C.O.E office 30/11/24 (Mon) KMV-II

Ex. ..i Code: 103305 Paper Code: 5154
(30)

Programme: Bachelor of Science
Semester-V

Course Title: Zoology (Developmental Biology)

Course Code: BSMM-5483 (I)

Time Allowed: 3 Hours **Max Marks: 30**

Note: Attempt five questions in all, selecting at least one question from each section (A to D). Fifth question can be attempted from any section. All questions carry equal marks (6). Draw diagrams wherever necessary.

Section A

1. Elaborate the process of fertilization. Explain with suitable examples and diagrams. 6
2. a) What do you understand by the term parthenogenesis. Explain its different types with the help of suitable examples and illustrations. 4
   b) Classify the type of ova based on amount of reserve food. 2

Section B

3. Elaborate various morphogenetic movements that occur during the process of gastrulation & discuss significance of gastrulation during development. 6
4. Explain the process of embryonic development and metamorphosis in Herdmania. 6

Section C

5. a) Write a detailed account of metamorphosis -in frog. 4

   b) Draw fate maps of Chick. 2
6. Explain the process of development up to three germinal layers in Frog. 6

Section D

7. Describe embryonic development in Rabbit with the help of well labelled diagrams. 6
8. Elaborate various types of placenta and their functions. 6

Exam Code: 103305 **Paper Code: 5155**
(30)

Programme: Bachelor of Science Semester-V

Course Title: Zoology (Genetics)

Course Code: BSMM-5483 (II)

Time Allowed: 3 Hours **Max Marks: 30**

Attempt five questions in all. Select at least one question from each section (A to D) respectively. Fifth question may be attempted from any section (A-D). Write legibly and Draw well labeled diagrams Wherever necessary. Each question carries equal (6) marks.

Section-A

1. Describe the Concept of Complementary genes with the help of suitable example. How they modify the F_2 Mendelian ratios. (6)
2. (a) Discuss the Concept of Multiple allelism with the help of example of Blood group inheritance in Humans.
   (b) What are Sex linked characters? Give examples. (3+3)

Section-B

3. (a) Give evidence in favor of semi-Conservative mode of DNA Replication.
   (b) Explain Wobble Hypothesis. (4+2)
4. Describe the role of Ribosomes in the process of protein synthesis. (6)

Section-C

5. Write short notes on-
   (a) Carcinogenesis (3)
   (b) Detection of mutations in Maize (3+3)
6. What are inborn errors of Metabolism? Discuss with reference to Alkaptonuria and Albinism. (6)

Section-D

7. (a) Describe Hardy Weinberg's law of genetical equilibrium. Enlist the factors which can alter genetical equilibrium.
   (b) Differentiate between transformation and transduction in Bacteria. (3+3)
8. Explain the following:
   (a) DNA Fingerprinting
   (b) Gene Cloning (3+3)

Exam Code: 103305 **Paper Code: 5156**

Programme: Bachelor of Science (Semester – V)

Course Title: Microbiology (Applied Microbiology-I)

Course Code: BSMM-5343

Time Allowed: 3 Hours **Maximum Marks: 60**

Note:- Attempt five questions in all, selecting atleast one question from each of the four sections (A-D).The fifth question may be attempted from any section. Each question carries 12 marks.

		Section A	
Q1	a.	Explain the contributions of Louis Pasteur to the field of fermentation and industrial microbiology.	6
	b.	What are the main sources of industrial microorganisms, and how are they selected for commercial use?	6
Q2	a.	Explain the different methods used to preserve stock cultures of industrial microorganisms.	6
	b.	Describe the role of microbial culture collections in industrial microbiology.	6
		Section B	
Q3	a.	Describe the primary screening methods used for isolating useful microorganisms.	6
	b.	What methods are used to isolate useful bacterial strains for industrial purposes?	6
Q 4	a.	Discuss briefly how production medium is optimized for microbial growth and product yield?	6
	b.	What are the essential characteristics of an ideal fermentation medium?	6
		Section C	
Q5	a.	Differentiate between submerged fermentation and solid-state fermentation.	6
	b.	Explain the role of aeration in fermentation and how it impacts microbial growth.	6
Q6	a.	What are the advantages and challenges of using fed-batch fermentation in industrial production?	6
	b.	Discuss the significance of analyzing market potential when designing an industrial fermentation process.	6
		Section D	
Q7	a.	Explain the importance of separating solid particles from fermentation broth in downstream processing.	6
	b.	Discuss the various methods of cell disruption used in downstream processing and their applications.	6
Q8	a.	Explain the principle of ion exchange chromatography and its role in the purification of fermentation products.	6
	b.	What are the essential components of a patent, and what subject matter can be patented?	6

