UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

8th Semester

Course No. : BSCH - 801

(Organic Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions)

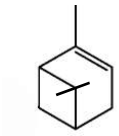
1. (a) Describe the phenomenon of resonance in NMR spectroscopy. 3

   (b) What is vicinal coupling? Write down the Karplus equation and explain the parameters involve in the equation. 4

   (c) Which of the following nuclei are NMR active 12_C , 13_C , 16_O , 11_B , 14_N , 15_N , 19_F , 31_P 2

   (d) Define chemical shift. 1

2. (a) "α-pinere has three methyl groups". Comment on the chemical shift of three different types of methyl proton in α-pinere 3



α-pinene

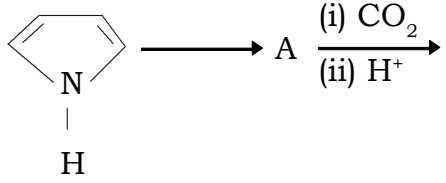
(b) Comment on the NMR spectra of N. N-dimethyl formanide recorded at room temperature and at high temperature (~ 130^0c) 3

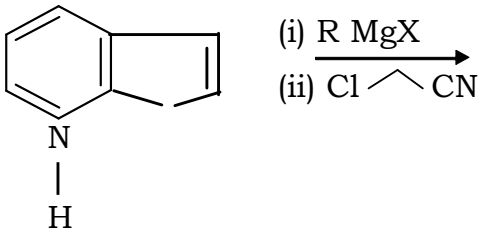
(c) Write a note on how hydrogen bording influences chemical shift position in a proton NMR spectrum. 2

(d) Why TMS is the universally accepted reference in proton and $13_{C\text{ - NMR}}$ 2

3. (a) How benzylic Grignard reagent reacts with formaldehyde. Provide mechanism. 4

(b) Write down the products of the following reactions. (provide mechanism) 3+3=6

(i) 

(ii) 

10. (a) What is Carboxypeptidase A? Give one example of reaction catalysed by carboxy peptidase A. 1+3=4

(b) How NAD^+ oxidize a substrate? Provide mechanism. 4

(c) Describe the nature of hydrogen bonding among the DNA- bases. 2

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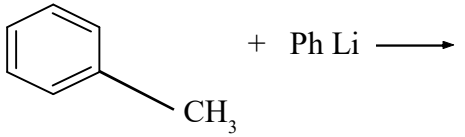
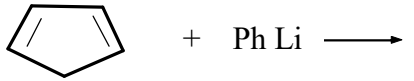
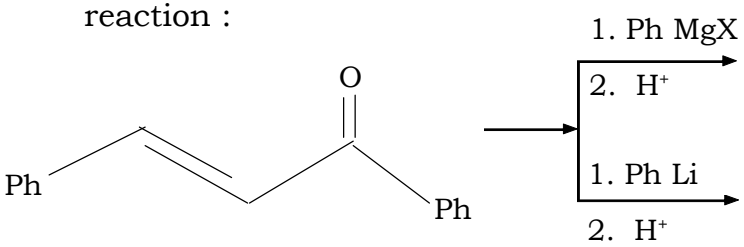
4. (a) Complete the following reaction : 2





(b) Write down the products for the following reaction : 4



(c) Compare the reactivity of CO_2 with Grignard reagent and Organolithium compounds. 4

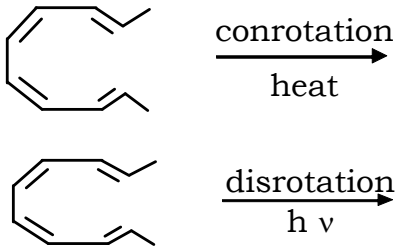
5. (a) What is the endo-rule as applied to Diels-alder reaction? Explain with suitable example. 5

(b) "Diels alder reaction is a stereo-specific". Explain with suitable example. 5

Or

6. (a) What is sigmatropic reaction? Describe the process of supra facial and antara facial migration in sigmatropic reactions. 1+4=5

(b) Write down the products for the following reactions : 5



7. (a) What is Sulpha-Drug? Give one example. 3

(b) Provide one method of poeporation of paracetamol. What is the pharmaceutical importance of paracetamol. 3+2=5

(c) Explain the pharmaceucial importance of "Dapsone" 2

Or

8. (a) What are antibiotics? Give one example of β-lactum antibiotic and provide its structure. 1+2=3

(b) What is API. 2

(c) Provide one method of synthesis of Aspirin. What is the pharmaceutical use of Aspirin? 3+2=5

9. (a) Describe the secondary structure of DNA with clear diagram. 5

(b) Write down any five basic principle of Green chemistry. 5

Or

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (HONOURS)

8th Semester

Course No. : BSPH - 801

(Cosmology and Nuclear Quantum Mechanics, Astrophysics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Normalize the wave function $\psi = A \exp(-ax^2)$ where A, a are constant.

   (b) For a given wave function $\psi = \frac{A}{r} e^{ikr}$ evaluate the expression for current density J.

   (c) Write short notes on group velocity and phase velocity. 4+4+2=10

Or

2. (a) Explain Ehrenfest theorem.

   (b) How to evaluate the expectation value of a anantum mechanical operator. 8+2=10

3. (a) Derive an expression for the normalized wave function and energy of a particle movins in a potential v(x) where,

$v(x) = 0 \quad -a < x < a$

$= \infty \quad |x| > a$

(b) Derive an expression for the reflection (R) and transmission (T) coefficient of a particle moving in a potential v (x).

$v(x) = 0 \quad x < 0$

$= V_0 \quad x > 0$

Hence show that $R + T = 1$ 4+6=10

Or

4. (a) Explain the phenemenon of quantum tunneling.

(b) Derive an expression for the normalized wave function and energy of a free particle in one dimensional infinite potential wall. 4+6=10

5. (a) Derive an expression for the maximum probility of a linear harmonic oscillator at its ground state.

(b) A linear harmonic oscillator is oscillations under a potential $v(x) = \frac{1}{2} kx^2 + cx$, derive an expression for its ground state energy eigen values. 4+6=10

Or

6. Derive expressions for the following physical parameters for an hydrogen atom at its ground state

(a) $< r >$

(b) $< r^2 >$

(c) $< r^5 >$ 4+3+3=10

7. Write short notes on: 5+5=10

(a) Defuse Nubelae

(b) Emission Nubelae

Or

8. Describe P.P. and CNO chain. 5+5=10

9. (a) Show that 1 U = 931.5 Mev

(b) Write short notes on : 2+4x2=10

(i) Nuclear magnetic moment

(ii) Electrical anadrupole moment.

