजों का स्थूलदर्शी अध्ययन।

(5) ध्रुवण–सूक्ष्मदर्शी की सहायता से प्रमुख शैलकर खनिजों के प्रकाशीय गुणों का अध्ययन।

(6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Unit:1
 (i) Definition of Mineral and Crystal.

   (ii) Crystal structures, Unit cells

   (iii) Elements of crystal. Crystal forms.

   (iv) Crystallographic axes and axial angles.

   (v) Parameters and indices of crystal notation

Unit:2
 (i) Laws of Crystallography

   (ii) Crystal symmetry

   (iii) Classification and symmetry of normal classes of seven crystal systems

   (iv) Forms of normal classes.

   (v) Twinning in crystals

Unit:3
 (i) Nature of light : reflection and refraction of light.

   (ii) Refractive index. Critical angle. Total internal reflection and Becke effect.

   (iii) Double refraction. Nicol prism, it's construction and working.

   (iv) Polarizing Microscope- its parts & functions.

   (v) Optical properties of minerals.

Unit:4
 (i) Silicate structures.

   (ii) Bonding in Minerals.

   (iii) Isomorphism. Polymorphism and Pseudomorphism.

   (iv) Solid solution

   (v) Physical properties of minerals

Unit:5 Study of Composition, physical and optical properties of the following Mineral groups:

   (i) Olivine, Garnet and Mica groups.

   (ii) Pyroxenes

   (iii) Amphiboles

   (iv) Feldspars

   (v) Silica

PRACTICALS-

(1)   Study of symmetry elements in crystal models.

(2)   Study of fundamental forms of normal classes of all seven crystal systems.

(3)   Verification of Euler's theorem.

(4)   Study of physical properties of rock forming minerals.

(5)   Study of the optical properties of important rock forming minerals using polarizing Microscope.

(6)   Geological excursion for seven days.

Suggested Readings:

Rutley's elements of Mineralogy	:	Read, H.H.
Dana's text book of Mineralogy	:	Ford W.E.
खनिज तथा क्रिस्टल विज्ञान	–	डॉ. बी. सी. जैश
खनिज विज्ञान के सिद्धांत	–	डॉ. ए. पी. अग्रवाल
प्रायोगिक भू–विज्ञान (भाग–1)	–	डॉ. र. प्र. मांजरेकर
प्रकाशीय खनिज विज्ञान के मूल तत्व	–	विंचेल

B.A./B.Sc. – First Year

Session : 2019-20

Name of the Subject   :-   Anthropology

Paper   : -   First

Name of the Paper   :-   FOUNDATION   OF ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT – I   Meaning and scope of Anthropology. History of Anthropology. Branches of Anthropology -
  (a) Socio-cultural Anthropology
  (b) Physical Biological Anthropology
  (c) Archaeological Anthropology
  (d) Linguistic Anthropology

UNIT – II   Relationship of Anthropology with other disciplines: Life Sciences, Medical Sciences, Social Sciences: History, Economics, Sociology, Psychology, Political Science

UNIT – III   Foundation in Biological Anthropology

  (a) Human Evolution with respect to Hominid fossils
  (b) Human Variation: Types and causes
  (c) Human Genetics: Concept, scope and branches
  (d) Human growth and development: Definition, scope, methods and factors effecting human growth and development

UNIT – IV   Fundamentals in Social-Cultural Anthropology.
  (a) Culture, Society, Community, Group, Institution
  (b) Human Institution:-
        Family: Definiton, types and function of family
        Marriage: Definition, forms of marriage and its functions
        Kinship: Definition, types and functions
        Religion: Theories on the origin of religion
  (c) Basic techniques of data collection :
        Observation , Schedule, Questionnaire, Geneology

UNIT – V   Fundamentals in Archaeological Anthropology.
  (a) Tool typology & Technology: Paleolithic, Mesolithic & Neolithic
  (b) Cultural evolution: Broad outlines of cultures (Stone age to metal age)
  (c) Dating techniques in archaeology

20|06|19

B.A. /B.Sc. – First Year
Session: 2019-20

Name of the Subject   :-   Anthropology

Paper   : -   Second

Name of the Paper   :-   PHYSICAL/ BIOLOGICAL ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT – I   Meaning, scope, History of Physical Anthropology & its applied aspects
Theories of organic evolution: Lamarckism, Neo-lamarckism, Darwinism, Neo-darwinism & Synthetic theory of evolution

UNIT – II   Position of Man in animal kingdom, Classification of living primates, Comparative anatomy of Man and Apes (with special reference to skull, pelvis, dentition and long bones)

UNIT – III   Fossil evidence of human evolution: Ramapithecus, Australopithecus, Pithecanthropus, Sinanthropus, Neanderthal, Cromagnon, Grimaldi man, Chancelade man.

UNIT – IV   Concept of Race: Race formation and Criteria of racial classification, UNESCO Statement, Racial element in India, Major races of the world.

UNIT – V   Human Genetics:

      a.   Structure of Chromosome, DNA & RNA

      b.   Mendelian principle.

      c.   Types of Inheritance in Human

20/06/19

B.A./B.Sc. – First Year
Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Practical

Name of the Paper   :-   OSTEOLOGY AND CRANIOMETRY

Total Marks : 50   Pass Marks : 17

I.   Identification of bones of human Skeleton. Sketching and labeling of various normas of skull, Overview of Pectoral & Pelvic girdles, Femur & Humerus bone

II.   Craniometry :-
   1. Maximum Cranial length.
   2. Maximum Cranial Breadth.
   3. Maximum frontal Breadth.
   4. Bizygomatic Breadth.
   5. Nasal Height.
   6. Nasal Breadth
   7. Minimum frontal breadth
   8. Bimaxillary Breadth.
   9. Maximum Biorbital Breadth
   10. Length of magnum foramen.

III. Craniometric indices :
   1.   Cranial Index
   2.   Nasal Index

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)
Syllabus for B.A. / B.Sc. Course, 2019-20
Subject: Statistics

Each year of B.A. /B.Sc. I, II, III shall have two theories and one practical course. All the Theory as well as Practical Examinations will be of 3 hours duration. In each practical examination 10% marks shall be fixed for viva –voce and 20% marks for practical record.

Scheme of Examination

		Title of the paper	MAX. Marks
B.A./B.Sc. I	**Paper-I** (Code No. 0803)**: Probability I**		50
	Paper-II (Code No. 0804)**: Descriptive Statistics I**		50
	Paper III: Practical- Based on Theory Papers I & II		50
		Total	**150**
B.A./B.Sc. II	**Paper-I** (Code No. 0853)**: Statistical Methods**		50
	Paper-II (Code No. 0854)**: Sampling Theory and**		50
	Design of Experiments		
	Paper III: Practical- Based on Theory Papers I & II		50
		Total	**150**
B.A./B.Sc. III	**Paper I** (Code No. 0907)**: Applied Statistics**		50
	Paper II (Code No. 0908): **Statistical Quality Control**		50
	and Computational Techniques		
	Paper III: Practical- Based on Theory Papers I & II		50
		Total	**150**

B.A. /B.Sc. –I
Subject-Statistics
Paper – I (Paper Code-0803)
PROBABILITY THEORY

Unit-I

Important concepts in probability: Random experiment: trial, sample point and sample space, event, Operations of events, concepts of mutually exclusive and exhaustive events. Definition of probability: classical and relative frequency approach. Richard Von Misses, Cramer and Kolmogrove approachesto probability, merits and demerits to these approaches, any general idea to be given. Discrete probability space, Properties of probability based on axiomatic approaches, Independence of events, Conditional probability, total and compound probability rules, Baye's theorem and its applications.

Unit-II

Random variables: Definition of discrete random variable (rv); probability mass function (pmf) and cumulative distribution function (cdf). Joint pmf of several discrete rvs. Marginal and conditional pmfs. Independence of rvs. Idea of continuous random variables, probability density function, illustration of random variables and its properties. Expectation of a random variable and its properties -moments, measures of location and dispersion, skewness and kurtosis, Moment generating function, raw and central moments, Probability generating function (pgf) and, their properties and uses.

Unit-III

Standard univariate discrete distributions: degenerate, discrete uniform, hypergeometric, Poisson, geometric and negative binomial distributions. Marginal and conditional distributions, Distributions of functions of discrete rvs, reproductive property of standard distributions.

Unit-IV

Univariate continuous distributions and their properties: Uniform, Beta, Gamma, Exponential, Normal, Cauchy, Lognormal. Moment generating function (mgf) : its properties and applications.
Tchebycheff's inequality and applications, statements and applications of weak law of large numbers and central limit theorems.

