

Part - III

- Note :** (i) Answer the question 52 compulsory. (07 X 0 5 = 35)
(ii) Of the remaining 11 questions, answer any six questions.
(iii) Draw diagrams wherever necessary.

- 51) Write the properties of electric lines of force
52) The effective resistances are 10Ω , 2.4Ω when they are connected in series and parallel respectively. What are the resistances of individual resistors? (Or)
In a meter bridge, the balancing length for a 10Ω resistance in left gap is 51.8cm . Find the unknown resistance and specific resistance of a wire of length 108cm and radius 0.2mm .
53) Explain the determination of internal resistance of a cell using voltmeter.
54) A rectangular coil of area $20\text{cm} \times 10\text{cm}$ with 100 turns of wire is suspended in a radial magnetic field of induction $5 \times 10^{-3}\text{T}$. If the galvanometer shows an angular deflection of 15° for a current of 1mA , find the torsional constant of the suspension wire.
55) Explain how an emf can be induced by changing the area enclosed by the coil.
56) A parallel beam of monochromatic light is allowed to incident normally on a plane transmission grating having 5000 lines per cm. A second order spectral line is found to be diffracted at an angle 30° . Calculate the wavelength of the light.
57) State and obtain Bragg's law
58) What is photoelectric effect? State the laws of photoelectric emission.
59) Derive an expression for de Broglie wavelength for matter waves
60) Explain how cosmic ray shower is formed
61) Explain the working of half wave rectifier
62) Mention the principle of RADAR and write its applications.

Part - IV

- Note :** (i) Answer any four questions in detail. (04 X 10 = 40)
(ii) Draw diagrams wherever necessary.

- 63) Derive an expression for the electric potential due to electric dipole. Discuss the possible cases
64) Explain the principle, construction, working and limitations of a cyclotron with a diagram.
65) A source of alternating emf is connected to a series combination of a resistor R, an inductor L and a capacitor C. Obtain with the help of a vector diagram and impedance diagram, an expression for
i) The effective voltage ii) the impedance iii) the phase relationship between the current and the voltage.
66) On the basis of wave theory, explain total internal reflection. Write the condition for total internal reflection to take place.
67) Draw a neat sketch of Ruby laser. Explain its working with the help of energy level diagram.
68) Explain the construction and working of Geiger-Muller counter.
69) Explain the working of transistor amplifier.
70) Explain with block diagram super heterodyne AM radio receiver.

Register Number:

PART - III

PHYSICS MODEL QUESTION -6

Time Allowed: 03:00 Hours]

Maximum Marks: 150]

Instructions:

- i) Check the Question Papers for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
ii) Use **Black or Blue ink** to write and **Pencil** to draw diagrams.

Part - I

- Note:** (i) Answer all the questions (30 X 01 = 30)
(ii) Choose the correct answer
(iii) Each question carries one mark.

- 01) Which of the following cannot be accelerated using Vande Graaff generator?
a) α -particle b) electron c) proton d) deuteron
02) Electric potential energy (U) of two point charges is
a) $\frac{q_1 q_2}{4\pi r^2 \epsilon_0}$ b) $\frac{q_1 q_2}{4\pi \epsilon_0 r}$ c) $pE \cos \theta$ d) $pE \sin \theta$
03) The intensity of the electric field that produces a force of 10^{-5}N on a charge of $5\mu\text{C}$ is
a) $5 \times 10^{-11}\text{NC}^{-1}$ b) 50NC^{-1} c) 2NC^{-1} d) 0.5NC^{-1}
04) S.I unit of the line integral of an electric field
a) volt b) volt - metre c) volt / metre d) no unit
05) The super conducting transition temperature of mercury is-----
a) 4.2°C b) 268.8°C c) -268.8°C d) 0°C
06) The torque on a rectangular coil placed in a uniform magnetic field is large, when
a) The number of turns is large b) the number of turns is less
c) the plane of the coil is perpendicular to the field
d) the area of the coil is small
07) Work done by a Lorentz force is
a) zero when $\theta = 90^\circ$ b) zero when $\theta = 45^\circ$ c) always zero
d) maximum $\theta = 90^\circ$
08) A choke coil is used in a fluorescent tube to
a) Increase current b) decrease current c) increase voltage momentary
d) decrease voltage momentary
09) In an AC circuit the applied emf $e = E_0 \sin(\omega t + \pi/\beta)$ leads the current $I = I_0 \sin(\omega t - \pi/\beta)$ by
a) π/β b) $\pi/4$ c) π d) 0
10) The core used in audio frequency chokes is
a) iron b) carbon c) lead d) air
11) A circuit has a resistance of 12Ω and an impedance of 15Ω . The power factor of the circuit will be
a) 0.8 b) 0.4 c) 1.25 d) 0.125