Or

10. Explain the Big-Bang theory and the study state of universe. 10

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Or

4. Discuss in details the various principles of integrated pest management strategies in agriculture. 10

UNIT - III

5. Describe the life cycle of action and pathogenesis of Leishenaniasis. 10

Or

6. Describe the life cycle, mode of actions and pathogenesis of Echinococcosis. 10

UNIT - IV

7. In details write about the clinical manifestations, pathogenesis and epidemiology of small pox in India. 10

Or

8. Discuss the various eradication programs in India. What actions have been taken by the government of India to eliminate epidemic diseases? 5+5=10

UNIT - V

9. How duck and fish integration can be beneficial under integrated farming system. Discuss in details. 10

Or

10. Discuss in details the various technologies applied for fisheries development at Beels. 10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (HONOURS)

8th Semester

Course No. : BSZH - 801

(Applied Zoology)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. Differentiate between -
   (a) Oligonyclus coffeae and sitophilus oryyae
   (b) Irogoderma granarium and callosbruchus chinensis 5+5=10

Or

2. Discuss the various methods and precautions for preventing tea pest mites and stored grain pest infection. 5+5=10

UNIT - II

3. What is the nature of damage of Gandhi bug and what are its biological control methods. 10

4. (a) Describe different types of taxonomic publications. 6

   (b) Describe the procedure of making herbarium specimen. 4

5. (a) What is type method? Describe various types of specimens. 6

   (b) Describe the principles of ICBM. 4

Or

6. (a) What is meant by taxonomic keys? Describe different types of taxonomic keys. 1+6=7

   (b) Explain principle of priority. Give its limitations. 3

7. Write note on :

   (a) Biocode 5

   (b) Prinitice Existing Angiospersm 5

Or

8. Write note on :

   (a) Usage of Computer in Plant Identification 5

   (b) Evolution of Angiosperms. 5

9. What is numerical taxonomy? Explain its applications. List its merits and demerits. 4+4+2=10

Or

10. How embryology is related to taxonomy. Describe embryological character used in plant identification. Give its application. 4+4+2=10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (HONOURS)

8th Semester

Course No. : BSBH - 801

(Biogogy & Systematics of Angiosperms)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Explain the components of systematics. 5

   (b) Discuss species as basic unit of taxonomy. 3

   (c) Give important features of hierarchical system of classification. 2

Or

2. (a) Describe taxonomic category & groups. 3

   (b) Explain evolutionary species concept. Describe its advantages and disadvantages. 4

   (c) What are the objectives of systematics. 3

3. (a) What is herbarium? Describe utility of herbarium is plant systematics. 2+4=6

Or

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

4th Semester

Course No. : BSCH - 401

(Inorganic Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Write down the primciple of ion exchange method of analysis. How lanthanides can be separated by this techniques. 3+4=7

   (d) Write down the principle of flame photometry. 3

Or

2. (a) Write a detailed note on portland cement. 5

   (b) Write a note on the manufacturing process of nitrolim. 5

3. (a) Consider the covalent bonding in the diatomic hydrogen molecule and justify why of all sharing of electrons gives mise to the formation of a stable bond. 5

(b) Write a brief account on valance bond theory. 5

Or

4. (a) Using VSEPR theory nationalize why Bcl_3 and Ncl_3 do not adopt similar structure? 3

(b) Which of the following in each pain will have the langer bond angles?
NH_3 , NF_3 ; OF_2 , Ocl ; PH_3 , NH_3 3

(c) Write a brief note on dipole-dipole interaction. 4

5. (a) Write brief notes on n-type and p-type semiconductors with suitable examples. 4+4

(b) Define insulator with example. 2

Or

6. (a) Describe Drude-Lorentz theory of metals. 6

(b) 'Peroxide anion is diamagnetic in nature'. Justify using MO diagram. 4

7. (a) Write down the IUPAC name and structure of the following complexes :
$[WF_5 N (CH_3)_2]$ and $(NH_4)_2 [VO(C_2O_4)_2]$ 2+2=4

(b) How to stabilize the less familian higher and lower oxidation states of first row transition metal (include one example each)? 3+3=6

Or

8. (a) Write a brief note on porphymin ligand (include structure). 3

(b) Give name and structure of one hexadentate ligand. 2

(c) Write a detailed note on stercoismerism of coordination complexes. 5

9. (a) Write down the postulates of Molecular Orbital Theory (MOT). 5

(b) Although oxygen is more electronegative than carbon in the CO molecule, why the negative end of the dipole is on the C atom? Justify with MO diagram. 3

(c) Define overlap integral. 2

Or

10. (a) Write a detailed note on greenhouse effect. 5

(b) What is pH? 2

(c) Write a brief note on the toxic effects of Hg. 3

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(b) Write the differences between the first order and second order phase transitions. 2

(c) Derive the relation 2

$$C_2 - C_1 = \frac{dL}{dT} - \frac{L}{T}$$

where L is the latent heat.

9. (a) Find the elctric field as a point inside a uniformly changed solid sphere of radius R and change density & using Gauss's law. 4

(b) Show that the solution of $\bar{\nabla}^2 V = 0$ in spherical polar coordinate system is 6

$$V(r,\theta) = \sum_{l=A}^{\infty} \left(A_l\, r^l + \frac{B_l}{r^{l+1}}\right) p_l(\cos\theta)$$

where $p_l(\cos\theta)$ is Legendre polynomial.