Unit-V

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

REFERENCES
1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Chung, K.L. (1979). Elementary Probability Theory with Stochastic Processes, Springer International Student Edition.
3. Edward P.J., Ford J.S. and Lin (1974): Probability for Statistical Decision-Marketing. Prentice Hall
4. Goon A.M., Gupta M.K. and Dasgupta B.(1999): Fundamentals of Statistics, Vol. I , World Press, Calcutta
5. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, Mc. Graw Hall.

ADDITIONAl REFERENCES:

6. Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7.David Stirzaker (1994). Elementary Probability, Cambridge University Press.
8.Feller, W. (1968). An Introduction to Probability Theory and its Applications, Wiley.
9. Hoel P.G. (1971): Introduction to Mathematical Statistics
10. Mayer P.L. (1970): Introductory Probability and Statistical Applications, Addition Wesley
11.Mukhopadhyay, P. (1996). Mathematical Statistics, New Central Book Agency, Calcutta.
12.Parzen, E. (1960). Modern Probability Theory and its Applications, Wiley Eastern.
13Pitman, Jim (1993). Probability, Narosa Publishing House.

Paper – II(Paper Code-0804)
DESCRIPTIVE STATISTICS

Unit - I

Origin and Development of statistical importance, uses and limitations of Statistics. Types of Data: Concepts of a statistics population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data.

Collection and Scrutiny of Data; Primary data – designing a questionnaire and a schedule; checking their consistency. Secondary data – their major sources including some government publications. Complete enumeration, controlled experiments, observational studies and sample surveys. Scrutiny of data for internal consistency and detection of errors of recording. Ideas of cross-validation.

Presentation of Data: Construction of tables with one or more factors of classification. Diagrammatic and graphical representation of non-frequency data. Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation – column diagram, histogram, frequency polygon and ogives. Stem and leaf chart. Box plot.

Unit -II

Analysis of Quantitative Data: Univariate data: Concepts of central tendency or location, and their measures; arithmetic, geometric and harmonic mean, median and mode.

Unit -III

Dispersion and relative measures of dispersion, skewness and kurtosis, and their measures including those based on quartiles and moments. Sheppard's corrections for moments for grouped data (without deviation).

Unit -IV

Bivariate data: Scatter diagram. Product moment correlation coefficient and its properties. Coefficient of determination. Correlation ratio. Concepts of regression. intra - class correlation coefficient with equal and unequal group sizes. Rank correlation – Spearman's and Kendall's measures. Correlation index. Principle of least squares. Fitting of linear and quadratic regression and related results. Fitting of curves reducible to polynomials by log and inverse transformation. Multivariate data: Multiple regression, multiple correlation and partial correlation in 3 variables. Their measures and related results.

Unit V

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

REFERENCES
1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Croxton FE, Cowden DJ and Klein S: Applied General Statistics (1973): Prentice Hall of India.
3.Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Vol. 1(1991) & Vol. 2(2001). World Press, Calcutta.
5.Gupta V.K. and Kapor S.C. : Fundamentals of Mathematical Statistics S. Chand and Sons.
ADDITIONAl REFERENCES:
 6.Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, McGraw Hill.
8.Snedecor GW and Cochran WG: Statistical Methods (1967) : Lowa State University Press.
9.Spiegel, MR (1967): Theory & Problems of Statistics (1967): Schaum's Publishing Series.

Paper III

Practical: Practical Based on Paper I & II

1. Presentation of data by Frequency tables, diagrams and graphs.
2. Calculation of Measures of Central Tendency, dispersion , skewness and kurtosis
3. Product Moment Correlation and Correlation Ratio
4. Fitting of Curves by the least square method
5. Regression of two variables
6. Spearman's Rank correlation Coefficient
7. Multiple regression of three variables
8. Multiple correlation and partial correlation
9. Evaluation of probabilities using addition and multiplication theorems, conditional probabilities and Bayes theorems
10. Exercises on mathematical expectations and finding measures of central tendency, dispersion, skewness and kurtosis of univariate probability distributions
11. Fitting of univariate and conditional distributions

DEFENCE - STUDIES
PAPER - I
INDIAN MILITATY HISRORY   M.M. 50
(paper code - 0817)

AIM : The main idea behind this paper is to give a conceptual background about the events and factors which infleenced course of history and helped in developing the art of war in India.

Note : Questions will be set from each unit, There will be only internal choice.

UNIT-1 1. The definition and scope of Defence Studies and its relationship with other subjects.

       2. Art of war of Epic and Puranic period.

       3. Comparative study of lndo-Greek art of war with special reference to the Battle of Hydaspus 326 B.C.

       4. Mauryan Military system and art of war.

UNIT-2 1. Kautalya's Philosophy of war.

       2. Gupta's military system and art of war.

       3. Military system of Harshavardhan.

       4. Dicline of Chariots and Importance of Elephant and Cavalory.

UNIT-3 1. Mughal military system.

       2. Rajput and Turk pattern of warfare with speci of reference to Battle of Somnath and Battle of Tarain up to 12th century A.D.

       3. Causes of the fall pf Rajput Military system.

       4. Army organization during Sultanate period.

       5. Battle of Panipat 1526 A.D. and Battle of Haldighati 1576 A.D.

UNIT-4 1. Maratha Military system.

       2. Warfare of Shivaji.

       3. Battle of Assaye 1803 A.D.

       4. Sikh Military system.

       5. Battle of Sobraon 1846 A.D

UNIT-5 1. 1857 Liberation Movement.

       2. Reorganizations of Indian Army under the, Crown.

       3. Nationalization of, Indian Army after independence.

       4. Military reforms of Lord Kitchner's.

READING LIST :

1. Military System of Anciant India   :   B.K. Majumdar
2. Generalship of Alexander the Great   :   J.F.C.Fuller
3. Kautilya Arthashastra   :   K.P. Kanbley
4: Military history of India   :   J.N. Sarkar

PAPER - II
DEFENCE MECHANISM OF THE MODERN STATE
(paper code - 0818)

AIM : To enable students to appreciate the importance of higher political direction in the formulation of national defence policy and roles as political and military leadership in furthering national security.

Note : Question will be from each unit, there will be only internal choice.

UNIT-1 1. Evolution of National defence policy.

2. Inter dependence of Foreign, Defence and Economics policies.

3. Higher defence organization of U.S.A., U.K. and RUSSIA.

4. Higher defence organization of CHINA, PAKISTAN and NATO.

UNIT-2 1. Higher defence organization in India.

2. Powers of President and relation to Armed forces.

3. Parliament and the Armed forces.

4. Defence (Political affair) committee of the cabinet. Its composition, methods of working during war and peace.

5. National Defence Council and its Valiant.

UNIT-3 1. Organization of Ministry of Defence.

2. Organization of Army head quarter.

3. Organization of Naval head quarter.

4. Orgatiization of Air head quarter.

UNIT-4 1. Organization and role of Para-militaty forces - B.S.F., I.T.B.P., C.I.S.F. etc.

2. Organization and role of Intelligence Agencies - RAW, CBI, CID., IB etc.

3. Military Intelligence.

4. Role of N.C.C. in preparing youth for Defence services.

UNIT-5 1. Organization of Civil - defence.

2. Importance and role of civil defence during war and peace.

3. Air-Raid signal and precaution before and after bombardment.

3. Role of Indian armed forces in war and peace.

READING LIST :

1.	Indian Army, A Sketch of its History & Organisation	: E.H.E. Choen
		:
2.	Defence Organization in India	: Venkateshwarm

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PRACTICAL   **M.M. : 50**

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There shall be practicall examination ot 3 hours duration and carying 50 marks. The distribution of marks shall be as follows -

1. Exercises based on Map reading   :   20 Marks
2. Exercises based on models   :   10 Marks
3. Sessional Work and Record   :   10 Marks
4. Viva-Voce   :   10 Marks,

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PART - A

ELEMENTARY MAP READING

</div>

1.   Maps- Difination, types, Marginal Information.

2.   Conventional signs - Military and Geographical.

3.   Direction and cardinal points.

4.   Types of North, Angle of Convergence.

5.   Study of Liquid compass, its parts, various tactical uses and preparation of Night navigation chart.

6.   service Protractor and its uses.

7.   To find North by Compass, Watch, Sun, Stars etc.

8.   Bearing and interconversion of bearing.

9.   Setting of Map.

10.   Grid System.

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PART - B

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RECOGNITION & ELEMENTRY STUDY OF FOLLOWING MODELS

1.   equivalent Rank and Badges of Indian Army, Navy and Air Force.

