

**IV Semester B.Sc. Examination, April/May - 2019****(Semester Scheme) (2014-15 Onwards)****PHYSICS (Paper - IV)****Electricity and Electromagnetism****Time : 3 Hours****Max. Marks : 60****Instruction : Answer any Three questions from Parts - A and B, Three questions from Part - C and Six questions from Part - D.****PART - A**

1. a) Show that path traced by a charged particle in an uniform transverse electric field is a parabola. [6]
b) Obtain an expression for impedance and current in a parallel LCR circuit fed with AC. [6]
2. a) Give the theory of Helmholtz galvanometer. [7]
b) Give the theory of Maxwell's bridge. [5]

PART - B

3. a) Give the thermodynamic theory of thermoelectric effect. [6]
b) What are low pass filters, high pass filters and band pass filters? Explain. [6]
4. a) Set up Maxwell's field equations in free space. [8]
b) Explain how electromagnetic waves can be produced by hertz experiment. [4]

PART - C

5. The area of the plates of an attracted disc electrometer is $5 \times 10^{-2} \text{m}^2$. The mass used to adjust the top plate is 1mg. Calculate the potential difference applied, if the distance between the plates is 0.01 m. [4]
Given : $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$.
6. When 0.1C of charge is passed through a moving coil galvanometer a deflection of 30 mm is observed on a scale 1m away. Time period of the coil is 12 Sec. Find current sensitivity of the galvanometer. [4]
7. If $\phi(x, y, z) = xy^2 + yz^2 + zx^2$ find grad ϕ at (1, 1, 1). [4]
8. The probes of a CRO are connected to a standard resistor of 500Ω connected to an A.C. Source. The pattern observed on the screen has a wavelength of 6 divisions and amplitude 5 divisions. If the time base scale is at 5ms/division and voltage scale is at 0.5V/division, Calculate the frequency and the r.m.s value of current flowing through the resistor. [4]

PART - D

9. a) Write the expression for the mechanical force on a charged surface. Explain the terms. [2]
b) Why is damping correction necessary in moving coil galvanometer? [2]
c) Distinguish between inductive reactance and capacitive reactance. [2]
d) Define half power frequency and band width of a resonant circuit. [2]
e) What is displacement current? Explain. [2]
f) State and explain Gauss divergence theorem. [2]
g) What is poynting vector? [2]
h) Define the terms. [2]
i) Neutral temperature and
ii) Inversion temperature in thermoelectricity.

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Total No. of Pages : 3

IV Semester II B.Sc. Examination, April/May - 2019
(Semester Scheme) (New Syllabus) (2014-15 Onwards)
CHEMISTRY (Paper - IV)

Time : 3 Hours

Max. Marks : 60

Instruction: Write neat diagrams and chemical equations wherever necessary.

PART - A

Answer all the questions.

[6 × 1 = 6]

1. a) What are isobars?
- b) Name the type of hybridisation involved in the formation of KrF_4 .
- c) What are crown ethers?
- d) Write the structural formula of tartaric acid.
- e) What happens to entropy when water vapour is converted to water?
- f) What is Compton effect?

PART - B

[Inorganic Chemistry]

Answer any three questions:

[3 × 6 = 18]

2. a) How are noble gases isolated from air by Rayleigh's method? [3]
- b) Explain the stability of elements with respect to n/p ratio. [3]
3. a) How is XeF_2 prepared? Discuss its structure. [4]
- b) Mention the uses of radioisotopes. [2]
4. a) Explain Pearson's concept of hard and soft acids and bases. [3]
- b) How do you detect and measure the radioactivity using G.M. counter? [3]

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5. a) Give a brief explanation about nuclear forces. [2]
b) Write a note on amphoteric nature of liquid SO_2 . [2]
c) What are the advantages of nuclear fusion over nuclear fission. [2]

PART - C

[Organic Chemistry]

Answer any three questions. [3 × 6 = 18]

6. a) How the mixture of amines is separated by Hinsberg's method? [4]
b) How is ether synthesised by Williamson's method? [2]
7. a) Explain the mechanism of Cannizzaro's reaction. [4]
b) ClCH_2COOH is more acidic than CH_3COOH . Why? [2]
8. a) How do you distinguish aldehydes from ketones by oxidation method? [4]
b) How is benzene diazonium chloride converted to chlorobenzene? [2]
9. a) Explain acid - catalysed opening reaction of epoxide. [2]
b) How does HNO_2 react with aliphatic primary amine? [2]
c) What is the effect of heat on α - hydroxy acid? [2]

PART - D

[Physical Chemistry]

Answer any three questions. [3 × 6 = 18]

10. a) Define co-efficient of viscosity. Mention the factors affecting viscosity. [3]
b) An heat engine operating between 150°C and 25°C takes 500kJ heat from reservoir. Calculate efficiency of heat engine and work done by the engine. [3]
11. a) Derive Gibbs - Helmholtz equation at constant pressure. [3]
b) Write Schrodinger wave equation. Give the importance of wave function. [3]

12. a) Explain the determination of surface tension of a liquid using stalagmometer. [3]
- b) Derive differential form of Clausius - Clapeyron equation. [3]
13. a) Define black body & black body radiation. [2]
- b) Explain Hamiltonian operator. [2]
- c) Calculate the parachor value of acetone. Given, parachor for C, H and O are 4.8, 17.1 and 20 respectively. Parachor for double bond (=) is 23.2. [2]



IV Semester B.Sc. Examination, April/May - 2019

(Semester Scheme) (Paper - IV)

MATHEMATICS (Freshers)

**Differential Equations - II and Integral Calculus - II
(2015-16 Batch and Onwards)**

Time : 3 Hours

Max. Marks : 60

Instruction : Answer all the sections.

SECTION - A

I. Answer any six questions Each question carries two marks :

a) Find a part of complementary function of

$$x^2y'' - 2x(x+1)y' + 2(x+1)y = x^3$$

b) Test for integrability of the equation

$$(x+z)dx + (z+x)dy + (x+y)dz = 0$$

c) Form the partial differential equation by eliminating arbitrary function from $Z = f(x^2 - y^2)$.

d) Solve $p^2q^3 = 1$.

e) Evaluate $\int_C 5xydx + y^2dy$ where C is the curve in the xy-plane $y = 2x^2$ from (0, 0) to (1, 2).

f) Evaluate $\int_0^1 \int_0^2 (x+y)dx dy$.

g) Evaluate $\int_0^1 \int_0^2 \int_0^2 x^2 yz dx dy dz$.

h) If 'c' is the curve leading from (0, 1) to (1, 3) show that $\int_C y^2 dx + 2xydy$ is independent of the path and hence evaluate.