10. (a) Obtain the multipole expansion of V in powers of h and identify the octopole term. 6

(b) Find the capacitance of a parallel plate capacitor filled with a dielectric medium of dielectric constant. 4

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (HONOURS)

4th Semester

Course No. : BSPH - 401

(Heat, Thermodynamics & Electrostatics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Show that the man free path of a gas is $\lambda = \frac{1}{n\pi d^2}$ where the symbols have their usual meanings. 3

(b) Derive the relation for pressure exerted by a gas.

$$p = \frac{1}{3}\varrho\, c^2 \quad where \quad c^2 = \frac{c_1^2 + c_2^2 + \ldots\ldots c_n^2}{n}$$ 7

Or

2. (a) Derive Vander Waal's equation of state of gas.

$$\left(p + \frac{a}{v^2}\right)(v - b) = RT$$ 5

(b) Show that the coefficient of diffusion of gas is 5

$$D = \frac{2}{3}\ \frac{1}{d^2 p\sqrt{m}} \left(\frac{KT}{\pi}\right)^{3/2}$$

3. (a) Derive the one dimensional heat conduction equation 5

$$\zeta c\, \frac{dT}{dt} - K \frac{dT}{dx^2} = 0$$

(b) Define emissive power of black body. 1

(c) State and prove Kinchhoff's law of blackbody radiation. 4

Or

4. (a) Explain ultra-violet (uv) catastrophe of blackbody radiation. 2

(b) Deduce Rayleish-Jean's law of blackbody radiation from Planck's law. 2

(c) Derive Wein's displacement law of blackbody radiation from Planck's law. 6

5. (a) Derive the work done in the isothermal process. 5

(b) Show that the change in entropy in adiabatic process is 5

$$S_2 - S_1 = R\ \left(\frac{\nu}{\nu - 1}\right) \log_e \left(\frac{V_2}{V_1}\right)$$

Or

6. (a) Derive the relation C_P - C_V = nR. Explain why $C_P > C_V$. 5

(b) Show that the entropy of perfect gas is 5
S = C_P Cos $_e$V + C_V Cos $_e$P + Const.

7. (a) Write the physical significance of thermodynamic potentials. 2

(b) Obtain the relation 2
dA = - SdT - PdV
where A = Helmhottz free energy. 2

(c) Derive Maxwell's thermodynamic relations 3+3=6

(i) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial s}\right)_V$

(ii) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_P$

Or

8. (a) Derive the following Tds equations. 3+3=6

(i) $Tds = C_p dT - T\left(\frac{\partial V}{\partial T}\right)_P dP$

(ii) $Tds = C_v \left(\frac{\partial T}{\partial P}\right)_V dP + C_v \left(\frac{\partial T}{\partial V}\right)_P dV$

Or

4. What is photorespiration. Describe the mechanism of photorespiration with reactions. Add a note on metabolic significance of photorespiration. 1+5=6

5. (a) Add a note on phloem loading and unloading of photosynthate with suitable model. 6

   (b) Write the differences between symplastic and apoplastic transport. 4

Or

6. (a) Discuss the process of modulation and nitrogen fixation in legumes. Add a short note on nif gene. 7+3=10

7. (a) With suitable diagram describe the different structure of protein. 5

   (b) Explain the post-translational modification of proteins. 5

8. Describe the kinetics of enzyme action and explain their regulation of enzyme activity. 5+5=10

9. Write short notes on : 5x2=10

   (i) Plant senescense and fruit ripening

   (ii) Photoperiodism

Or

10. Describe the physiological role and mechanism of action of auxin. 10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (HONOURS)

4th Semester

Course No. : BSBH - 401

(Plant Physiology and Biochemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Discuss the theories of Ascent of Sap with suitable model. 5

   (b) Explain the factors that affect the rate of transpiration. 5

Or

2. (a) What is mineral nutrition? What do you mean by micro and macro elements? 2+3=5

   (b) Write the deficiency symptoms and physiological role of suffer and manganese. 5

3. (a) Briefly describe non-cyclic photo phosphorylation with schematic model. 5

   (b) Differentiate between photosystem I and photosystem II. 5

5. Write a detail account on the different separation techniques used in biology. 10

Or

6. Write short notes on the following : 5x2=10
   (a) Spectrophotometry
   (b) Phase contrast microscopy.

7. Describe the laboratory facilities required to maintain animal cell and tissue culture. 10

Or

8. Write short notes on the following : 5x2=10
   (a) Cell lines and its maintenance
   (b) Cell culture media

9. Describe the different measures of central tendancy used in biostatistics. 10

Or

10. Differentiate between the following : 5x2=10
    (a) Standard error and standard deviation
    (b) Correlation and regression.

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (HONOURS)

4th Semester

Course No. : BSZH - 401

(Physiology, Endocrinology, Biotechniques & Biost)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Describe the mechanism of nerve impulse transmission. 10

Or

2. Write short notes on the following : 5x2=10
   (a) Mechanism of muscle contraction
   (b) Types of sensory receptors.

3. Discuss the mechanism of action hormones with suitable diagram. 10

Or

4. Write a brief account on the following : 5x2=10
   (a) Gastrointestinal hormones.
   (b) Structure of pituitary gland.

7. Describe Raoult's law. 10

Or

8. Write note on abnormal colligative property. 10

9. Discuss about different types of degrees of freedom. 10

Or

10. What is the Maxwell Boltzmann distribution of rotational spectra. 10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

6th Semester

Course No. : BSCH - 601

(Physical Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Elucidate Langmuir adsorption isotherm. 10

Or

2. What is BET isotherm? 10

3. Explain different concepts associated with partially miscible liquid mixture. 10

Or

4. State Nernst distribution law. 10

5. Calculate the equilibrium constant for a reaction with increase in stoicheometric coefficient. 10

Or

6. What will be the equilibrium constant when stoicheometric coefficient of a reaction decreases? 10

8. (a) Write an algorithm to find the solutions of a quadratic equation. Also draw its correcponding flowchart. 4+3=7

   (b) Write the MATLAB program to find the solutionof a given quadratic equation 3

$$ax^2 + 6x + c = 0$$

9. Find the general solution of Legendre's differential equation using series solution method. 10

Or

10. (a) Show that x = 0 is a regular singular point of D.E 2

$$2x^2 \frac{d^2y}{dx^2} + 3x \frac{dy}{dx} + (x^2 - 4)\, y = 0$$

   (b) Find solution about x = 0 of the D.E 8

$$3x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = 0$$

using series solution method.