2.   Famous Armoured vehicles used in war.

3.   Weapons used in Infantry.

4.   Various Ships of Indian Navy.

5.   Famous Air-Crafts Used by Air-Force.

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INDUSTRIAL CHEMISTRY
PAPER - I
INDUSTRIAL ASPECTS, OF ORGANIC & INORGANIC CHEMISTRY
(paper code - 0821)

UNIT-1 1.1 Nomenclature Generic names, Rade names.

1.2 Raw Materials for Organic compounds :-

Petroleum, natural gas, Fractionation of Crude oil.

UNIT-2 2.1. Petrolutri :- Cracking, reforming Hydroforming isomerisaton.

2.2. Coal :- Types, Structure,' Properties, distillation of coal', chemicals derived there from.

UNIT-3 3.1.Renewable natural resources :- Cellulose, starch, properties, modification, impor-tant ind. Chemicals derived from them, Alcohol and alcohol based chemicals, Ox-alic acid, Furfural.

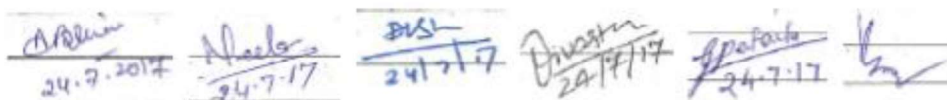3.2. Basic metallurgical operations':- PuIverisation, calcination, Roasting, refining.

UNIT-4 4.1 Physico chemical principles of extraction of,:- Iron, Copper, Lead, Silver, Sodium, Aluminium, Magnesium, Zinc, Chromium.

UNIT-5 Inorganic materials of Industrial Importance :- Their availablility, forms, structure arid modification. Alumina, Silica, Silicates, Clays, Mica, Carbon, Zeolites.

BOOKS :
1. Coal Conversion, E.J. Hoggman, The Energon Co., Lavamic Wyomnig, U.S.A.
2. Introduction of Petroleum Chemicals, H. Steiner, Pergamen Press.
3. From Agrocarbon to Petrochemicals, L.F. Hatch & S. Matarm, Gulf Publishing Co., Houston.
4. Colten Cellutose : Its Chemistry & Technology, Hall A.G.
5. Methods in Carbohydrate Chemistry, Vol. 3 - Cellulose, Whistler, R.L.
6. Chemistry of Cellulose, Heuser, E.
7. Chemistry & Industry of Starch, Kerr, R.W.
8. Modified Starches : Properties & Uses, Wurzburg, O.B.
9. Principles of Extractive Metallurgy, Herbashi, Vol. I & II.
10. Theory of Metellurgical Processes, Volsky, A. & Sergievskaya, F.
11. Text book of Metallurg, Baiky, A.R.
12. Clays, H. Reis, John Wileys & Sons.
13. Unit Processes of Extractive Metallurgy, Pehike, Elserier Publication.
14. Industrial Chemistry, Reigel, Reinhold Publication.

PAPER - II
INDUSTRIAL ASPECTS OF PHYSICAL CHEMISTRY
MATERIAL AND ENERGY BALANCE
(paper code - 0822)

UNIT-1 Surface. chemistry and Interfacial Phenomena Adsorption lsotherm, Sols, Gels, Emulions, Micoemulsions,.micelles, Aerosols, Effect of surfacttants, Hydrotropes.

UNIT-2 Calalysts :- Introduction, Types, Homog-eneous and Heterogeneous, Basic Principles, Mechanisms factors affecting the performance, Introduction to phase transfer catalysis

UNIT-3 3.1. Enzyme catalysed reactions - Rate model, Industrially important reactions.

    3.2. Material Balance without chemical Reactions:- flow diagram formaterial balance, simple material with or without recycle or by-pass for chemical engineering opera-tions such as distillation, crystallisation, evaporation, extraction, etc.

UNIT-4 4.1. Dimensions and Units :- Basic. chemical calculations -Atomic weight, molecular, weight, equivalent weight, mole composition of (i) liquid mixt'ure & (ii) gaseous mixture.

    4.2. Material balance involving chemical reaction :- concept of limiting reactant, con-version, yield liquid phase reaction, gas phase reactions with/without recycle or by-pass.

UNIT-5 Energy Balance :- Heat capacity of p-ure gases and gaseous mixtures at constant pres sures. Sensible heat changes. in liquids, Enthalpy changes.

BOOKS :
1. Aersol, Science & Technology, Shephered, H.R.
2. Catalysir :Heterogeneons & Homogeneous, Delmon, Elbevior Scienu Publication.
3. Catalysir, Science & Technology, Anderson, J.
4. Catalysir in Micelller & Macromolecular systems, Fendler & Fendler.
5. Phase Transfer Catalysis, Principle & Techniques, Strles, C.
6. Surgace Chemistry, J.J. Bikermann, Academic Press.
7. Physical Chemistry of Surfaces by A.W. Admson.
8. Storchiometry, B.I. Bhalt & S.M. Vora.
9. Chamical Process Principle - Part I, B.A. Hougen, K.M. Watson & R.A. Ragats, Asia Publi-cation.

PAPER - III
UNIT OPERATIONS IN CHEMICAL INDUSTRY AND UTILITIES, FLUID FLOW AND HEAT TRASNPORT IN INDUSTRY
(paper code - 0823)

UNIT-1 1.1. Distillation - Introduction; Batch and continuous distillation, separation of azeo-tropes, plate columns & packed,columns.

1.2. Absorption - Introduction, Equipments- Packed columns, spray columns, bubble columns, palcked bubble columns, mechanically, agitated contractors.

UNIT-2 2.1 Evaporation - Introduction, Equipm ' ents - short tube (standard) evaporator, forced circulation evaporators, falling film evaporators, climbing film (Upward flow) evaporatiors, wiped (agitated) film evaporator.

2.2 Filtration - Introduction, filter media and filter aids, Equipments- Plate and frame,filter press, nutch filter, rotatory drum filter, spartkler filter, candle filter, bahgfifter, cen-trifuge.

2.3 Drying - Introdunction, free moisture, bound. moisture,drying curve, Equipments tray dryer, rotatory dryer, flash drater, fluid bed dryer, drum dryer, spray dryer.

UNIT-3 3.1 Utilities in chemical Industry

Fuel - Types of fuels -advantages and disadvantages, combustion of fuels, calortific value. specification for fuel oil.

Boilers - Types of.-boilers and their functioning.

Water - Specifications fof industrial use, various water treatments.

Steam - Generation and use.

Air - Specifications for Industrial use processing of air.

UNIT-4 Fluid Flow : Fans, blowers, compressors, vacuum pumps, ejector. Pumps :-

Reciprocating pumps,, Gear pumps,. centrifugal pumps.

UNIT-5 Heat Exchangers -: Shall and Tube type; finned tube heat exchangers, plate heat ex-changers, refrigeration cycles.

BOOKS :
1. Introduction Chemical Engineering, W.L. Badger, J.J. Banchero, McGraw Hill.
2. Unit Operations in Chemical Engineering, W.L. McCabe & J.C. Smith, McGraw Hill.
3. Chemical Engineer's Hand Book, J.H. Perry, McGraw Hill.
4. Unit Operations - I & II, D.D. Kale, Pune Vidyarthi Griha Prakashan, Pune.
5. Unit Operations of Chemical Engineering, Vol. I, P. Chattopadhyay, Khanna Publishers, Delhi.

PRACTICAL

Duration of Examination :   **04 Hrs.**

Discription of marks   Experiment   :   30 marks
                              Viva   :   05 marks
                              Sessional   :   05 marks
                              Project   :   40 marks
                              Total   :   80 marks

EXPERIMENTS TO BE PERFORMED :

1. Simple laboratory tecniques crystallisation, Fraction Crystallisation, Distillation, Fractional distillation Boiling Point.Diagram.

2. Extraction Processes- Phase diagram, partition H_2SO_4 co-efficient.

3. Preparation of standard solutions- Primary and secondary standards, Determination of-   and H_3PO_4 in a mixture.

4. Calibration of Thermometres.

5. Acquaintance with safety measures in a laboratory Hazards of Chemicals.

6. Depression and elevation in.b.p./m.p. of solids and liquids.

7. Chromatography-column, Paper, Thin layer.

8. Ore analysis dolomite, limestone, -calcite, Analysis of alloys such as cupro-nickel.

9. Determination of Physical Constants

    Refractive -index, surface tension, Effect of surfactants, on surface tension,

    viscosity- Fluids, Polymer solutions effect of additives on viscocity, optical

    rotation.

10. Study, experimenfs/demonstration experiments.

Note : Any two experiments have to be carried out by the students in the Examination. A Mini mum of 60% of the'experiments have to be conducted by the students.