Exam Code: 103305 **Paper Code: 5157**

Programme: Bachelor of Science (Semester – V)

Course Title: Chemistry (Inorganic Chemistry)

Course code: BSMM / BSNM – 5084 (I)

Time: 3 Hours **Max Marks: 30**

Instructions: Candidates are required to attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries equal (6) marks.

Section-A

1. (a) Describe the main idea of crystal field theory. Explain and show diagrammatically the crystal field splitting in tetrahedral complexes. (4)
   (b) Octahedral complexes have ~~less~~ more crystal field-splitting energy than tetrahedral complexes. Why? (2)

2. (a) Explain the factors that affect crystal-field splitting energy. Support your answer with suitable examples. (4)
   (b) Discuss the limitations of valence bond theory. (2)

Section-B

3. (a) Describe various types of magnetic behaviours along with suitable examples. (2)
   (b) Define magnetic susceptibility. Describe Faraday's method for the determination of magnetic susceptibility. (4)

4. (a) What do you mean by thermodynamic stability of metal complexes? Discuss various factors affecting the stability of metal complexes. (4)
   (b) Calculate the spin only magnetic moment of Cr^{2+} and Cu^{2+} ions. (2)

Section-C

5. (a) What are term symbols? Determine the term symbols for p^2 system. (4)
   (b) Write the spectroscopic ground state for d^3 and d^4 electronic configuration. (2)

6. (a) Describe the selection rules for d-d transitions. Why are these transitions considered as weak transitions? (4)
   (b) Draw the Orgel diagram for d^3 system in octahedral and tetrahedral fields. (2)

Section-D

7. (a) Discuss the preparation, properties and applications of alkyls and aryls of lithium. (4)
   (b) Define EAN rule. Show whether $Fe(CO)_5$ and $V(CO)_6$ follow the EAN rule or not. (2)

8. (a) What is homogenous catalysis? Discuss in detail the mechanism of the homogenous hydrogenation reaction. (4)
   (b) Classify the organometallic compounds based on the nature of the bonding involved. Give suitable examples. (2)

Paper Code: 5158

Programme	Exam Code	Course Code
Bachelor of Science (Medical)	103305	BSMM-5084 (II)
Bachelor of Science (Non-Medical)	103305	BSNM-5084 (II)

Semester- V

Course Title: Chemistry (Physical Chemistry) (40)

Time Allowed: 3 Hours **Max Marks: 30**

Note: Attempt five questions, selecting at least one from each section (A,B,C and D). The fifth question may be attempted from any section. Each question carries 6 marks.

SECTION-A

1. (a) Discuss the variation of molar conductivity with concentration for strong and weak electrolytes. (3)
   (b) State the postulates of Arrhenius theory of electrolytic dissociation. (3)
2. Describe briefly the principle of experimental determination of transference number by Hittorf's method. (6)

SECTION-B

3. (a) Define corrosion. Explain the electrochemical theory for the mechanism of rusting of iron. (3)
   (b) Derive the following equation for the pH of an acidic buffer. (3)

$$pH = pKa + \log\frac{[Salt]}{[Acid]}$$

4. (a) Write the half cell reaction and the overall reaction for the electrochemical cell Zn, Zn^{2+} (0.1 M) $|Cd^{2+}$ (0.001 M) | Cd and calculate the e.m.f. (the cell potential) at assuming ideality. The standard reduction potentials of redox couples Cd^{2+} |Cd and Zn^{2+} |Zn are -0.40 V and -0.76 V respectively. (3)
   (b) How do determine the pH of solution using Quinhydrone electrode. How is this electrode useful in determining the pH of a solution. (3)

SECTION-C

5. (a) How many α and β-particles will be emitted when $^{238}Ra_{88}$ changes to $^{212}Bi_{83}$? (3)
   (b) Explain the construction and working of 'Nuclear Reactor'. (3)
6. (a) Derive expression for disintegration constant and half-life period of a radioactive elements. What is expression for average life? What do you understand by 1 curie? (3)