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (HONOURS)

6th Semester

Course No. : BSPH - 601

(Theory of Relativity, Computational Physics & Mathematical Physics II)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) State two fundamental postulates? Special theory of relativity. 2

   (b) Show that the Lorentz transformation reduces to Galilean transformation when $v << c$. 2

   (c) Using the Lorentz transformation equations derive the relation $L = L_o \sqrt{1 - \beta^2}$ 6

where L_o = proper length and $\beta = \frac{v}{c}$

Or

2. (a) Derive the transformation equations of velocities:

$$u_x' = \frac{u_x - v}{1 - \frac{vu_x}{c^2}}$$

$$u_y' = \frac{u_y\sqrt{1-\beta^2}}{1-\frac{vu_x}{c^2}}$$

$$u_z' = \frac{u_z\sqrt{1-\beta^2}}{1-\frac{vu_x}{c^2}}$$

(b) Two spacecrafts A and B are moving away from earth in the same direction with speed 0.8c and 0.6c respectively. Find the velocity of B with respect to A. 2

3. (a) Show that the maximum relative error in the measurement of acceleration due to gravity using Kater's pendulum is 8

$$\frac{\Delta g}{g} = \frac{\Delta l_1 + \Delta l_2}{l_1 + l_2} + \frac{2(T_1\,\Delta\,T_1 + T_2\,\Delta\,T_2)}{T_1^{\,2} + T_2^{\,2}}$$

(b) If $\Delta l_1 = \Delta l_2 = 0.1$cm, $\Delta T_1 = \Delta T_2 = 0.001$ sec, T_1=1.51 sec, T_2=1.50 sec and l_1+l_2=56.2 cm, then calculate the maximum relative error and percentage error. 2

Or

4. (a) What is conditional probability? Explain withdiagram. 3

(b) Define continuous random variable. Find the constant a such that the function

$$f(x) = \begin{cases} \lambda x^2, & 0 < x < 3 \\ 0, & otherwise \end{cases}$$

is a probability density function. 4

(c) Find the probability that a single toss of a die will result in a number less than 4 if (i) no other information is given (ii) it is given that toll resulted in an odd number. 3

5. (a) Derive the Newton-Raphson method for finding the solution of an equation $f(x) = 0$ 4

(b) Use Newton - Raphson method to find the solution of $x^3 - 5x + 3 = 0$ upto 3rd ituation. [Take $x_0 = 3$] 6

Or

6. (a) Evaluate the integral using the trapezoidal method. 2

$$I = \int_0^3 e^{-x^2}\,dx$$

(b) Derive Simpson's 1/3 rule of integration. 8

$$I = \frac{h}{3}\,[f(a) + 4\,f(c) + f(b)]$$

$$\text{where } C = \frac{a+b}{2}$$

7. (a) What is an algorithm? Write the advantages of the algorithm. 2+2=4

(b) Write the algorithm to find the largest of three numbers. Also draw its corresponding flowchart. 3+3=6

Or

4. Write notes on : 5

   (a) Pure culture methods 5

   (b) Plant virus transmission

5. (a) Explain the classification of plant virus. 5

   (b) Describe in detail the conjugation process in bacteria. 5

Or

6. (a) Describe the symptoms of virus infection in plants using suitable examples. 5

   (b) What are actinomycetes? Describe their economic importance. 3+2=5

7. Write notes on :

   (a) Microbial production of citric acid. 5

   (b) Microbe yielding antibiotics. 5

Or

8. Write notes on :

   (a) Bio-pesticidal microbes. 5

   (b) Spoilage of milk products by microbes. 5

9. (a) Describe role of microbes in sulphur cycle. 5

   (b) What are plant growth promoting rhizo bacteria? Describe their useful roles. 1+4=5

Or

10. (a) Explain myconhiza. Describe their importance. 3+2=5

    (b) Describe microbe used as bio-fertilizers. 5

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (HONOURS)

6th Semester

Course No. : BSBH - 601

(Microbiology)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Describe the characteristic features of different types of prokaryotic micro-organisms. 5

   (b) Explain the methods for estimation of microbes. 5

Or

2. (a) Explain bacteria based on mode of nutrition. 5

   (b) Describe the physical means to control microorganisms. 5

3. Write notes on :

   (a) Bickettsia 5

   (b) Bacterial growth curve 5

Or

Or

4. Describe the phenomenon and types of colouration and mimicry in animals. 10

UNIT - III

5. What are the major factors affecting wetland loss and degradation? Describe the ramsar convention and its purpose in India. 5+5=10

Or

6. What are the various national programs taken by India for conservation and management of wetlands? 10

UNIT - IV

7. Describe the concept, approaches and theories of 'Origin of Life'. 10

Or

8. Describe the phylogeny of evolutionary stages of horse and elephant. 5+5=10

UNIT - V

9. Describe the mode of action of pesticides and metals. 5+5=10

Or

10. Describe the mode of action of carcinogens and poisons. 5+5=10

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2023/EVEN/07/20/BSZH–601/

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (HONOURS)

6th Semester

Course No. : BSZH - 601

(Environmental Biology, Evolutionary Biology & Toxicology)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. How energy flow can be explained with the help of single channel energy model and y-shaped energy model. 5+5=10

Or

2. Explain the carbon and nitrogen cycles (with diagram) in details. 5+5=10

UNIT - II

3. Differentiate between : 5+5=10

   (a) Cursorial and Fossorial adaptation

   (b) Arid and Arborial adaptation

7. Write down the structure and usage of DDT and BHC. 5x2=10

Or

8. Give five synthetic route of alcohol. 5x2=10

9. Write a note on Hess's law. 10

Or

10. Discuss about hardware and software of computer. 5x2=10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

2nd Semester

Course No. : BSCH - 202

(General Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Write note on two oxoacids of Nitrogen. 5x2=10

Or

2. Write note on two oxides of Bromine. 5x2=10

3. How will you explain that KM_nO_4 is used as oxidant in redox reactions? 10

Or

4. Elucidate the confirmatory tests of basic radicals. 10

5. Explain the concept of simple axis of symmetry and inversion centre. 5+2=10

Or

6. Write note on Fischer and Newman projection formulae. 5x2=10

(c) Show that Newton's lens equation 5

$$x_1 x_2 = f_1 f_2$$

9. (a) Find the general solution of damped harmonic oscillator with a damping constant μ. And discuss its solution in 8

(i) Overdamped condition ($\mu > \omega_0$)

(ii) Underdamped condition ($\mu > \omega_0$)

(b) What is logarithmic dewment of damped oscillation? 2

Or

10. (a) Show that the amplitude of damped forced oscillator is given by 6

$$A = \frac{F_0/m}{\sqrt{(\omega_0{}^2 - \omega^2)^2 + 4\mu^2\omega^2}}$$

(b) What is amplitude resonance? Show that Q-factor is $Q = \frac{\omega_0}{2\mu_0}$ at resonance. 4

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (HONOURS)

2nd Semester

Course No. : BSPH - 202

(Mathematical Physics, Geometrical Optics, Waves & Oscillation)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Find the value of n for which the vector $r^n \vec{r}$ is solenoidal, where $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$ 4

(b) What is directional derivative of a scalar function ϕ ? 1

(c) Find the directional derivative $\phi(r) = \frac{1}{r}$ at (1, -1, -1) in the direction $\vec{r}$. 5

Or

2. (a) Write the volume elements : 2

(i) spherical polar coordinate system

(ii) cylindrical coordinate system.