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B. SC. PART - I
COMPUTER SCIENCE
PAPER - I
COMPUTER FUNDAMENTALS
PAPER CODE - 0805

MAX MARKS - 50

Note:- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I CLASSIFICATION AND ORGANISATION OF COMPUTERS

History of computer, Generation of computer, calculator vs computer. Digital and Analogue computers and its evolution. Major components of digital computers, Memory addressing capability of CPU. Word length and processing speed of computers, Microprocessors, Single chip Microcomputer, Large and small computers, Users interface, hardware, software and firmware, multiprogramming multiuser system, Dumb smart and intelligent terminals, computers Network and multiprocessing LAN parallel processing, Finn's classification of computers control flow and data flow computers.

UNIT-II CENTRAL PROCESSING UNIT

Parts of CPU-ALU control unit, Registers; Architecture of Intel 8085 microprocessor, Instruction for Intel 8085 microprocessor, Instruction Word size, Various addressing mode, Interrupts some special control signals, Instruction cycle fetch and execute operation, Timing Diagram, Instruction flow and data flow.

UNIT-III MEMORY

Memory hierarchy, Primary and Secondary Memory, Cache memory, Virtual Memory, Direct Access storage devices (DASD) Destructive and Non-destructive Readout, Program and data memory, Memory Management Unit (MMU) PCMCIA cards and Slots.

UNIT-IV I/O DEVICE

I/O devices-Keyboard, Mouse, Monitor, Impact and Non-Impact Printers, Plotters, Scanner, other Input/output devices: Scan method of Display, Raster Scan, Vector Scan, Bit Mapped Scan, CRT Controller, I/O Port, Programmable and Non Programmable I/O port, Inbuilt I/O ports, Parallel and Serial ports, USB, IEEE 1394, AGP, Serial data transfer scheme, Microcontroller, Signal Processor, I/O processor, Arithmetic Processor.

UNIT-V SOFTWARE AND PROGRAMMING TECHNIQUES

Application and System Software: Introduction, Example, Difference etc. Introduction to Open Source Software such as Unix/Linux (Ubuntu), Liber office etc. Introduction to Machine Language Assembly Language and High Level Language; Programming Techniques, Stack Subroutine, Debugging of programs, Macro Program Design Software Development, Flow Chart, Multiprogramming, Multiuser, Multitasking Protection, Operating system and Utility programs Application packages

TEXT BOOK

1. Computer Fundamentals, P.K. Sinha, BPB Publication, Sixth Edition.
2. Computer Fundamentals Architecture and Organization, B. Ram, New Age International Publishers, Fifth Edition.
3. Fundamentals of Computers, V. Rajaraman, PHI Sixth Edition.
4. Computers Today, Donald H. Sanders, McGraw-Hill Third Edition.
5. IBM PC and Clones, B. Govindarajulu, McGraw-Hill Second Edition.
6. UNIX Concepts and Applications, Sumitabha Das, Tata McGraw-Hill Fourth Edition.

MAX MARKS - 50

Note :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I
Fundamentals of   C Programming - Overview of C : History of 'C', Structure of 'C' program. Keywords,Tokens,Datatypes,Constants,LiteralsandVariables,OperatorsandExpressions:Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associativity, Type casting, Console I/O formatting, Unformatted I/O functions: getch(),getchar(), getche(), getc(), putc(), putchar().

UNIT-II
Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: For, do.while, while, for, Nested loops, break and continue, goto and label, exit function.
Functions:-Definition, function components: Function arguments, return value, function call statement, function prototype. Type of function Scope and lifetime of variable. Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III
Array:-Array declaration, one and two dimensional numeric and character arrays. Multidimensional arrays.
String:-String declaration, initialization, and string manipulation with/without using library function.
Structure, Union & Enum- Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, functionreturningstructure.**Union**:basics,declaringunionandunionvariable,**Enum**:declaringenumanden umvariable.

UNIT-IV
Pointers: Definition of pointers, Pointer declaration, Using &and* operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions–malloc, calloc, realloc and free, Pointers vs. Arrays, Arrays of pointer, pointer to array, Pointers to functions ,Function returning pointer, Passing function as Argumenttofunction,Pointertostructure,Dynamicarrayofstructurethroughpointertostructure.

UNIT-V
File Handling and Miscellaneous Features-Filehandling:filepointer,Fileaccessingfunctions,:fopen, fclose,fputc,fgetc,fprintf,fscanf,fread,fwrite,beof,fflush,rewind,fseek,ferror.File handling through command line argument. Introduction to C preprocess or #include, #define, conditional compilation directives:#if,#else,#elif, #endif, #ifndefetc.

TEXTBOOKS

1. Programming in ANCII. Balagurusamy c Tata McGgraw-Hill third edition.
2. Let Us C, Yashwant Kanetkar Infiniti science Press, 8th edition.
3. Mastering C, K.R. Venugopal Tata McGgraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis, M Ritchic, Prentice Hall Second Edition.
5. Application programming in ANSI C, R. Johnsonbaugh, Martins Kalin, Macmillan Second Edition.
6. The Spirit of C Mullish Cooper, Jaico Publishing House.
7. How to solve it by computer, R.G. Dromeypearson edition.

ELECTRONICS EQUIPMENT MAINTENANCE
PAPER - I
PRINCIPLES OF ELECTRONICS
(paper code - 0809)

UNIT-1 General information : Symbol, colour code, types (Such an carbon, mental film, thin-film thick-fillm, wire-wound), Variable resistors potentiometers (logarithmic linear multi-turn wire wound rheostate.

Physical properties : Temperature dependence (Thermistor), Light Dependencs (LDR),

Voltage Dependence (VDR).technical specification wattage and working voltages. Methods of measurement of resistance: very low to very high values.

INDUCTORS : General Information: symbol, Types each as air core, iron core, ferrite core, chocking inductors (Coil), frequency response of an inductor.

Method of measurement of inductances: using universal bridges design and fabrication rules.

CAPACITORS : General infortnation : symbol, colour code, types of capacitors such as

Air, paper, Electrolytic, Mica, Tentalum Polyuterene, fixed and variable capacitors. Mea-surement of Capacitance: universal bridge. application areas.
BATFERIES : Dry Cells, Lead-Acid Accumulators, Nickel Cadrnlum cells, standard cells, principles, Specifications.
FUSES : Fast and Slow Fuses, Pilot Lamps.
PCB : Types of PCB, layout techniques, cables and connectors for PCB

UNIT-2 TRANSFORMERS: General information- principle, types of transformer such as single phase, auto mains and isolation transformers. Frequency dependence of transformer theoriern. (Audio, IF and RF), Design of mains transformers and CVT.

RELAYS : General ihformation: symbol, types of relays, such as rend electromagnefic. Specifications, rating, application areas.

MICROPHONES AND LOUDSPEAKERS : General information: frequency response, input and output Impodance, power rating, directionality (omns and unli-directional). Application areas.
TRANSDUCERS : Commonly used transducers, L.D.R., thermistars thermocouples, phatodioden, pholc transistors, IR detectors L Volt.

UNIT-3 SWITCHES, CABLE AND CONNECTORS : Spdl, dpdl, band switches, touch switches, thumpwheel switches, rnicro switches, specifications, application areas.

NETWORK THEOREMS : Kirchoffs current and voltage law, -maximurr. power transfer,

THEOREMT : bevenins theorem, norton's theorem, super position theorem.

LCR AND WAVESHAPING CIRCLITS : Serial and parallal response, idea of black Nix., qwivalent circuits. Idea of two terminal and two part network, eqi&alent cirewits. Integra-tion, differer lation using R.C. circuits, *chpping clampaig.*

UNIT-4 NUMBER SYSTEMS : Introduction to decimal bmiazy, octal floca decial, number systern interconversions of decimals binary and BCD number. Binary arithmetic and Boolean algebr& Boolean axiom, D Morgan's theorms-statement vanfication and applications.

LOGIC GATES : Posifive and Negative logic, different logic gate, such as AND, OR NOT, NAI, NOF, EXOR, symbol and truth tables. Inverting a non-irverting suffers.

LOGIC.FAMILIES : TTL, ECL & CMOS parameters like power dissipation, speed, sup-ply requirements, logic level, fan in, fan out noise half addar, full addar, half subtulor.

UNIT-5 COMBINATIONAL CIRCUITS : Encioder-decoder sequenfial circuits, flip flops (As,K,,D,I,N,S) -shift, registers, counte% Semiconductors memory.

PAPER - II
ELECTRONIC DEVICES, COMPONENTS & ASSEMBLIES
(paper code - 0810)
UNIT-1 INTRODUCTION- TO SEMI CONDUCTORS

ENERGY BAND DIAGRAM: conductors, semiconductor, insulation, intrinsic and exitrinsic sermi conductors (P.N. type), diffused junctions, depletion layer, barrier potential.

