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(2033)

UG (CBCS) IIIrd Year Annual Examination

3290

B.Sc. CHEMISTRY

(Chemistry of Transition and Inner Transition Elements, Coordination Chemistry, Organometallics and Acids and Bases)

(DSE-2B)

Paper : CHEM 304 TH

Time : 3 Hours] **[Maximum Marks : 50**

Note :– Attempt *five* questions in all, selecting *one* question from each Section. All questions carry equal marks. Section–E is compulsory.

Section–A

1. (a) Transition metals exhibit variable oxidation states. Explain.

(b) Discuss diamagnetic behaviour of $[Co(NH_3)_6]Cl_3$.

(c) How is $KMnO_4$ prepared ? Discuss the reactions showing its oxidising behaviour. 3,3,4

2. (a) Actinides forms oxocations while lanthanides do not. Explain.

(b) What do you understand by Lanthanide contraction ? Discuss its main cause.

(c) Discuss the ability of actinides to form complexes. 3,4,3

Section–B

3. (a) Write the IUPAC names of the following co-ordination compounds :

(i) $[Pt(NH_3)_4(NO_2)Cl]SO_4$

(ii) $K[PtCl_3(C_2H_4)]$

(iii) $\left[(NH_3)_4 Co \begin{matrix} NH_2 \\ ONO \end{matrix} Co(NH_3)_4\right](NO_3)_4$

(b) What are the main postulates of Valence Bond Theory ?

(c) $[NiCl_4]^{2-}$ is tetrahederal while $[Ni(CN)_4]^{2-}$ is square planar. Explain on the basis of Valence Bond Theory. 3,3,4

4. (a) Calculate the effective atomic number for the following compounds :

(i) $[V(CO)_6]^-$

(ii) $Fe(\Pi C_5H_5)CO_3$

(b) Discuss the nature of bonding in metal carbonyl complexes.

(c) Molar conductance of $PtCl_4 \cdot 4NH_3$ in water corresponds to total of three ions. Write and explain the structure on the basis of Werner Theory. 2,4,4

Section–C

5. (a) Explain crystal field splitting in octahederal complexes.

(b) Whether a complex will be low spin or high spin depends upon the relationship between crystal field splitting (Δ) and pairing energy (P). Explain with examples.

(c) Write a short note on spectrochemical series. 4,3,3

6. (a) Discuss the bonding in $[CoF_6]^{3-}$ and $[Co(NH_3)_6]^{3+}$ on the basis of crystal field theory.

(b) What are the factors affecting the magnitude of CFSE ?

(c) Calculate CFSE for d^7 high spin and low spin octahedral complexes. 3,4,3

Section–D

7. (a) Explain Cady-Elsey concept of acids and bases.

(b) What do you understand by conjugate acids and bases ? Show that a strong acid has a weak conjugate base and vice-versa.

(c) What do you understand by Polarising power and polarisability ? Explain with examples. 4,3,3

8. (a) What are the points of difference between hard and soft acids ?

(b) Comment on the feasibility of the following reaction with reason :

$$SO_3^{2-} + HF \longrightarrow HSO_3^- + F^-$$

(c) Discuss the various factors which affects the hardness or softness of acids and bases. 3,3.4

Section–E

9. (i) The oxidation state of Cr in $Cr_2O_7^{2-}$ is ..... .

(ii) Sodium nitroprusside is paramagnetic in nature.

(True/False)

(iii) The divalent ion of 3*d* series having maximum magnetic moment is ..... .

(iv) What are transuranic elements ?

(v) What are ambidentate ligands ?

(vi) Oxidation number of Co in $K_3[Co(CN)_6]$ is ..... .

(vii) What is EAN rule ?

(viii) Write down the full form of EDTA.

(ix) Define Acid and Base on the basis of Lux-Flood concept.

(x) SO_3 behaves as a Lewis acid. (True/False)

1×10=10

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UG (CBCS) IIIrd Year Annual Examination

3316

B.Sc. ZOOLOGY

(Immunology)

(DSE-IB)

Paper : ZOOL 302 (B) TH

Time : 3 Hours] **[Maximum Marks : 50**

Note :- Attempt *five* questions in all, selecting *one* question each from Sections B, C, D and E. Question No. 1 of Section-A is compulsory.

Section-A

(Compulsory Question)

1. Fill up the following with suitable terms or words :

   (i) Small pox vaccine was first discovered by ..... .

   (ii) In CD_4 cells, term CD stand for ..... .

(iii) Most abundant Immunoglobulin type in normal human serum is ..... .

(IgA, IgE, IgG, IgM)

(iv) Name a function of dendritic cells.

(v) Full form of ELISA is ..... .

(vi) What is MHC ?

(vii) Cytokines produced by lymphocytes is known as ..... .

(viii) What is AIDS ?

(ix) What are Antibodies ?

(x) What is Leukocytosis ? 1×10=10

Section–B

2. (a) What are Immunoglobulins ? Describe *five* types of immunoglobulins in detail.

(b) What are basic properties of antigens ? Classify the antigens. 6+4=10

3. (a) Describe in detail the Secondary lymphoid organs of immune system.

(b) Describe important historical milestones of immunology. 5+5=10

Section–C

4. (a) Give detailed account of structure and functions of MHC.

(b) Give a comprehensive account of autoimmunity and autoimmune diseases. 5+5=10

5. (a) Describe exogenous pathways of antigen presentation and processing.

(b) What are Cytokines ? Write about basic properties and functions of cytokines in brief. 5+5=10

Section–D

6. (a) How, Antigen-antibody interactions serve as a tool for research and diagnosis ? Describe and also give examples.