(b) Obtain the unit vectors $\hat{r}, \hat{\theta}$ and $\hat{\phi}$ in spherical polar coordinate system. 3

(c) State Gauss' divergence theorem. Demonstrate the divergence theorem physically. 5

3. (a) Defin Fourier series of the function $f(x)$ in the interval $[-\Pi, \Pi]$ 1

(b) Find the Fourier series of the function f(x) defined by $f(x) = x$, $0<x<2\Pi$. Also sketch its graph from $x = -4\Pi$ to $x = 4\Pi$ 6

(c) State Gamma function. Show that 3

$\Gamma(n+1) = n\Gamma(n)$

$\Gamma(n+1) = n!$

Or

4. (a) Define orthogonal matrix. 1

(b) Show that $A = \frac{1}{3}\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$

is an orthogonal matrix. 1

(c) Find the eigen values and eigen vectors of the matrix A. 5

$$A = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

5. (a) State Fermat's principle of light. 1

(b) Using Fermat's principle show that 5+4=9

(i) Laws of reflection

(ii) Snell's law

Or

6. (a) Show that the axial chromatic aberration is equal to the product of dispersive power (ω) and mean focal length (f). 5

(b) Find the condition for achromatism of two lenses in contact. 3

(c) Calculate the focal length of a lengs of $\omega_2 = 0.031$ which should be placed in contact with a convex lens of $f_1 = 0.88$ m and $\omega_1 = 0.022$ to make the combination achromatism.

7. (a) Explain monochromatic spherical aberration. 4

(b) Derive the minimum condition of spherical aberration of a combination of two plan-convex lenses. 6

Or

8. (a) Find the condition for simultaneous minimum of chromatic and spherical aberration of a system of two lenses separated bya distanced. 3

(b) Show that the equivalent power of Hyugen's eye-piece is $P = \frac{2}{3} p_1$ 2

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (HONOURS)

2nd Semester

Course No. : BSBH - 202

(Diversity of Phanerogams - Angiosperms)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(Answer five questions)

1. What are the different systems of classification? Describe briefly Enger and Prantl system of classification with merits and demerits. 2+4+4=10

Or

2. (a) What are the phyletic principles used by Takhtajan to evaluate the degree of advancement of flowering plants. 3

   (b) Compare Enger and Prantl system of classification with Takhtajan's system of classification. 7

3. Describe the characteristic features and economic important of following families along with suitable diagram 5+5=10

   (a) Fabaceae

   (b) Solanaceae

Or

4. (a) Write the salient features of the family Aracaceae and mention two economically important plants of the family. 4+1=5

   (b) Write the characteristic differences between poaceae and cyperaceae. 5

5. Write short notes on the following : 5x2=10

   (i) Food chain and food web

   (ii) Flow of energy in an ecosystem

Or

6. (a) Add a note on different biotic and abiotic factors of an exosystem. 5

   (b) Discuss briefly about the interaction of biotic and abiotic factors of an ecosystem. 5

7. (a) What is ecological succession? 2

   (b) Discuss briefly the causes of succession and mention the types of succession with examples. 4+4=8

Or

8. Write short notes on any two of the following : 5x2=10

   (i) Plant indicator

   (ii) Hydrosere

   (iii) Xerosere

9. (a) Write a short note on the role of herbaria in taxonomic study. 7

   (b) What is the standard size of herbarium sheet? Name two important herbaria in India. 1+2=3

Or

10. (a) Define Botanical Survey of India. 2

    (b) Write in brief on any one Botanical Garden of India. Add a note on the role of Botanical Gardens ex situ conservation of rare and endemic plants. 4+4=8

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4. Describe the salient features and classification of platyhelminths in details. 10

Unit - III

5. Describe the external morphology, & digestive system of leech (with diagram). 10

Or

6. Discuss the life history and pathogenesis of wuchereria bancrofti in details. 10

Unit - IV

7. Discuss the Torsion andDetorsion in Mollusca in details with the help of a neat diagram. 10

Or

8. Describe the circulatory, respiratory and nervous system in pila with the help of a neat diagram. 10

Unit - V

9. In details discuss the external morphology and life-cycle of starfish with a neat diagram. 10

Or

10. Write short notes on :

    (a) Water vascular system in Echinodermata.

    (b) Larval forms in Crustacea. 5+5=10

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (HONOURS)

2nd Semester

Course No. : BSZH - 202

(Non-Chordates)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions taking one from each unit)

Unit - I

1. Describe the structure and life history of polystomella. 5+5=10

Or

2. Describe the reproduction system of sycon and canal system of porifera. 5+5=10

Unit - II

3. Describe the characteristic features and life history of Obelia in details. 10

Or

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (HONOURS)

8th Semester

Course No. : BSCH - 802

(Physical Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Write down the approximations suggested by Erich Huckel for the construction of molecular orbital energy level diagram. 2

   (b) Using Huckel approximation find out the energies of the ∏-orbitals of cyclobutadiene. 8

Or

2. (a) Setup and solve the matrix equation within the Huckel approximation for linear H_3. 8

   (b) What is delocalization energy? 2

3. (a) Write a detailed note on Standard Hydrogen Electrode (SHE). 5

   (b) What is liquid junction potential? 3

(c) Define ionic strength (electrolytic solution). 2

Or

4. (a) Write a detailed note on glass electrode. 5

(b) Write down the differences between conductometric and potentiometric titrations. 3