JUNCTION DIODES : Rectifying diode, forward and reverse bias characteris tic, switch-ing diode, varacleor diode, photo diode. light ernitting diode, IR sources and delector optical isolators, Zener diode, Tunnel diode, tunnel diode.

BIPOLAR JUNCTION TRANSISTORS : Basic working principle (qualitative), characterstic, Basic configurations and baising. Operating point, load line, biasmig for stabilization of operating point.

UINT-2 JEFT & MOSFET: Basic working principle (qualitative), charactenistic Binchoff voltage,

UNI JUNCTION TRANSISTORS : Basic working principle (qualitative), characterstic applications, as a switch.

POWER CONTROL DEVICES : Four layer diode (PNPN), Sillicon conq-olled, rectifier
(SCR) tracis, diac, principle & characteristics.

AMPLIFIERS : Different terms used in amplifers, sucn as signal fource ssource, input output, voltage and current gain power gain,- decibel , input and'output impendance.

Classification according to the frequency response, RC coupled, class A common emit-ter Amplifier, Introduction to the class & operafion
FEED BACK IN AMPLIFIER : Effect of negative feedback on amplifier performance.

UNIT-3 POWER AMPLIFIER : Transformer coupled equivalent circuit only in brief, class A, class B. class AB and class C the constant power hyperbola, the AC load line input and output considerations, determination of Non-hner distortion.

PUSH-PULL AMPLIFIERS : Phase splitter circuits, complimentary push-pull, thermal ranway, Heat sinks.
Class B and C resonant load amplifiers, graphical class C analysis, **resonant** load requirements.

OPERATIONAL AMPLIFIER :
Basic, idea of an OPAMP with black box concept miverting and noninverting inputs, virtual ground
Parameters such as input impendance, output impendance, open loop gain, measure-ments of parameters.
Qualitative description of OPAMP as mverting and non inverting arnphfier,

summing and. difference amplifier, comparater and linear ubtegratirs,

instrumentation amplifier.

UNIT-4 OSCILLATORS : Positive feedback, barkhausen criltenia, phase shift

oscillators, wei bridge oscillators Tuned oscillators, Hartley, colpits-

oscillators, crystal oscillator.

 POWER SUPPLIES : Regulated power supply, Zener regulated power

supply series and shunt regulated power supply, block diagrain of IC 723,

regulated supply of IC 723.

11iree ter~nal Ics power supply. Study of power supply. w.r. to variation 'in loadand I 'me voltage.
SWITCHED MODE POWER SUPPLY : Design principle,
and application. **IC 555** : Operations and applications.

UNIT-5 MODULATION : AM and FM : Principles, modulation, index, modulation, bandwidth, balanced modulator,

DEMODULATION : Am and Fm delectors diode detectors, ratio detector, balanced de-modulator'.

Introduction to communication systems, basic principles and operation of communica-tion system.

Hemchand Yadav Vishwavidyalaya, Durg (C.G.)

Session 2019-20
June 2019 onwards
Class: B.Sc. Electronics

Scheme of Examination

Paper Code	Course Opted	Title of Course	Theory	Practical	Grand Total	Minimum Passing Marks
First Year						
ELB-101	Core Course	Network Analysis And Analog Electronics	**50**		**100**	**33**
ELB-102	Core Course	Linear and Digital Integrated Circuits	**50**			
ELB-103P	Core Course Practical/Tutorial	Networks Analysis and Analog Electronics Lab	**25**	**50**	**50**	**17**
ELB-104P	Core Course Practical/Tutorial	Linear and Digital Integrated Circuits Lab	**25**			
Second Year						
ELB-201	Core Course	Communication Electronics	**50**		**100**	**33**
ELB-202	Core Course	Microprocessor and Microcontrollers	**50**			
ELB-203P	Course Practical/Tutorial	Communication Electronics Lab	**25**	**50**	**50**	**17**
ELB-204P	Course Practical/Tutorial	Microprocessor& Microcontroller Lab	**25**			
Third Year						
EL301	**Skill Enhancement Course**	Industrial Electronics	**50**		**100**	**33**
EL302	**Skill Enhancement Course**	Mobile Application Programming and Introduction to VHDL	**50**			
EL303P	**Skill Enhancement CoursePractical**	Industrial Electronics Lab	**25**	**50**	**50**	**17**
EL304P	**Skill Enhancement Course Practical**	Mobile Application Programming and Introduction to VHDL Lab	**25**			

B.Sc. Part I

ELECTRONICS

Paper-I

ELB-101: NETWORK ANALYSIS AND ANALOGELECTRONICS

Theory: **Maximum Marks 50**

Unit-1

Basic Circuit Concepts: Voltage and Current Sources, Review of Resistors, Inductors, Capacitors. Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL),

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak,Peak to Peak, Root Mean Square and Average Values. AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits.AC applied to Series and parallel RLC circuit, Series and Parallel Resonance, condition for Resonance, Resonant Frequency, Bandwidth, and significance of Quality Factor (Q).

Passive Filters: Low Pass, High Pass.

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem,Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorems.

Unit-2

Junction Diode and its applications: PN junction diode (Ideal and practical)-constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanationfor load and line regulation.

Unit-3

Bipolar Junction Transistor: CE, CB Characteristics and regions of operation, Transistor biasing, DC load line, operating point, thermal runaway, idea about stability and stability factor. Voltage divider bias, circuit diagrams and their working.

Field Effect Transistors: JFET, Construction, Working and Characteristics. MOSFET, Construction, Working and Characteristics.

Power Devices: UJT, Construction, Working and Characteristics. SCR, Diac, Triac, Construction, Working and Characteristics and Applications.

Unit-4

Amplifiers: Transistor biasing and Stabilization circuits- Fixed Bias and VoltageDivider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and CAmplifiers.

Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

Unit-5

Feedback   in Amplifiers: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift,Weins bridge, Crystal andColpitt's oscillator. Determination of Frequency and Condition of oscillation.

Reference Books:

[1] Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)

[2] Electrical Circuits, M. Nahvi& J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)

[3] Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press

[4] Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.

[5] Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.

[6] Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill

[7] Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning

[8] Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6thEdn., Oxford University Press.

[9] J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

[10] J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

Paper- II

ELB-102: LINEAR AND DIGITAL INTEGRATEDCIRCUITS

Theory: **Maximum Marks 50**

Unit-1

Operational Amplifiers (Black box approach): Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground.

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Summing and Difference Amplifier, (3) Differentiator, (4) Integrator, (5) Wein bridge oscillator, (6) Comparator and Zero-crossing detector, and (7) Active low pass and high pass, Butterworth filter (1st order only).

Unit-2

Number System and Codes: Decimal, Binary, Octal and Hexadecimal number systems base conversions. Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication.

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.

Unit-3

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).Arithmetic Circuits: Binary Addition. Half and Full Adder.Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Data processing circuits: Multiplexers, De-multiplexers, Decoders, Encoders. Clock and Timer (IC 555): Introduction, Block diagram of IC 555, Astable and Monostable multivibrator circuits.

Unit-4

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop.

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters (4 bits): Ring Counter. Asynchronous counters, Decade Counter Synchronous Counter.

Unit-5

D-A and A-D Conversion: 4 bit binary weighted and R-2R D-A converters, circuit and working, Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all).

Reference Books:
[1] OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall
[2] Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.
[3] Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
[4] Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
[5] Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
[6] Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.
[7] Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
[8] R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

ELECTRONICS LABORATORY
ELB 103P: NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB
(Hardware and Circuit Simulation Software)   **Max.Marks:25**

The scheme of practical examination will be as follows-

Experiment	--	**30**
Viva	--	**10**
Sessional	--	**10**
Total	--	**50**

AT LEAST 06 EXPERIMENTS FROM THE FOLLOWING BESIDES #1

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
8. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
9. Study of the I-V Characteristics of UJT and design relaxation oscillator..
10. Study of the output and transfer I-V characteristics of common source JFET.
11. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
12. Design of a Single Stage CE amplifier of given gain.
13. Study of the RC Phase Shift Oscillator.
14. Study the Colpitt`s oscillator.

Reference Books:

1. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
2. Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
4. Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.

ELECTRONICS LAB
ELB 104P: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB
Max.Marks:25

At least 04 experiments each from section A, B and C

Section-A: Op-Amp. Circuits (Hardware)

1. To design an inverting amplifier using Op-amp (741,351)for dc voltage of given gain

2. (a) To design inverting amplifier using Op-amp (741,351) & study its frequency response

   (b) To design non-inverting amplifier using Op-amp (741,351) & study frequency response

3. (a) To add two dc voltages using Op-amp in inverting and non-inverting mode

   (b) To study the zero-crossing detector and comparator.

