

# HIGHER SECONDARY SECOND YEAR

## PHYSICS

### MODEL QUESTION PAPER-I

TIME : 2.30 HOURS

MARKS : 70

#### PART-I

#### I. CHOOSE THE CORRECT ANSWER.

15x1=15

- The unit of electric flux.  
a)  $\text{NCm}^{-2}$                       b)  $\text{N m}^{-2}\text{c}^{-1}$                       c)  $\text{Vm}^{-1}$                       d)  $\text{Vm}$
- Net capacitance of three identical capacitors in series is  $1\mu\text{F}$ . If they are connected in parallel, resultant capacitance will be  
a)  $3\mu\text{F}$                       b)  $\frac{1}{3}\mu\text{F}$                       c)  $9\mu\text{F}$                       d)  $1\mu\text{F}$
- The electrical resistivity of copper wire 1m, 2m are  $\rho_1\Omega\text{m}$ ,  $\rho_2\Omega\text{m}$  at a given temperature, then,  
a)  $\rho_1 > \rho_2$                       b)  $\rho_2 < \rho_1$                       c)  $\rho_1 = \rho_2$                       d)  $\rho_2 = 2\rho_1$
- The masses of different substances liberated in electrolysis by the same quantity of electricity are proportional to their  
a) relative valencies                      b) relative atomic masses  
c) product of atomic mass and valency                      d) ratio of atomic mass and valency.
- A wire of length  $\ell$  metres carrying a current  $I$  ampere is bent in the form of a circle. The magnitude of the magnetic moment is  
a)  $\frac{\ell I^2}{2\pi}$                       b)  $\frac{\ell^2 I}{4\pi}$                       c)  $\frac{\ell^2 I}{2\pi}$                       d)  $\frac{\ell I^2}{4\pi}$
- Which of the following device does not allow DC to pass through?  
a) resistor                      b) capacitor                      c) inductor                      d) all
- At resonance, the value of the power factor in a series LCR circuit is  
a) 0                      b) 1                      c)  $\frac{\pi}{2}$                       d)  $\pi$

8. In Young's double slit experiment, 12 fringes are observed in a certain region of the screen when light of wavelength 600 nm is used. If the wave length of light changed as 400 nm, then the number of fringes observed in the same segment of the screen is

- a) 12                      b) 18                      c) 24                      d) 30

9. Two photons of energies twice and thrice the work function of a metal are incident on the metal surface. then the ratio of maximum velocities of the photo electrons emitted in the two cases respectively is

- a)  $\sqrt{2} : 1$                       b)  $1 : \sqrt{3}$                       c)  $\sqrt{3} : \sqrt{2}$                       d)  $1 : \sqrt{2}$

10. Anaemia can be diagnosed by

- a)  $_{15}P^{31}$                       b)  $_{15}P^{32}$                       c)  $_{26}Fe^{59}$                       d)  $_{11}Na^{24}$

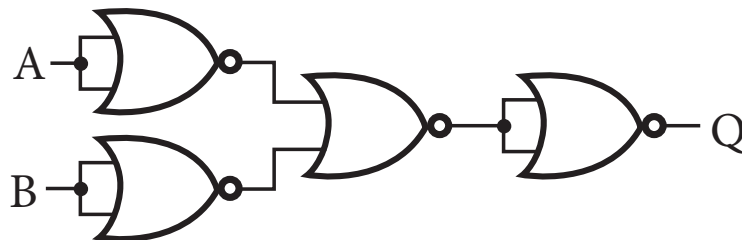
11. Radio active substances x and y contain equal number of atoms initially. Half life of x and y are 1 day and 2days respectively. At the end of 2nd day and the ratio of rate of disintegration of x and y is.