(c) Give example of electrolyte concentration cell without transference (one example). 2

5. (a) Which observation of photoelectric effect could not be explained by the laws of classical physics? 2

(b) Estimate the potential energy of an electron in Li^{2+} ion in terms of *r* and *e* (terms have their usual meaning). 4

(c) The wave function, $\psi(\phi)$, for the motion of a particle in a ring is of the form $\psi = N_{exp}(-im_l\phi)$. Determine the normalization constant, N. 4

Or

6. (a) Find r_{rms} for H atom in 1s orbital. 5

(b) By the method of separation of variables, show that the wave-function for a particle on a sphere could be written as, $\psi(\theta,\phi) = H(\theta)\phi(\varphi)$ and find the ϕ independent equation of H . 5

7. (a) Write down the definitions of rate, order, and molecularity of a chemical reaction. 3

(b) Prove that the half-life of n^{th} order reaction, $t_{1/2} \propto 1/a^{n-1}$ 4

(c) The rate constant for the decomposition of a certain compound is 1.70 x 10^{-2} dm^3 moL^{-1} s^{-1} at 24^0c and 2.01 x 10^{-2} dm^3 moL^{-1} s^{-1} at 37^0c. Evaluate the Arrhenius parameters of the reaction. 3

Or

8. (a) Write a note on the method of half life period for the determination of order of a reaction. 5

(b) Discuss the collision theory of reaction rates. 5

9. (a) How micelle is formed? 3

(b) How the structure of snfactants affects the critical micelle concentration in aqueous medium? 6

(c) Define conducting polymers. 1

Or

10. (a) What is liquid crystal? How the smectic phase is formed? 2+4=6

(b) What is Handy-Schultze rule? 2

(c) How many types of liquid crystals are there? 2

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(b) Explain the working mechanism of a multimeter.

Or

10. Explain the working mechanism of : 6+4=10

(a) MOSFET

(b) Cathod Ray socilloscope

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (HONOURS)

8th Semester

Course No. : BSPH - 802

(Nuclear and Particle Physics, Digital Electronics & Solid State Device)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Evaluate the velocity and mass of a beta particle whose kinetic energy is 0.5 Mev.

If the kinetic energy is decreased to a value of 0.25 Mev then calculate the percentage changes in velocity and mass.

(b) If a gram of radium is reduced by 5mg in 5 years then calculate its half life.

(c) Describe the process of radioactive dating with example. 6+2+2=10

Or

2. (a) Write short notes on 'α' ray spectrum and fine structure.

(b) Write short notes on pair production, internal conversion. 5+5=10

3. (a) Physical parameters of a betatron is mentioned below :

$B = 0.4$ wb/m^2

$f = 50$ Hz,

$r = 2$ m

Calculate the energy gain per revolution and hence the final energy.

(b) Explain the origin and nature of mass parabola for a odd A nuclei. 5+5=10

Or

4. Explain the working mechanism of 5+5=10

(a) Ioxization chamber

(b) Seintillation counter

5. (a) Calculate the binding energies of the following nuclei

(i) ${}_6C^{12}$ (ii) ${}_8O^{16}$

Here $m_P = 1.0078$ U

$m_N = 1.0087$ U

$m_C = 12$ U

$m_O = 16$ U

symbols have their usual meaning.

(b) Write short notes on chain reaction. 4+4+2=10

Or

6. (a) Calculate the Q value of the following Fusion reaction.

$1H^2 + 1H^2 \rightarrow 2He^4 + Q$

$M\left(1H^2\right) = 2.014102$ U

$M(He) = 4.002604$ U

(b) Explain the Quark composition of proton.

(c) What is a Baryons? 4+4+2=10

7. (a) Derive the binary equivalent of the following numbers :

(i) $(425.350)_g$ (ii) $(3Eg)_{16}$

(b) Using Karnaugh map, simplify the Boolean Algebra. (2x2)+2+4=10

(i) $Y = \overline{A}\,B + A\,B$

(ii) $Y = \overline{A}\,\overline{B}\,\overline{C} + \overline{A}\,B\,C + \overline{A}\,B\,\overline{C}$

Or

8. Write short notes on : 5+5=10

(a) Half adder

(b) RS Flip-flop

9. (a) Write short notes on : 3+2+4=10

(i) Tunnel diode

(ii) Solar cell

Or

4. (a) What is meant by centre of origin of plant? Describe Vaviloves centres of origin along with suitable examples. What are its importance and limitations? 1+4+2=7

   (b) Describe the origin of Cotton (Gossypium L.) 3

5. Write note on :
   (a) Forage legumes 5
   (b) Millet types

Or

6. Write note on :
   (a) Maize types 5
   (b) Sugar manufacture process 5

7. (a) How fibres can be classified? 5
   (b) Describe cotton species. 5

Or

8. (a) Describe types of plymood. 5
   (b) Explain economically beneficial medicinal plants of India. 5

9. (a) Describe different types of grafting methods. 5
   (b) How pollen acts as source of honey, fond and medicine? 5

Or

10. Explain the process of tea processing. Describe different types of tea. 5+5=10

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2023/EVEN/07/20/BSBH–802/

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (HONOURS)

8th Semester

Course No. : BSBH - 802

(Ethnobotany, Horticulture, Palynology, Palaeo Botany, Biostatistics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Describe relation between ethnobotany and pharmacology. 5

   (b) Delineate economically important plants of North-East India. 5

Or

2. (a) Describe plant introduction. 5

   (b) Explain the methods used in ethnobotanical exploration. 5

3. (a) Differentiate between primary and secondary centre of crop origin. 4

   (b) Describe the origin of hexaploid wheat (Triticum aestirum L.). How it can be classified? 2+4=6

5. Describe the habit, habitat and ethology of Rhinoceros and Hoolock Gibbon. 10

Or

6. Write a brief account on the following : 5x2=10
   (a) Red Data Book
   (b) Biodiversity convention

7. Discuss the different types of biological buffers and its significance. 10

Or

8. Write short notes on the following : 5x2=10
   (a) Concept and division of Biophysics
   (b) Biological indicators

9. Differentiate between the following : 5x2=10
   (a) Adsorption and absorption
   (b) Lyphophobic and lyphophilic

Or

10. Write short notes on the following : 5x2=10
    (a) Osmotic pressure
    (b) Viscocity.

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2023/EVEN/07/20/BSZH–802/

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (HONOURS)

8th Semester

Course No. : BSZH - 802

(Aquaculture, Wildlife Mang. & Biophysics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Discuss the symptoms and the treatment of two most common fish diseases. 10

Or

2. Write short notes on the following : 5x2=10
   (a) Sewage fed fisheries.
   (b) Culture of prawn.

3. What is wildlife? Describe the strategies of conservation and management of wildlife in India. 10

Or

4. Write short notes on the followng : 5x2=10
   (a) Kaziranga National Park
   (b) Project Tiger.

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

PHYSICS (PASS)

4th Semester

Course No. : BSPP - 402

(Magnetism, Heat & Thermodynamics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Derive an expression for the potential energy of a magnetic dipole placed in a uniform magnetic field.