   (b) How will you explain nuclear stability in terms of neutron/proton ratio. Represent stability belt graphically. Interpret the results from the graph. (3)

SECTION-D

7. (a) Discuss pure rotational spectra of diatomic molecules. (3)
   (b) Explain the formation of electronic band spectra with the help of potential energy curves? How are these curves useful in determining the dissociation energies of the molecules? (3)
8. (a) What do you understand by Rayleigh scattering, Stokes line, Anti-Stokes lines? (3)
   (b) What are P, Q, R branches of the vibration-rotation spectrum? (3)

Exam Code: 103305 **Paper Code: 5159**
(30)

Programme: Bachelor of Science
Semester-V

Course Title: Botany (Plant Physiology)

Course Code: BSMM-5075 (I)

Time Allowed: 3 Hours **Max Marks: 30**

Note: Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries equal (6) marks.

SECTION-I

1. Define transpiration? Explain the mechanism of transpiration in plants? 6
2. Differentiate between the following: -
   a. Macronutrients and micronutrients
   b. Symptoms of N and Mg deficiency in plants 3+3

SECTION-II

3. Writes a short note on: -

a. Seed dormancy
b. Florigen concept
c. photoperiodism 2+2+2

4. What is source-sink relationship? Describe the mechanism of phloem transport? 3+3

SECTION-III

5. What do you understand by photophosphorylation? Distinguish between cyclic and non-cyclic? 6
6. Explain the Calvin cycle in detail with well labelled diagram? 6

SECTION-IV

7. Discuss the role of: -
   a. Ethylene in fruit ripening
   b. Auxin in paithenocaipy 3+3
8. Define photomorphogenesis? Discuss the mechanism? 6

Exam Code: 103305 **Paper Code: 5160**
(30)

Programme: Bachelor of Science
Semester-V

Course Title: Botany (Biochemistry and Biotechnology)

Course Code: BSMM-5075 (II)

Time Allowed: 3 Hours **Max Marks: 30**

Note: Attempt FIVE questions in all, selecting at least ONE question from each section. The fifth question may be attempted from any section. Each question carries 6 marks.

Section-A

1. (a) Describe the classification of enzymes on the basis of reactions they catalyse. (3)
   (b) With the help of suitable examples, explain how coenzymes and cofactors affect enzyme activity. (3)
2. Explain the process of Kreb's cycle. (6)

Section-B

3. What is biological nitrogen fixation? Discuss the mechanism of this process (6)

4. (a) Describe the process of biosynthesis of fatty acids. (4)

(b) Write a brief note on functions of lipids. (2)

Section-C

5. Discuss the importance of cloning vectors in genetic engineering taking suitable examples. (6)
6. (a) Differentiate between genomic and cDNA library. Discuss their applications. (4)

(b) What are transposable elements? Write their importance. (2)

Section-D

7. (a) Briefly describe the vectors used for gene transfer in plants.

(b) Discuss the importance of marker genes with the help of suitable examples. (3,3)

8. Write notes on the following:

(a) Cellular totipotency and morphogenesis

(b) Achievements of plant biotechnology in crop improvement. (3,3)

COE office 25/11/24 (M) KMV-II

Exam Code: 103305 **Paper Code: 5161**

Programme: Bachelors of Science (Semester – V)

Course Title: Food Science and Quality Control

(Vocational) (Food Analysis)

Course Code: BSMM-5255

Time Allowed: 3 Hours **Max. Marks: 60**

Note: Attempt five questions in all, selecting atleast one question from each section. Fifth question may be attempted from any section. Each question carries 12 marks. Draw diagrams wherever required.

SECTION A

Q1. Write a comprehensive note on macronutrients present in food and their role in maintaining health. 12

Q2. Discuss the impact of following food processing techniques on the retention of major vitamins and minerals present in foods: 12

a. Pasteurization
b. Freezing
c. High Pressure Processing

SECTION B

Q3. a. What is the basic principle of flame photometry, and how does it work for mineral analysis. 6

b. Elaborate the general steps involved in the HPLC analysis of a vitamin sample, from sample preparation to data interpretation. 6

Q4. a. Explain how ICP-OES support analysis of micronutrient minerals in food and agricultural products. 6

b. Explicate the sensitivity and detection limit of ICP-OES for mineral analysis and compare it with Atomic Absorption Spectroscopy. 6