(b) Describe the basic properties of antigens. 6+4=10

7. (a) Give a comprehensive account of complement system components.

(b) Describe B and T cell epitopes. 6+4=10

Section–E

8. (a) Describe monoclonal antibodies. What are the applications of these antibodies ?

   (b) Differentiate between each of the following :

   (i) Natural and Acquired Immunity

   (ii) Functions of B cells and T cells 6+4=10

9. (a) What are hypersensitivity reactions ? Differentiate between type-I, II, III, IV hypersensitivity reactions. Also give examples.

   (b) Describe principles and main components of immune system. 6+4=10

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UG (CBCS) IIIrd Year Annual Examination

3307

B.Sc. BOTANY

(Cell and Molecular Biology)

(DSE-1B)

Paper : BOTA 303

Time : 3 Hours] **[Maximum Marks : 50**

Note :– Attempt *five* questions in all. Q. No. **1** is compulsory. Attempt *one* question from each Section–B, C, D and E. All questions carry equal marks.

Section–A

(Compulsory Question)

1. Do as directered :

   (i) ..... microscope enable to study living cells.

   (ii) Cell was discovered by ..... .

   (iii) Which cell organelle is protein factory of cell ?

(iv) Nucleolus was discovered by ..... .

(v) Crossing over occurs during ..... stage.

(vi) Middle lamella is made up of ..... and ..... .

(vii) DNA replication occurs during ..... phase.

(viii) Name the purines present in DNA.

(ix) Which enzyme is responsible for DNA replication ?

(x) Name the initiation codon. 1×10=10

Section–B

2. (a) Draw well labelled prokaryotic cell. Differentiate between prokaryotic and eukaryotic cell.

(b) How is light microscope differ from electron microscope ?

(c) Define resolving and magnifying power of microscope. 5+3+2

3. (a) Describe ultrastructure and function of chloroplast.

(b) What do you mean by semiautonomous nature of mitochondria ?

(c) Describe the marker enzymes of mitochondria. 5+3+2

Section–C

4. (a) Discuss the structure and functions of endoplasmic reticulum.

(b) Explain briefly packaging of DNA in eukaryotes.

(c) Differentiate between Heterochromatin and Euchromatin. 5+3+2

5. (a) Describe the structure and functions of cell wall.

(b) Name the proteins and their functions present in cell membrane.

(c) What is selective permeable ? 5+3+2

Section–D

6. (a) Describe the cell cycle and its check points.

(b) Draw well labelled diagrams of Zygotene and Pachytene.

(c) What is B-DNA ? 5+3+2

7. (a) What is DNA replication ? Explain the various steps of replication of DNA.

(b) Differentiate between RNA and DNA.

(c) Write a short note on Satellite DNA. 5+3+2

Section–E

8. (a) Define Translation. What are different steps in Protein Synthesis ?

(b) What is Genetic Code ? What are the characteristics of a genetic code ? 6+4

9. (a) Explain gene regulation in Prokaryotes with respect to Tryptophan Operon.

(b) Give the structure and functions of *m*-RNA. 6+4

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UG (CBCS) IIIrd Year Annual Examination

3305

B.Sc. BOTANY

(Economic Botany and Biotechnology)

(DSE-1A)

Paper : BOTA 301

Time : 3 Hours] **[Maximum Marks : 50**

Note :– Attempt *five* questions in all, selecting *one* question from each of the Sections–B, C, D and E. Question No. 1 of Section–A is compulsory. Attempt all subparts of a question together.

Section–A

(Compulsory Question)

1. Do as directed :

(i) The source of cotton fibre is ..... .

(a) Roots (b) Stems

(c) Leaves (d) Seeds

(ii) Give the botanical name of rice.

(iii) The vegetative propagation in sugarcane is done by ..... .

(a) panicle (b) root

(c) stem (d) bulbils

(iv) Expand the term IARI.

(v) Crushing, tearing and curling (CTC) are common method applied for the manufacturing of tea. (True/False)

(vi) Organogenesis refers to :

(a) Formation of callus tissue

(b) Formation of roots and shoots from callus

(c) Both (a) and (b)

(d) None of the above

(vii) ..... is used for sterilization of media.

(a) Incubator (b) Refrigerator

(c) Laminar air flow (d) Autoclave

(viii) ELISA stands for ..... .

(ix) Southern blotting technique is used to detect ..... sequence in tissue sample.

(a) DNA (b) RNA

(c) Protein (d) Starch

(x) Which of the following is not used as a vector for cloning of DNA ?

(a) pBR322 (b) RAPD

(c) YAC (d) EMBL3 1×10=10

Section–B

2. (a) Write a brief note on the major research institute of crop plants of India. 5

(b) Write short notes on the following :

(i) Dry cultivation and wet cultivation of rice.

(ii) Origin of wheat. 2½+2½

3. (a) Write the botanical name, family and part used of five common spices.

(b) Define Pulses. Give the uses of Soyabean. 5,5

Section–C

4. Write short notes on the following :

(a) Non-alcoholic beverages

(b) Groundnut 5×2=10

5. Write a botanical name, family, part used and medicinal property of *five* medicinal plants. 10

Section–D

6. Write short notes on the following :

   (a) Haploid production

   (b) Eembryo culture 5×2=10

7. (a) Describe the steps required for plant tissue culture.

   (b) Discuss the application of plant tissue culture in agriculture. 6,4

Section–E

8. (a) What is *r*-DNA ? Write in brief the basic steps involved in cloning.

   (b) What are transgenic plants ? What role will such plants play in future crop improvement programmes ? 5,5

9. Write short notes on the following :

   (a) Monoclonal antibodies

   (b) PCR 5×2=10