   (b) Derive an expression for the force on magnetic dipole placed in a non-uniform magnetic field. 4+6=10

Or

2. A cube in formed by joining canal wires each of resistance R. Calculate the equivalent resistance between

   (a) diagonally opposite corners of the cube

   (b) two corners of the same edge of the cube 5+5=10

3. (a) Derive and expression for the magnetic field due to current in a straight wire of finite length.

   (b) Evaluate an expression for the magnetic field at a pont on the axis of a circular current carrying conductor. 4+6=10

Or

4. (a) Explain the working mechanism of Helmholtz coil.

   (b) Derive an expression for the axial magnetic field of a solenoid. 5+5=10

5. (a) Explain the growth and decay of current in a series RL Circuit.

   (b) What is Eddy current? 7+3=10

Or

6. (a) Calculate the effective inductance between two coils connnected in series.

   (b) What is coefficient of coupling? 7+3=10

7. (a) Derive an expression for pressure exerted by an ideal gas.

   (b) Derive an expression for mean free path. 7+3=10

Or

8. Applying Maxwell distribution law, derive expression for the following physical parameters.

   (a) Average velocity

   (b) RMS velocity

   (c) Most probable velocity 4+4+2=10

9. (a) Derive an expression for the efficiency of Carnot engine.

   (b) Explain coefficient of performance of a refrigerator. 7+3=10

Or

10. Derive the following Maxwell's relations. 2.5x4=10

   (a) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$

   (b) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$

   (c) $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$

   (d) $-\left(\frac{\partial S}{\partial P}\right)_T = \left(\frac{\partial V}{\partial T}\right)_P$

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UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

MATHEMATICS (PASS)

4th Semester

Course No. : BSMP - 402

(Differential Calculus, Integral Calculus and Differential Equation)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Prove that $\lim_{x\to 0}(1+3x)^{\frac{x+2}{x}} = e^6$ 3

(b) Prove that $\lim_{x\to 0}\frac{\log(1+x^3)}{Sin^3 x} = 1$ 3

(c) If $f(x) = \begin{cases} 3x+b & for \quad x>1 \\ 11 & for \quad x=1 \\ 5ax+b & for \quad x<1 \end{cases}$ 4

is continuous at $x = 1$, then find the value of a and b.

(d) Show that the function 4

$$f(x) = \begin{cases} 3+2x\ , & -\frac{3}{2} \le x \le 0 \\ 3-2x\ , & 0 < x \le \frac{3}{2} \end{cases}$$

is continuous at x = 0 but not differentiable at x = 0.

Or

2. (a) State Roll's theorem. Show that the equation $e^{x-1} + x - 2 = 0$ has no real root greater than 1. 4

(b) State Lagranges mean value theorem. Verify Lagranges mean value theorem for the function $f(x) = x(6 - x)$, where $3 \leq x \leq 4$ 1+3=4

(c) Find 'C' of the Lagranges mean value theorem, if $f(x) = x^2 - 3x - 1$, $x \in \left[\frac{-11}{7}, \frac{13}{7}\right]$ 3

(d) Examine the validity and conclusion of Roll's theorem for the function $f(x) = e^x \sin x$, $\forall\ x \in [0, \pi]$ 3

3. (a) Expand *Sin x* in an infinite series in powers of *x*. 4

(b) Expand *Cot x* in an infinite series in powers of *x*. 5

(c) Find the Maclaurin's series for *Coshx*. 5

Or

4. (a) Find the equation of tangent and normal to the curve $x = \frac{2at^2}{1+t^2}$, $y = \frac{2at^3}{1+t^2}$ 5

9. (a) Solve $\frac{d^2y}{dx^2} + y = x^2$ 5

(b) Solve $\frac{d^2y}{dx^2} + a^2 y = Sin\ ax$ 5

(c) Find the orthogonal trajectories to the family of curves $y^2 = 4ax$. 4

Or

10. Solve the following differential equation :

(a) $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} + \frac{dy}{dx} + y = Sin\ 2x$ 4

(b) $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = x^2e^x$ 5

(c) $x^2 \frac{d^2y}{dx^2} + 5x \frac{dy}{dx} + 3y = e^{-x}$ 5

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(b) Prove that for the curve r = a (1 - cos), polar subtangent = $2a\,Sin^2\,\frac{\theta}{2}\tan\frac{\theta}{2}$ 5

(c) Find the radius of curvature at any point of the cycloid $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$

5. (a) Find the reduction formula for $\int Sin^n x\,dx$ where n is a positive integer. Evaluate $\int_0^{\frac{\pi}{2}} Sin^8 x\,dx$ 4+1=5

(b) Find the reduction formula for $\int_0^{\frac{\pi}{2}} Sin^m x\,.Cos^n x\,dx$ 5

(c) Evaluate $\int_0^{\frac{\pi}{2}} Sin^7 x\,.Cos^4 x\,dx$ 4

Or

6. (a) Find the surface area of the paraboloid of revolution of the parabola $y^2 = 4ax$, about x-axis and bounded by the section $x = x_1$. 4

(b) What is the entire area enclosed by the curve y = x^2 + 1 and the x-axis, between $x = 0$ and $x = 2$ 2

(c) Find the area enclosed by the curve $y = x^2 - 4x + 3$ and the x-axis, between $x = 1$ and $x = 4$. 3

(d) What is the entire area enclosed by the curve r = a cos 2θ 4

7. (a) Find the order, degree and linearity of the differential equation $\frac{d^2y}{dx^2} + x^2\frac{dy}{dx} + x\,siny = 0$ 1+1+2=4