4. To design a precision Differential amplifier of given I/O specification using Op-amp.

5. To investigate the use of an op-amp as an Integrator.

6. To investigate the use of an op-amp as a Differentiator.

7. To design a Wien bridge oscillator for given frequency using an op-amp.

8. To design a circuit to simulate the solution of simultaneous equation and $1^{st}/2^{nd}$order differential equation.

9. Design a Butterworth Low Pass active Filter (1st order) & study Frequency Response

10. Design a Butterworth High Pass active Filter (1st order) & study Frequency Response

11. Design a digital to analog converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware)

1. (a) To design a combinational logic system for a specified Truth Table.

   (b) To convert Boolean expression into logic circuit & design it using logic gate ICs.

   (c) To minimize a given logic circuit.

2. Half Adder and Full Adder.

3. Half Subtractor and Full Subtractor.

4. 4 bit binary adder and adder-subtractor using Full adder IC.

5. To design a seven segment decoder.

6. To design an AstableMultivibrator of given specification using IC 555 Timer.

7. To design a MonostableMultivibrator of given specification using IC 555 Timer.

8. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.

9. To build JK Master-slave flip-flop using Flip-Flop ICs

10. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.

11. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.

Section-C: SPICE/MULTISIM simulations for electronic circuits and devices

1. To verify the Thevenin and Norton Theorems.

2. Design and analyze the series and parallel LCR circuits

3. Design the inverting and non-inverting amplifier using an Op-Amp of given gain

4. Design and Verification of op-amp as integrator and differentiator

5. Design the 1^{st}order active low pass and high pass filters of given cutoff frequency

6. Design a Wein`s Bridge oscillator of given frequency.

7. Design clocked SR and JK Flip-Flop`s using NAND Gates

8. Design 4-bit asynchronous counter using Flip-Flop ICs

9. Design the CE amplifier of a given gain and its frequency response.

Reference Books

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw

2. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4^{th}edn., 2000, Prentice Hall

3. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

4. Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill

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B.Sc. Part-I
INFORMATION TECHNOLOGY
PAPER-I
FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE
(PAPER CODE-0824)

NOTE : The Question paper setter is advised to prepare unit wise question with the provision of internal choice

MAX MARKS : 50

UNIT-I INFORMATION TECHNOLOGY

Concept of IT and information system, Application of IT (In Business, Education Medicine Science Governance and Agriculture) Impact of IT on society E and industry, Legal and Ethical aspect of IT, Security and Threats in IT, M-Commerce, Virtual reality, latest trend in IT, future of IT.

UNIT-II COMPUTER NETWORK
BASIC CONCEPT OF COMPUTER NETWORK Internet concept **LAN, MAN, WAN** Topology, Protocol, Transmission mode Communication Process Required element of data communication.
WIRELESS COMMUNICATION Mobile Internet GPS,3G, 4G Wi-Fi Bluetooth infrared radio frequency microwave.
SOCIAL NETWORK Evolutions of social network site (YouTube, Facebook, LinkedIn Twitter) Advantages and Disadvantage of social networking sites.

UNIT-III MS WORD
Introduction word processing (MS-Word) Advantage of word processing, Introduction and Installation Editing a file using paragraph styles, Newspaper style columns using macros advanced word processing, Headers and Footers, Finding text setting up printer Mail merge and other applications, mathematical calculator, table handling.

UNIT-IV MS-EXCEL
Introduction to spreadsheets (MS-EXCEL), Definition and advantage of electronics worksheet, Working on spread sheets range and related operations, Setting saving and retrieving worksheets Inserting, Deleting, Copying and Moving of data cells, Inserting and deleting rows and column, protecting Cells Printing a worksheet, erasing a worksheet in Graphs creations, Type of graphs, Creating a chart sheet 3D, Columns charts, Moving and changing the size of chart, Printing the chart.

UNIT-V MS POWERPOINT AND MS ACCESS
MS-POWERPOINT: Presenting with Power point: Creating presentation working with slides, Different type of slides, Settings page layout, Selecting background and applying designs, Adding graphics to slide, Adding sound and movie, Creating chart and graph, Playing a slide show, slide transition, Advancing slide, Setting time, Rehashing timing, Animating slide, Animating objects, Running the show from window.
MS ACCESS: Creating table in access define data type Manipulating records.

TEXTBOOKS

1. Computer fundamental R.K.Sinha BPB Publication Sixth edition.
2. Introduction to Information Technology V Raja Raman PHI Second Edition.
3. Computer Networks Forouzan Tata McGraw Hill Second Edition.
4. Microsoft Office 2007 fundamentals L Story D walls.
5. MS Office, S.S.Srivastava Firewall media.

B. SC. PART - I
INFORMATION TECHNOLOGY
PAPER - II
PRAMMING IN C LANGUAGE

MAX MARKS - 50

Note :- The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I
Fundamentals of C Programming - Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Datatypes, Constants, Literals and Variables, Operators and Expressions : Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associativity,Typecasting,ConsoleI/Oformatting,UnformattedI/Ofunctions:getch(),getchar,getche(), getc(),putc(),putchar().

UNIT-II
Control Constructs : If-else, conditional operators, switch and break, nested conditional branching statements, loops: do...While, while, for, Nested loops, break and continue, goto and label, exit function.
Functions:-definition, function components: Function arguments, return value, function call statement, function prototype. Type of function Scope and lifetime of variable. Call by value and call by reference. Function using arrays, function with command line argument. User defined function: Maths and character functions, Recursive function.

UNIT-III
Arrays, Strings and Functions: Array:-Array declaration, One and Two dimensional numeric and character arrays. Multidimensional arrays.
String:-String declaration, initialization and string manipulation with/without using library function.
Structure, Union &Enum- Structure: basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, function returning structure. **Union**: basics, declaring union and union variable. **Enum** : declaring enum and enum variable.

UNIT-IV
Pointers: Definition of pointers, pointer declaration, using &and* operators. Void pointer, pointer to pointer, Pointer in math expression, Pointer arithmetic, pointer comparison, dynamic memory allocation functions–malloc, calloc, realloc and free, pointers vs Array, Arrays of pointer, Pointer to array, Pointers to function, function returning pointer, passing function as argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V
File Handling and Miscellaneous Features- File handling: file pointer, file accessing functions,: fopen, fclose,fputc,fgetc,fprintf,fscanf,fread,fwrite,beof,fflush,rewind,fseek,ferror.File   handling   through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives:#if,#else,#elif,#endif,#ifndefetc.

TEXTBOOKS
1. Programming in ANCI E. Balagurusamy c Tata McGraw-Hill third edition.
2. Let Us C, Yashwant Kanetkar Infiniti science Press, Eighth edition.
3. Mastering C, K.R. Venugopal Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis, M Ritchic, Prentice Hall Second Edition.
5. Application programming in ANSI C, R. Johnsonbaugh, Martins Kalin, Macmillan Second Edition.
6. The Spirite of C Mullish Cooper, Jaico Publishing House.
7. How to solve it by computer, R.G. Dromey person edition.

INDUSTRIAL MICROBIOLOGY

Paper	Title	Time	Marks
First	General Microbiology, Tools and Techniques	3 hrs.	50
Second	Molecular Biology, Biochemistry and Microbial Genetics	3 hrs.	50
	PRACTICAL (including sessionals)	4 hrs.	50 (40+10)

PAPER -

GENERAL MICROBIOLOGY, TOOLS AND   TECHNIQUES   **M.M.50**
I (paper code - 0826)

UNIT-1 History and development of Industrial Microbiology. Contributions of antony von Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Wakman, Alexandar Flaming.

UNIT-2 General characteristics and structure of Bacteria, Cyanobacteria, Fungi, Actino-mycetes, Mycoplasms, Vinuses.

UNIT-3 Microscopy - Invention of Microscope, Compound microscope, Dark field, Fluorescent, Phase contrast and Electron microscope.

UNIT-4 Method of sterilization, culture media and isolation techniques. Methods of preservation of microbial cultures.

UNIT-5 Basic principles and usage - pH meter, Densitometer, Colorimeter, Spectrophotometry, Fluori-metry, Centrifugation - Principles and applications. Usage of Fermentation.

PRACTICALS

The Practical works will, in general be based on the prescribed syllabhus in theory and the candidates will be required to show the knowledge of the following :

1. Preparation of media, autoclaving and sterilization of glassware.
2. Isolation of Phytopathogens.
3. Isolation of Microorganisms from soil and water : Bacteria, Fungi, and Algae.
4. Purification of microbial cultures.
5. Camera Lucida Drawing.
6. Standard Plate count.
7. Heamocytometer.
8. Chromatographic techniques : Separation of amino acids by paper and thin layer chromatography.
9. Measurement of pH of fruit juice.
10. Estimation of cargohydrate by colorimeter.

