

20714



M-240

Sl.No. 1893

Total No. of Pages : 2

IV Semester B.Sc. Examination, April/May- 2018

(Semester Scheme) (2014 - 15 Batch onwards)

PHYSICS (Paper - IV)

Electricity and Electromagnetism



Time : 3 Hours

Max. Marks : 60

*Instruction : Answer any three questions from part - A and Part - B, three questions from part - C and six questions from Part -D.*

PART - A

1. a) Give the construction and working of attracted disc electrometer. [6]  
b) Give the theory of Ballistic Galvanometer. [6]
2. a) Obtain the expression for the instantaneous current, impedance and phase when a sinusoidal voltage is applied to the series RL circuit. [7]  
b) Give the theory of De' Sauty's bridge. [5]

PART - B

3. a) With neat diagram explain the construction and working of CRO. [6]  
b) Derive wave equation for the field vectors in free space. [6]
4. a) What are scalar and vector fields give one example for each. [4]  
b) Show that electromagnetic waves are transverse in nature. [5]  
c) What are synchrotron radiation? Explain. [3]

PART - C

5. Calculate the charge which must be placed on a sphere of radius 20cm in order that repulsion per square metre of the surface may just balance the atmospheric pressure. [4]

P.T.O.

6. A resistance of 10 Ohms is joined in series to an inductance of 0.5 Henry fed with AC of 200V and of frequency 50 Hz. What capacitance should be put in series with the combination to obtain maximum current. [4]
7. An R-L low pass filter has a resistance of  $1k\Omega$  and cut-off frequency 1200Hz. Calculate the value of inductance in the circuit. [4]
8. If  $\phi = 2x^3y^2z^4$  find  $\text{div grad } \phi$ . [4]

PART - D

9. a) What is electric pressure on a charged surface? Explain. [2]  
b) State maximum power transfer theorem for AC circuits. [2]  
c) What is power factor in A.C. circuit? Mention its significance. [2]  
d) Set up  $\nabla \cdot \vec{B} = 0$ . [2]  
e) What is peltier effect? [2]  
f) State and explain Gauss' divergence theorem. [2]  
g) Draw the frequency response of parallel LCR resonant circuit and indicate half power frequencies and resonant frequency. [2]  
h) What are oscillating dipoles? Explain. [2]



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Total No. of Pages : 3

IV Semester II B.Sc. Examination, April/May - 2018

(Semester Scheme)

CHEMISTRY (Paper - IV)

(2014-15 batch onwards) (New Syllabus)

Time : 3 Hours

Max. Marks : 60

Instructions : Write neat diagrams and chemical equations wherever necessary.

PART - A

1. Answer all the questions.

[6×1=6]

- Name the type of hybridisation involved in the formation of  $\text{XeO}_3$
- Define mass defect.
- What is Hinsberg's reagent?
- What are crown ethers?
- Define the term "Coefficient of viscosity"
- What is photo electric effect?



PART - B

(Inorganic Chemistry)

Answer any three questions.

[3×6=18]

- What are thermonuclear reactions? Give example. [2]
  - Explain the meson theory of nuclear stability [2]
  - Give important characteristics of liquid  $\text{SO}_2$  as a solvent [2]
- What is levelling effect? Explain with an example. [2]
  - Explain the principle in making hydrogen bomb. [2]
  - Distinguish between isotones and isobars by taking suitable examples [2]

P.T.O.

4. a) How do you detect and measure radio activity by using G.M. Counter [3]  
b) Explain Pearson's concept of hard and soft acids with suitable examples [3]
5. a) Explain the applications of radio active isotopes. [3]  
b) How do you separate Noble gases by Dewar's method? [3]

**PART - C**

**(Organic Chemistry)**

Answer any three questions.

6. a) Explain aldol condensation with mechanism [3]  
b) How do you estimate methoxyl and ethoxyl groups in a compound by Ziesel's method? [3]
7. a) Give the synthesis of tartaric acid mention its uses. [3]  
b) How are primary, secondary and tertiary amines distinguished by acetylation method? [3]

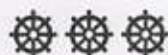
8. a) Explain Hoffmann martins rearrangement [2]  
b) Explain the reaction of acetone with 2,4-DNP. [2]  
c) What is the effect of substituent's on the acidity of aromatic carboxylic acids? [2]
9. a) Why aniline is less basic than N-methyl aniline? [2]  
b) How does acetaldehyde react with alcohol? [2]  
c) Explain Base catalysed hydrolysis of epoxide. [2]