- 12) If the wavelength of the light is reduced to one fourth, then the amount of scattering is
 a) increased by 16 times b) decreased by 16 times
 c) increased by 256 times d) decreased by 256 times
- 13) Phase between the electric field and the magnetic field of an electromagnetic wave is
 a) 0 b) $\pi/4$ c) $\pi/2$ d) π
- 14) Strength of scattering depends on
 a) Wavelength of light b) size of the particle
 c) both (a) and (b) d) velocity of light
- 15) The speed of light in glass is
 a) same as in air b) greater than the speed in air
 c) less than the speed in air d) less than the speed of sound in air
- 16) A Coolidge tube operates at 24800V. The maximum frequency of X radiation emitted from Coolidge tube is
 a) 6×10^{18} Hz b) 3×10^{18} Hz c) 6×10^8 Hz d) 3×10^8 Hz
- 17) The chromium ions doped in the ruby rod
 a) Absorbs red light b) absorbs green light
 c) absorbs blue light d) emits green light
- 18) The size of an atom from Rutherford experiment is
 a) 10^{-10} m b) 10^{-16} m c) 10^{-14} m d) 10^{-12} m
- 19) For the first order X-ray diffraction, the wavelength of the X-ray is equal to the lattice spacing at a glancing angle of
 a) 15° b) 60° c) 45° d) 30°
- 20) At the threshold frequency, the velocity of the electrons is
 a) zero b) maximum c) minimum d) infinite
- 21) The rest mass of photon is
 a) $h\nu$ b) $h\nu/C$ c) $C/h\nu$ d) zero
- 22) Isotopes have
 a) Same mass number but different atomic number
 b) Same proton number and neutron number
 c) Same proton number but different neutron number
 d) Same neutron number but different proton number
- 23) The time taken by the radioactive element to reduce to $1/e$ times is
 a) half life b) mean life c) half life/2 d) twice the mean life
- 24) Anemia can be diagnosed by
 a) $_{15}P^{31}$ b) $_{15}P^{32}$ c) $_{26}Fe^{59}$ d) $_{11}Na^{24}$
- 25) An atom has 108 protons and 108 neutrons. The diameter of the nucleus is
 a) 12.4 F b) 15.6 F c) 3.9 F d) 7.8 F
- 26) The colour of light emitted by a LED depends on
 a) its reverse bias b) the amount of forward current
 c) its forward bias d) type of semiconductor material
- 27) Forbidden energy gap for semiconductors like Ge and Si are respectively
 a) 1.1 eV and 0.7 eV b) 0.7 eV and 1.1 eV
 c) 11 eV and 0.7 eV d) 1.1 eV and 7 eV

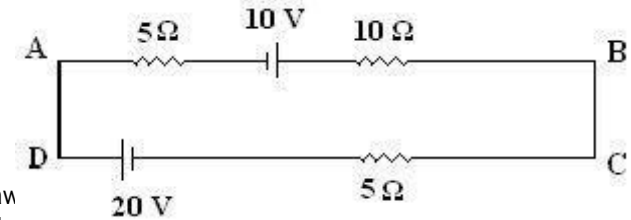
- 28) In the forward bias characteristic curve, a diode appears as
 a) a high resistance b) a capacitor c) an OFF switch d) an ON switch
- 29) High frequency waves follow
 a) The ground wave propagation b) the line of sight direction
 c) ionospheric propagation d) the curvature of the earth
- 30) The first man made satellite is
 a) Aryabhata b) Sputnik c) Vennila d) Rohini

Part – II

Note : Answer any fifteen questions.

(15 X 03 = 45)

- 31) Define one coulomb
 32) Define electric field intensity. Give its unit
 33) Name three changes observed in transition temperature
 34) Find the magnitude and direction of the current in the following circuit



- 35) State Ohm's law
 36) State tangent law
 37) What is inductive reactance? Give its unit.
 38) An aircraft having a wing span of 20.48 m flies due north at a speed of 40 ms^{-1} . If the vertical component of earth's magnetic field at the place is $2 \times 10^{-5} \text{ T}$, calculate the e.m.f. induced between the ends of the wings.
 39) On what factors the amounts of optical rotation depend on?
 40) Give the conditions for sustained interference.
 41) The minimum wavelength of X-rays produced from a Coolidge tube is 0.05 nm. Find the operating voltage of the Coolidge tube.
 42) State Moseley's law
 43) Define threshold frequency.
 44) What are isotones? Give examples
 45) The radioactive isotope $_{84}\text{Po}^{214}$ undergoes a successive disintegration of two α -decays and two β -decays. Find the atomic number and mass number of the resulting isotope.
 46) Why CE configuration is preferred over CB configuration for operating transistor as an amplifier?
 47) State De Morgan's theorems.
 48) Draw the circuit for NOT gate using transistor.
 49) When there is no feedback the gain of the amplifier is 100. If 5% of the output voltage is feedback into the input through a negative feedback network, find out the voltage gain after feedback.
 50) What are the advantages of frequency modulation?