BOOK RECOMMENDED :

1. General Microbiology, Vol. II by Power and Daginawala.
2. Microbiology by Pelczar, Reid and chan.
3. General Microgiology by Davis and Harper.
4. A Treatise on Media and Methods Used in Bacteriological Techniques by V. Iswarn.
5. Introductory Mycology by C.J. Alexopoulous & Mims.
6. Microbiology by P.D. Sharma.

PAPER - II
MOLECULAR BIOLOGY, BIOCHEMISTRY AND MICROBIAL GENETICS
(paper code - 0827)

M.M. 50

UNIT-1 Nucleic Acids - Structure of DNA and RNA(s), Replication of DNA, Synthesis of RNAs and their types, Genetic code, Concept of genes.

UNIT-2 Molecular Biology - Translation and Protein Synthesis, Operon Concept, CAMP CAP (Catabolic activator protein), Gene expression in Prokaryotes, Lac-Operon. Gene ragulation in Eukaryotes (Britton-Davison Model of Gene Expression).

UNIT-3 Genetic recombination in Bacteria - Transformation, Transduction and conjugation, Genetic Mapping, Extrachromosomal genetic material, Plasmids, Cosmids, Transposons, Overlapping genes, Silent genes and their evolutionary significance. Mutation -Molecular mechanism of mutation, Chemical and Physical Mutagens, Repair of Mutation Damage.

UNIT-4 Biochemistry - Classification of carbohydrates, Chemical structure and property of starch, Cellulose, Glycogen, Synthesis of Purines & Pyrimidine.
Lipids - Saturated and unsaturated fatty acids, Biosynthesis of fatty acids, Distribution and functions of lipids in microorganisms, Degradation of lipids by $O < B$ and Co oxidation, Lipid peroxidation.

UNIT-5 Enzymes - Classification. Co-enzymes, Cofactors, Mechanism of enzyme action, Competitive and non-competitive inhibition. Allosteric regulations of enzymes, isoenzymes, factors contributing to catalytic efficiency of enzymes.

Amino acids - Classification of essential amino acids based on polarity. Acid-base properties and solubilities. Amino acid sequencing of proteins; Primary, Secondary and Tertiary structure.

PRACTICAL

The Practical work will, in general, be based on the syllabus prescribed in theory and the candidates will be required to show the knowledge of the following -

1. Isolation of antibiotic resistant bacteria.
2. Extimation of alkaline phosphatase activity.
3. Measurement of o<amylase activity in extra-cellular fraction of microbial cultures.
4. Estimation of glycogen in bacterial cells.
5. Measurement of cellulase activity by Viscometric technique.
6. Determination of cellulase and amylase activity by reducing sugar assay test.
7. Isolation of DNA.

BOOK RECOMMENDED :

1.   General Microbiology, Vol. 1 by Power & Daginawala.
2.   Bicrobial Biochemistry by Moat.
3.   Principles of Biochemistry by Lehninger.
4.   Outline of Biochemistry by Cohn and Stumph.
5.   Biochemistry by Harper.
6.   Text book of Biochemistry by Rama Rao.
7.   Text book of Biochemistry by O.P. Agrawal.

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BIO CHEMISTRY
PAPER-I
BIOMOLECULES   M.M. 50
(paper code - 0832)

UNIT-I

Introduction to Biochemistry, water as a biological solvent, weak acids and bases, pH, buffers, Henderson-Hasselbalch equation, physiological buffers, fitness of the aqueous environment for living organisms.

CARBOHYDRATES

Structure of monosaccharides. Stereoisomerism and optical isomerism of sugars.

Reactions of aldehyde and ketone groups. Ring structure and anomeric forms, mutarotation. Reactions of sugar due to hydroxyl groups. Important derivatives of monosaccharides, disaccharides and trisaccharides (structure, occurrence and functions of important ones). Structure ocurrence and biological importance of monosaccharides, oligosaccharides and polysaccharides e.g. Cellulose, Chitin, agar, algenic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, glycogen and starch. Bacterial cell wall polysaccharides etc. Glycoproteins.

UNIT-II Lipids

Definition and classification. Fatty acids : introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids, prostaglandins. Triacylglycerols: nomenclature, physical properties. chemical properities and characterzation of fats - hydrolysis, saponification value, rancidity of fats,

Reichert-Meissel number and reaction of glycerol. Biological significance of fats. Glycerophospholipids (lecithins, lysolecithins, cephalins, phosphatidyl serine, phos-phatidyl inositol, plasmalogens), sphingomyelins, glycolipids - cerebrosides, ganglio-sides. Properties and functions of phospholipids, isoprenoids and sterols.

UNIT-III Proteins

Introduction, classification based on solubility, shape, composition and functions.

Aminoacids: common structural features, stereo-isomerism and RS system of designating optical isomers, classification and chemical properties, titration of amino acids, separation of amino acids. Essential amino acids.

Peptides: structure of peptide bond, chemical synthesis of polypeptides - protection and deprotection of N-terminal, and C-terminal ends and functional groups in the side-chains, formation of peptide bonds, condensing agents, strategy of chemical synthesis, Merrifield solid-phase peptids sysnthesis. Determination of the amino acid sequence of a polypeptide chain, specific chemical and enzymatic cleavage of a polypeptide chains and separation of peptides. Protein structure: levels of structure in protein architecture, primary structure of proteins, secondary structure of proteins helix and pleated sheets, tertiary structure of proteins, forces stabilizing the tertiary structure and quaternary structure of proteins. Denaturation and renaturation of proteins. Behaviour of proteins in solutions, salting in and salting out of proteins.

Structure and biological functions of fibrous proteins (keratins, collagen and elastin), glooular proteins (hemoglobin, myoglobin), lipoproteins, metalloproteins, glycoproteins and nucleoproteins.

UNIT-IV

Nature of genetic material: evidence that DNA is the genetic material, Composition of RNA and DNA, generalized structural plan of nucleic acids, nomenclature used in writing structure of nucleic acids, features of DNA double helix. Denaturation and annealing of DNA, structure and roles of different types of RNA Size of DNA in procaryotic and eucaryotic cells, central dogma of molecular biology, Gene, Genome, chromosome.

UNIT-V Porphyrins

Prophyrins: Porphyrin nucleus and classification of porphyrins. important Metalloporphyrins occurring in nature. Detection of porphyrins spectrophotometrically and by fluores-cence. Bile pigments - chemical nature and their physiological significance.

PAPER - II

(paper code - 0833)

BIOPHYSICAL AND BIOCHEMICAL TECHNIQUES   M.M. 50

UNIT-I Concepts of Bioenergetics

Principles of thermodynamics and their applications in biochemistry - introduction, thermodynamic system, thermodynamic state functions, first and second laws of thermodynamics, concept of free energy, standard free energy, determination of   G for a reaction, relation between equilibrium constant and standard free energy change, biological standard state and standard free energy change in coupled reactions.

Biological oxidation-reduction reactions - introduction, redox potentials, relation between standard reduction potentials and free enegy change (dervations and numericals included). High-energy phosphate compounds - introduction, phosphate^{32} P, ^{35} S, 14 C and 3H group transfers-free energy of hydrolysis of ATP and sugar phosphates along with reasons for high G.

UNIT-II Hydrodynamic Methods

Sedimentation - sedimentation velocity, preparative and analytical ultracentrifugation techniques. determination of molecular weight by hydrodynamic methods (derivations excluded and numericals included).

Measurement of pH

Principles of glass and reference electrodes, types of electrodes, complications of pH measurement (dependence of pH on ionic strength, electrode contamination and sodium error) and use of pH paper.

UNIT-III Radioisotopic Techniques

Types of radioisotopes used in Biochemistry, units of radioactivity measurements, techniques used to measure radioactivity (gas ionization and liquid scintillation counting), nuclear emulsions used in biological studies (pre-mounted, liquid and stripping), isotopes commonly used in biochemical studies-Autoradiography. Biological hazards of radiation and safety measures in handling radioisotopes. Biological application.

UNIT-IV Chromatography

General principles and applications of :

1.   Adsorption chromatography
  2.   Ion-exchange chromatography
  3.   Thin-layer chromatography
  4.   Molecular-sieve chromatography
  5.   Hydrophobic chromatography
  6.   Gas-liquid chromatography
  7.   HPLC
  8.   Affinity chromatography
  9.   Paper chromatography

Electrophoresis

Basic principles of agarose electrophoresis, PAGE and SDS-PAGE, Two-dimensional electrophoresis, its importance. Isoelectrofocussing.