- a) 1 : 2                      b) 2 : 1                      c) 1:1                      d) 1:4

12. In p - type semi conductor, there are

- a) immobile negative ions                      b) immobile positive ions  
c) no minority carriers                      d) holes as majority carriers

13. The gate shown is a



- a) OR                      b) AND                      c) EX - OR                      d) NAND

14. All medium wave signals received during the day time use

- a) Ground wave                      b) Space wave                      c) Sky wave                      d) all the above

15. In Millikan's oil drop experiment a drop of radius  $r$  and carrying a charge ' $q$ ' is held stationary between the plates at a potential difference  $V$ . Then another drop of radius  $2r$  will be stationary at a potential difference  $4V$ . It carries a charge of .

a)  $\frac{q}{2}$

b)  $2q$

c)  $4q$

d)  $\frac{q}{4}$

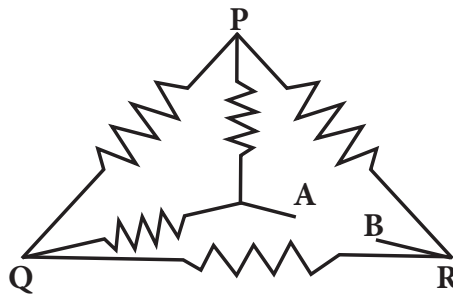
**PART - II**

**Answer any 6 questions in which question no : 22 is compulsory.**

**6x2=12**

16. Define electric field Intensity.

17. If each of the resistances shown in the circuit is  $R$ . Calculate the effective resistance between terminals A and B.



18. A current carrying long straight conductor produces magnetic field of  $4 \times 10^{-8} \text{ T}$  at a point 20 cm from the conductor. Calculate the current passing through the wire conductor.

19. Write the rms value of alternating current. Draw the graph for the variation of  $I^2$  with respect to time

20. Give any two characteristics of electromagnetic waves.

21. Why ordinary plane transmission gratings cannot be used to produce diffraction effects in X - rays?

22. When the energy of the incident radiation increased by 20 %, the kinetic energy of the photo electrons emitted from a metal increased from 0.5 eV to 0.8eV. Calculate the work function of the metal.

23. Define the Converse of pair production

24. Why multimeter is called as AVO meter?

### PART - III

Answer any six questions in which question No: 33 is compulsory

6x3=18

25. What are the properties of electric lines of forces?
26. Derive an energy associated with an inductor.
27. In Young's experiment a light of frequency  $6 \times 10^{14}$  Hz is used. Distance between the centres of adjacent bright fringes is 0.75 mm. Calculate the distance between the slits, if the screen is 1.5 m away.
28. Write down any three properties of cathode rays.
29. State the laws of photo electric emission.
30. Deduce the relation between  $\alpha$  and  $\beta$  of a transistor
31. Draw circuit diagram of Colpitt oscillator.
32. What are the merits of Satellite Communication?
33. Calculate the velocity of a photo electron if the work function of a target material is 1.24eV and the wave length of incident light is  $4.36 \times 10^{-7}$  m.

### PART - IV

Answer all the questions

5 x 5=25

34. (a) Derive an expression for the radius of the  $n^{\text{th}}$  dark ring in Newton's ring experiment  
(b) Wavelength of light in air is  $6000 \text{ \AA}$ . What will be its wavelength in a media of refractive index 1.5?

(OR)

Derive an expression for a force on a current carrying conductor placed in a magnetic field.

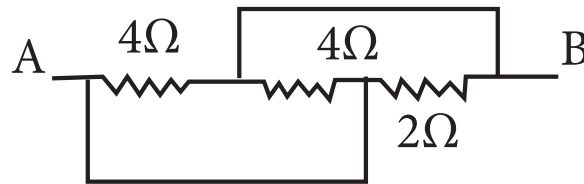
35. (a) A source of alternating emf is connected with RLC series combination circuit. Obtain with the help of vector diagram, the expression for (i) the effective voltage (ii) the phase relationship between the current and the voltage.

(OR)

(b) State Gauss Law Derive an expression for electric field due to an infinite long straight charged wire by using Gauss law.

36. (a) Derive an expression for balancing condition of Wheatstone network.

(b) Calculate the equivalent resistance between points A and B of the circuit shown



(OR)

Explain the working of Ruby laser with energy level diagram.

37. Describe the principle, construction and working of Geiger - Muller counter.

(OR)

Derive an expression for voltage gain of an amplifier with negative feed back.

38. Explain the functional block diagram of a mono chrome TV receiver.

(OR)

(a) Obtain an expression to calculate the amount of radio active substance present at any instant.

(b) The disintegration constant of a radio active element is  $0.00231$  per day. calculate its half life and mean life.