(b) Solve (cos y + y cos x) dx + (sin x - x sin y) dy = 0 3

(c) Solve $\frac{dy}{dx} + e^x y = e^x$ 3

(d) Solve $\frac{dy}{dx} + \frac{1}{x}y = x^2$ 4

Or

8. (a) Solve $Sec^2 y\,\frac{dy}{dx} + 2x\tan\,y = x^2$ 5

(b) Solve $x\,\frac{dy}{dx} + y = y^2\,logx$ 5

(c) Find the general solution and singular solution of the differential equation

$y = px + \frac{a}{p}$, $p = \frac{dy}{dx}$ 4

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

CHEMISTRY (PASS)

4th Semester

Course No. : BSCP - 402

(General Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Discuss the Werner's theory of coordination compounds with suitable example. 4

   (b) Write note on : $1^1/_2+1^1/_2=3$

   (i) Linkage isomerism

   (ii) ionization isomerism

   (c) What are the possible geometrics of 4-coordinated complexes. 3

Or

2. (a) What kind of isomers exist for octahedral complexes with molecular formula $[MA_4 B_2]$ and $[MA_3B_3]$. 2+2=4

   (b) Provide IUPAC name for the following complexes (i) $[Pt a_2 (NH_3)_4]^{2+}$

(ii) [Ni $(CO)_3$ (Py)]

(iii) [Co Cl_2 $(en)_2]^+$ 3x1=3

(c) Which of the following complexes are chiral?

(i) [Cr (edta)] $^-$

(ii) $[Ru(en)_3]^{2+}$

(iii) [Pt (dien) Cl] $^+$

3. (a) Discuss the structure and function of Myoglobin. 5

(b) What are Siderophores? Give two examples and provide their structures. 5

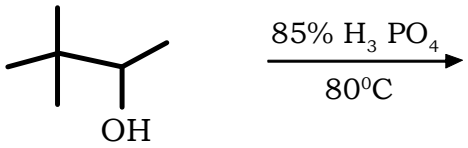
Or

4. (a) Discuss the biological role of calcium. 3

(b) Write a note on the toxic effect of cyanide. 3

(c) Provide the structure of following macrocylic rings.
(i) Porphyrin (ii) Corrin 2+2=4

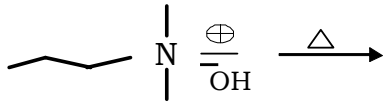
5. (a) Predict the major product. Discuss the mechanism for the same 5



(b) Discuss the laboratory procedure for synthesizing alcohols from alkenes that avoids rearrangement. 5

Or

6. (a) Write down the product and provide mechanism for the following reaction : 5



(b) How does carbonyl compounds react with carbonyl compounds? Provide mechanism. 5

7. (a) Discuss about the Kohlarauch's law of independent migration of cons. 5

(b) Calculate the heat of formation of ammonia, given the heats of combustion of ammonia and hydrogen as -90.6 and -68.3 k cal/mol respectively. 5

Or

8. (a) Write short notes on reversible and irreversible calls. 4x2=8

(b) What is heat of neutralization. 2

9. (a) What do you mean by molecularity, order and rate of reaction. 3x2=6

(b) Write a note on Clausius-Mosotti equation. 4

Or

10. (a) How dielectric constant will change with the change of temperature. 4

(b) Discuss about the chemistry of zero order reaction in details. 6

★★★

5. Describe the morphology and life cycle of star fish. 10

Or

6. Differentiate between the following : 5x2=10
   (a) Annelida and ARthropoda
   (b) Mollusca and Echinodermata

7. Discuss in detail the theories of organic evolution. 10

Or

8. Distinguish between the following : 5x2=10
   (a) Lamarckism and Darwinism
   (b) Aquatic and volant adaptation

9. What is muscology? Discuss the values of taxonomic collection. 10

Or

10. Write short notes on the following : 5x2=10
    (a) Preservation of specimen
    (b) Equipment of collection.

★★★

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

ZOOLOGY (PASS)

4th Semester

Course No. : BSZP - 402

(Non chordates, Organic evolution & adaptation)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. Describe the structure and reproduction of paramecium. 10

Or

2. Write short notes on the following : 5x2=10
   (a) Canal system of sycon
   (b) Pathogenicity of liver-fluke

3. Illustrate and describe the urinogenital system of Leech. 10

Or

4. Write a brief account on the followng : 5x2=10
   (a) Social life of Bees
   (b) Digestive system of prawn

(b) Write short notes on any one of the following:

(i) Role of polyploidy in agriculture 5

(ii) Chromosome duplication

5. Write short note on : 5x2=10

(a) Double helical structure of DNA

(b) DNA replication

Or

6. Write notes on any 2 : 5x2=10

(a) Plasmids

(b) Mitochondrial DNA

(c) Structure and function of ER

7. (a) Explain Mendol's dihybrid cross with a suitable example. 4

(b) What is linkage? Describe various types of linkage with example and give their significance.

1+3+2==6

Or

8. (a) Give an account of DNA damage and repiar? 5

(b) What do you understand by spontaneous mutations and induced mutations? 5

9. (a) Explain the regulation of gene expression on prokaryotes. 5

(b) Give a detailed account of mechanism of protein synthesis. 5

Or

10. Write short notes on any two of the following : 5x2=10

(i) Cloning vectors

(ii) Cellular totipotency

(iii) Biology of Agrobacterium

★★★

2023/EVEN/07/20/BSBP–402/

UG (CBCS) EVEN SEMESTER EXAMINATION, 2023

EDUCATION (B.Sc. B.Ed.)

BOTANY (PASS)

4th Semester

Course No. : BSBP - 402

(Cytogenetics & Biotechnology)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. (a) Describe the chemical composition and function of plasma membrane? 5

(b) Write down the function of cell wall. 5

Or

2. (a) Describe the structure and function of nucleous. How is it formed. 5

(b) Give an-account of the structural details of an interphase nucleus and discuss the function of it. 5

3. (a) Define nullisomy and tetrasomy. 4

(b) What are sex charomosomes? Describe the homogametic sex and heterogametic sex.

1+5=6

Or

4. (a) Give an account of the structural details of an eukaryotic chromosome. 5