SECTION C

Q5. a. Explain the role of refractometry in assessing the quality and ripeness of fruits and vegetables 6

b. Differentiate in between Newtonian and non-Newtonian fluids. Discuss the common methods to measure viscosity of such fluids. 6

Q6. a. What is polarimetry, discuss the key components of a polarimeter and explain its working as an analytical technique. 6

b. What is food rheology. Discuss the working principle of rotational viscometer and its application in food rheology. 6

SECTION D

Q7. Describe the significance of gas chromatography in food analysis, its operational principles, key components and various types of detectors. 12

Q8. Differentiate in between reverse phase and normal phase chromatography also explain various factors influencing resolution and separation efficiency of complex samples. 12

Paper Code: 5162

Programme	Exam Code	Course Code
Bachelor of Science (Non-Medical)	103305	BSNM-5395 (I)
Bachelor of Science (Computer Science)	103305	BCSM-5395 (I)

Semester-V

Course Title: Physics (Condensed Matter Physics)

(30)

Time Allowed: 3 Hours **Max Marks: 30**

a. Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries 6 marks.

b. Students can use Non-Scientific calculators or logarithmic tables.

Section A

1. Explain the crystal structure of sodium chloride and diamond. Calculate the packing fraction for diamond and show that it has comparatively loose packing. (6)

2. (a) Why reciprocals of intercepts of the plane are taken to find Miller indices? (3)
(b) Show that [hkl] direction is normal to the plane (hkl) plane in a cubic crystal. (3)

Section B

3. Define the geometrical structure factor. How is it related to the atomic scattering factor? Write the structure factor for bcc crystal and account for missing (100) reflection. (6)
4. What is the reciprocal lattice? What is the advantage of using reciprocal lattice over the direct space lattice in the crystal structure analysis? Derive the expression for the primitive translation vectors of the reciprocal lattice. (6)

Section C

5. Obtain the expression for dispersion relation in case of mono-atomic linear chain of atoms. (6)
6. Discuss Einstein's theory of lattice heat capacity and explain why it is not capable of correct behaviour at low temperature. (6)

Section D

7. Explain the need of doping a pure semiconductor. Derive the expression for density of electrons in the conduction band for n type semiconductors. (6)
8. Discuss the formation of allowed and forbidden energy bands on the basis of the Kronig- Penny model. Discuss the extreme conditions when energy levels are either discrete or continuous. (6)

COE-31/12/24-KMV II (M)

Paper Code: 5163

Programme	Exam Code	Course Code
Bachelor of Science (Non-Medical)	103305	BSNM-5395 (II)
Bachelor of Science (Computer Science)	103305	BCSM-5395 (II)

Semester-V

Course Title: Physics (Electronics)

(30)

Time Allowed: 3 Hours **Max Marks: 30**

NOTE:- Attempt five questions selecting at least one question from each section. Fifth question can be attempted from any section. Each question of 6 marks. Use of log table and calculator is allowed.

SECTION-A

1. Draw labelled I-V characteristics of a p-n diode and derive diode equation expressing I-V relationship. 6
2. Explain the use of p-n junction as full wave bridge rectifier. What is its ripple factor, efficiency, and peak inverse voltage? Why PIV of a diode should be less than breakdown voltage? 6

SECTION -B

3. (a) Draw the circuit diagram and explain the input and output characteristics of a transistor in CB mode? What is early effect? 4

   (b) What is the accurate expression for collector current in a transistor. A transistor has $\alpha = 0.96$, leakage current 1.2 μA and collector current 0.932 mA. Find the emitter and base current in transistor. 2

4. Explain the working of n-channel FET with output and mutual characteristics. What are its parameters? 6

SECTION -C

5. What are h-parameters? Why are they so called? What are their advantages. Find their expressions for a CE transistor with equivalent circuit. 6

6. Describe the working and analysis of an emitter follower. What are its applications? 6

SECTION -D

7. (a) Why a tank circuit once excited does not produce sustained oscillations? State and prove Barkhausen. criterion for sustained oscillations. 3

(b) A phase shift oscillator consist of three identical RC sections in the feedback network. If in each section R is 200k Ω, C=0.01μF, calculate the frequency of oscillations. Why three RC sections are used? 3

8. Draw the circuit diagram of a Phase shift R-C oscillator. Derive the condition for sustained oscillations. What is the frequency of oscillations? 6