PART - D  
(Physical Chemistry)

Answer any three questions:

[3×6=18]

10. a) Derive Vant Hoff's reaction isotherm. [3]  
b) How do you determine the surface tension of a liquid by using stalagmometer? [3]
11. a) Explain the Hamiltonian operator. [3]  
b) Derive the differential form of claussius clappeyron equation [3]
12. a) What is the effect of temperature on viscosity of a liquid? [2]  
b) Explain the concept of particle is one dimensional box. Write the expression for the energy of a particle in one dimensional box. [2]  
c) Calculate the miximum efficiency of a steam engine operating between 105°C and 26°C temperatures [2]
13. a) What is planck's radiation law? [2]  
b) State the second law of thermodynamics in terms of entropy. [2]  
c) Write the sugden equation for parachor and mention the terms involved in it. [2]



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Sl.No. 6784

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IV Semester B.Sc. Examination, April/May - 2018  
(Scheme Semester)  
MATHEMATICS (Paper - IV)  
(2015-16 onwards)  
Differential Equations II and Integral Calculus II

Time : 3 Hours

Max. Marks : 60

Instruction : Answer all the sections

SECTION - A



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

- Verify that  $y = e^x$  is a solution of  $xy'' - (2x-1)y' + (x-1)y = 0$
- Verify the condition for integrability  $3x^2dx + 3y^2dy - (x^3 + y^3 + e^{2z})dz = 0$
- Form a partial differential equation by eliminating arbitrary constants a and b from  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2z$ .
- Solve :  $p^2 + q^2 = x + y$
- Evaluate  $\int xdy - ydx$ , along the line  $y = x$  from  $(0,0)$  to  $(1,1)$ .
- Evaluate  $\int_0^1 \int_0^{x^2} (x^2 + y^2) dy dx$
- Evaluate  $\iint_D dx dy$ , where D is the region  $1 < x^2 + y^2 < 9$ ,  $x > 0$ ,  $y > 0$ .
- Evaluate  $\int_0^1 \int_0^{-1} \int_0^2 x^3 y^2 z dz dy dx$ .

P.T.O.

**SECTION - B**

(Differential Equations - II)

II. Answer any six questions. Each question carries four marks.

a) Solve  $x^2 y'' + xy' - y = 2x^2$  given that  $\frac{1}{x}$  is a part of complementary function.

b) Solve  $\frac{d^2 y}{dx^2} + y = \tan x$  by the method of variation of parameters.

c) Test the equation  $x \frac{d^2 y}{dx^2} + 3 \frac{dy}{dx} = \cos x$

for exactness and hence solve.

d) Solve  $\frac{dx}{x} = \frac{dy}{-y} = \frac{dz}{x^2 - y^2}$

e) Form a partial differential equation by eliminating arbitrary function  $f$  from  $f(x + y + z, x^2 + y^2 + z^2) = 0$

f) Solve  $q - p + x - y = 0$

g) Solve  $p^2 x + q^2 y = Z$  by using charpit's method.

h) Solve  $\frac{\partial^2 z}{\partial x^2} - 4 \frac{\partial^2 z}{\partial x \partial y} + 4 \frac{\partial^2 z}{\partial y^2} = e^{x+y}$ .

**SECTION - C**

(Integral Calculus - II)

III. Answer any six questions. Each question carries four marks.

a) Compute  $\int_C xy dx + x^2 z^2 dy + xyz dz$  with  $x = e^t, y = e^{-t}, z = t^3, 0 < t < 1$ .

- b) Evaluate  $\int_C (xy + y^2)dx + x^2dy$ , where  $C$  is a closed curve of the region bounded by  $y = x$  and  $y = x^2$ .
- c) Evaluate  $\iint_R xydx dy$  over the positive Quadrant bounded by the circle  $x^2 + y^2 = a^2$ .
- d) Evaluate  $\int_0^1 \int_x^{\sqrt{x}} xydy dx$ , by changing the order of integration.
- e) Find the area of the surface  $Z = \sqrt{x^2 + y^2}$ ,  $\frac{1}{16} < x^2 + y^2 < \frac{1}{4}$ .
- f) Evaluate  $\iiint_I yz^3 \cos(xyz) dx dy dz$  where  $I$  is the cube  $0 < x < 1, 0 < y < 1$  and  $0 < z < 1$ .
- g) Evaluate  $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dz dy dx$ .
- h) Find the volume of the tetrahedron bounded by the coordinate planes and the plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$