UNIT-V Spectroscopic Techniques

Beer-Lambert law, light absorption and its transmittance, determination and application of extinction coefficient, application of visible and UV spectroscopic techniques (structure elucidation and numericals excluded). Principle and application of NMR, ESR, Mass spectroscopy. Fluorescent and emission spectroscopy.

Immunological Techniques

Immunodiffusion, immunoelectrophoresis, radioimmunoassay, ELISA, immunofluores-cence.

PRACTICAL   M.M. 50

1. Preparation of standard buffers and determination of pH of a solution.
2. Qualitative tests for :
    a. Carbohydrates
    b. Proteins and amino acids
    c. Lipids
3. Determination of saponification value and iodine number of fats.
4. Extimation of ascorbic acid.
5. Titration curve for amino acids and determination of pK value;
6. Verification of Beer-Lambert's law.
7. Estimation of
    i) Carbohydrate by anthrone method.
    i) Blood glucose by the methods (a) Folin-Wu, (b) Nelson-Somogyi
8. Estimation of amino acids by ninhydrin method.
9. Isolation and assay of glycogen from rat liver.
10. i) Extraction of total lipids by Folch method
    i) Estimations of food adulterant.
11. Estimation of DNA and RNA.
12. Separation of sugars using paper chromatography.

Syllabus of Biotechnology

(B. Sc. I Year)

Session

2019-2020
2020-2021

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)
B.Sc.-I
BIOTECHNOLOGY
PAPER – I

BIOCHEMISTRY, BIOSTASTICS AND COMPUTERS

UNIT-I

1. Introduction to Biochemistry: History, Scope and Development.
2. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides.
3. Lipids: Structure, Classification and Function.

UNIT –II

1. Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.

2. Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application.

UNIT –III

1. Hormones: Plant Hormone-Auxin and Gibberellins and Animal Hormone-Pancreas and Thyroid.

2. Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain and β-oxidation of Fatty acids.

UNIT-IV

1. Scope of Biostatistics, Samples and Population concept, Collection of data-sampling techniques, Processing and Presentation of data.

2. Measures of Central Tendency: Mean, Median and Mode and Standard Deviation.
3. Probability Calculation: Definition of probability, Theorem on total and compound probability.

UNIT-V

1. Computers - General introduction, Organization of computer, Digital and Analogue Computers and Computer Algorithm.

2. Concept of Hardware and Software, Input and Output Devices.

3. Application of computer in co-ordination of solute concentration, pH and Temperature etc., of a Fermenter in operation and Internet application.

List of Books

1. Nelson and Cox (2005) Principles of Biochemistry, Fourth Edition
2. Todd and Howards Mason (2004) Text book of Biochemistry, Fourth Edition
3. Lubert Stryer and Berg ((2004) Biochemistry, Fifth Edition
4. Diana Rain, Marni Ayers Barby - (2006) Textbook on Q level Programming. 4th Edition.
5. Karl Schwartz: (2006) Guide of Micro Soft. Marina Raod, 4th Edition.
6. E Balaguruswamy by Programming in BASIC (1991).
7. RC Campbell by Statistics for Biologists. .
8. P Cassel et al by Inside Microsoft Office,
9. Statistical Methods, GW Snedecor and WG Cochran.
10. AC Wardlaw by Practical Statistics for Experimental Biologists,
11. JHZar by Bio-statistical analysis
12. RR Sokal FJ Rohlf by Introduction to Biostatistics
13. L Y Kun (2003) Microbial Biotechnology: Principles and applications
14. Khan and Khanum (1994) Fundamental of Biostastics

B.Sc.-I

BIOTECHNOLOGY

PAPER–II
CELL BIOLOGY, GENETICS AND MICROBIOLOGY

UNIT-I

1. Concept of life, Cell as a basic unit of living system and Cell theory.
2. Diversity of Cell shape and size.
3. Prokaryotic cell structure: Function and ultra structure of cell (Gram positive and Gram negative Bacteria), Plasma membrane, Flagella, Pilli, Endospore and Capsule.
4. Eukaryotic cell: Plant cell wall and Plasma membrane.

UNIT-II

1. Cytoplasm: Structure and Functions of Endoplasmic reticulum, Ribosome, Golgi complex, Lysosomes, Nucleus, Mitochondria and Chloroplast.
2. Cytoskeleton: Microtubules, Microfilaments and Intermediate filaments.
3. Cell division: Mitosis and Meiosis.
4. Programmed Cell Death.

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UNIT-III

1. Mendel's Laws of Inheritance.
2. Linkage and Crossing over.
3. Chromosome variation in number and structure: Deletion, Duplication, Translocation, Inversion and Aneuploidy, Euploidy (Monoploidy and Polyploidy and its importance).

UNIT-IV

1. History, Scope and Development of Microbiology.
2. Basic techniques of Microbial Culture
3. Microbial Growth & Nutrition of Bacteria: Isolation, media sterilization- physical and chemical agents, pure culture-pour plate method, streak plate method and spread plate method.
4. General features and Economic importance of Fungi, Algae and Protozoa etc.

UNIT-V

1. Bacterial Reproduction: Conjugation, Transduction and Transformation.
2. Mycoplasma – History, Classification, Structure reproduction & Diseases.
3. Viruses – Basic features, Structure, Classification, Multiplication, Bacteriophages (Morphology, life cycle, infection and medicinal importance)

List of Books

1. C.B. Power- Cell biology, First Edition (2005), Himalaya Publishing House.
2. Gereld Karp - Dell and molecular biology, 4th Edition (2005)
3. P.K. Gupta - Cell and molecular biology, Second Edition (2003), Restogi publications.
4. C.B., Oowar - Cell biology, Third Edition (2005) Himalaya Publishing Hosue.
5. S.S. Purohit - Microbiology : Fundamentals and Applications, 6th Edition (2004)
6. R.C. Dubey and D.K. Maheshwari: Practical Microbiology. S.Chand Publication.
7. R.C. Dubey and D.K. Maheshwari,Microbiology (2006). S.Chand Publication.
8. Tortora, Funke and Case - Microbiology, An introduction, sixth Edition (1995), Benjamin/Cummings Publishing Company.
9. Prescott, Harlyey and Klein - Microbiology, Third Edition, Wm. C. Brown Publishers (1996).
10. P. Chakraoborthy - Textbook of microbiology, Second Edition (2007).
11. Prescott, Harley and Klein - Microbiology. Third Edition. Wm. C. Brown.
12. Microbial Genetics, David Freifelder, John F Cronan, Stanley R Maloy, Jones and Bartlett Publishers.
13. Elements of Human Genetics. I.I. cavalla-Sfoeza, WA Benjamin Advanced Book Program.
14. S.K Jadhav and P.K. Mahish (2018) Prayogtmak Jaivprodyogiki awam Sukshmjivigyan-Chhattisgarh Hindi Granth Academy, Raipur.

List of Practical's

MICROBIOLOGY AND BIOCHEMICAL TECHNIQUES

(1) Laboratory rules, Tools, Equipment and Other requirements in Microbiological laboratory.

(2) Micrometry – Use of ocular & stage Micrometrer.

(3) Counting of bacteria by counting chamber, by plate count.

(4) Preparation of media and cultivation techniques:
    (a) Basic liquid media (broth)
    (b) Basic Solid media, (agar slants and deep tubes)
    (c) Demonstration of selective and differential media
    (d) Isolation and enumeration of micro organisms
    (e) Isolation from air and Soil

(5) Smears and staining methods:
    (a) Preparation of bacterial smear
    (b) Gram Negative & Positive staining

(6) Methods of obtaining pure cultures
    (a) Streak plate method
    (b) Pure plate method
    (c) Spread plate method
    (d) Broth cultures

(7) Growth & Biochemical techniques
    (a) Determination of bacterial growth curve
    (b) Amylase production test
    (c) Cellulose production test
    (d) Estimation of Sugar in given solution
    (e) Extraction and separation of lipids
    (f) Estimation of proteins
    (h) Mitosis and Meiosis

(8) Biostatistics:
    (a) By Manual and by computer.
    (b) Problems on mean, mode and median.

SCHEME OF PRACTICAL EXAMINATION

Time – 4 hrs.   **M. M.: 50**

1. Experiment based on culture of micro-organisms	15 Marks
2. Bacterial growth/Staining techniques	10 Marks
3. Biochemical techniques	05 Marks
4. Bio statistics	05 Marks
5. Spotting	05 Marks
6. *Viva – Voce*	05 Marks
7. Record/Sessional	05 Marks