CLASS XII

SUBJECT : PHYSICS

Time : 3 hrs **Max. Marks : 70**

General Instructions

(1) Section A : Q NO. 1 contains ten multiple choice type of questions carrying one mark each.

Q no. 2 contains eight very short answer type question carrying one mark each.

(2) Section B : Q no. 3 to Q no. 14 are twelve short answer type of questions carrying two marks each.

(3) Section C : Q no. 15 to Q no. 26 are twelve short answer type of questions carrying three marks each.

(4) Section D : Q no. 27 to Q no. 31 are five long answer type of questions carrying four marks each.

(5) Use of log table is allowed.

SECTION A

Q1: Select and write correct answer: [10]

1) The angular momentum of electron in the third Bohr orbit of hydrogen atom is

[$h/2\pi = 1.055 \times 10^{-34}$ Kg m^2/s]

a) 3.165×10^{-34} Kg m^2/s b) 3.165×10^{34} Kg m^2/s

c) 3.165×10^{-24} Kg m^2/s d) 3.165×10^{24} Kg m^2/s

2) The Boolean expression for an exclusive OR gate

a) $\overline{A+B}$ b) $A \oplus B$ c) $\overline{A}+\overline{B}$ d) A.B

3) A transformer has 100 turns in primary and 250 turns in secondary. The primary peak voltage is 28V .

The rms secondary voltage is nearest to

a) 100V b) 20V c) 50V d) 40V

4) In series LCR circuit, at resonance , phase difference between current and Emf of source is

a) π rad b) π/2 rad c) π /4 rad d) Zero rad

5) A body of mass m performs uniform circular motion along a circular path of radius r and velocity v. If its angular momentum is L , then centripetal force acting on it is

a) mL^2/r^2 b) L^2/mr c) L^2/mr^2 d) L^2/mr^3

6) For polyatomic molecule having ' f' vibrational modes , the ratio of two specific heats is

a) 1+ f/ 2+f b) 2+f/ 3+f c) 4+f/ 3+f d) 5+f/ 4+f

7) A sonometer wire vibrates with three nodes and two antinodes .The corresponding mode of vibration is

a) first overtone b) second overtone c) third overtone d) fourth overtone

8) The property of light which does not change when it travels from one medium to another is

a) velocity b) wavelength c) frequency d) amplitude

9) The internal energy change in a system that has absorbed 2 Kcal of heat and done 500 J of work is

a) 8900 J b) 6400 J c) 5400 J d) 7900 J

10) In which of the following substance , surface tension increases with increase in temperature

a) copper b) molten copper c) iron d) molten iron

Q2) Answer the following [8]

1) What is the minimum angular momentum of the electron in a hydrogen atom?
2) Define angle of contact?
3) The internal resistance of a cell can be determined with the help of which device?
4) What is mechanical equilibrium?
5) In the relation $I= MK^2$, K stands for what ?
6) Define radius vector?
7) A motorcyclist is to undertake circles inside the cylindrical wall of a well of inner radius 4m .Coefficient of static friction between the tyres and the wall is 0.4. Calculate the minimum speed required?
8) A plane wavefront of light of wavelength 5500 A^0 is incident on two slits in a screen perpendicular to the direction of light rays. If the total separation of 10 bright fringes on a screen 2m away is 2cm .Find the distance between the slits.

SECTION B

Attempt any eight of the following [16]

Q3) A toroid of narrow radius of 10 cm has 1000 turns of wire .For a magnetic field of 5×10^{-2} T along its axis , how much current is required to be passed through the wire .

Q4) A 100mH inductor, a 25 μF capacitor and a 15 Ω resistance are connected in series with a120V ,50 Hz ac source . Calculate

i) impedance of circuit at resonance
ii) current at resonance .

Q5) Compare the rate of emission of heat by a black body at 327^0C with the rate of emission of heat of same body at 27^0C .

Q6) A progressive wave is y=12 sin (5t-4x) where all quantities are in SI units .

On this wave how far away are the two points having a phase difference of 90^0 .

Q7) What is a logic gate? Draw symbol of NOT and NOR gate

Q8) When water boils why does its temperature remain constant ?

Q9) A drop of water of radius 6mm breaks into a number of droplets of radius 1mm.How many droplets will be formed ?

Q10) Draw a neat labeled diagram to determine the resistance of the galvanometer by using a meter bridge .

Q11) What is a wavefront ? What is the shape of the wavefront at a point far away from the source of light.

Q12) Explain why it is necessary to use cylindrically concave pole pieces in the construction of a moving coil galvanometer .

Q13) State the Zeroth law of thermodynamics .Give schematic representation.

Q14) Define end correction .State any two limitations .

SECTION C

Attempt any eight of the following [24]

Q15) What is a transformer? Explain step up and step down transformer .

Q16) Derive an expression for electrostatic potential due to the system of charges .

Q17) Explain interference of light .

Q18) State and prove theorem of parallel axes about moment of inertia .

Q19) Why is the PV curve for adiabatic process steeper than that for isothermal process .Explain formation of clouds at high altitude .

Q20) What is a junction transistor? State the types and draw the symbol for each.

Q21) The energy of photon is 2ev. Find its frequency and wavelength.

Q22) Define magnetization . State its formula , SI unit and dimensions .

Q23) When the length of a simple pendulum is decreased by 20 cm , the period changes by 10% .Find original length of pendulum.

Q24) A coil consists of 400 turns of wire. Each turn is a square of side 20 cm. A uniform magnetic field directed perpendicular to the plane of the coil changes from 0 to 0.5 T in 0.8s , what is the magnitude of induced Emf in the coil.

Q25) A 60 W filament lamp loses all its energy by radiation from its surface . The emissivity of the surface is 0.5 ,area of surface is $5X10^{-5}$ m^2 .Find the temperature of the filament.(σ=5.67 X 10^{-8} J/m^2 s^1K^4)

Q26)What should be the diameter of a soap bubble in order that excess pressure inside it is 51.2N/m^2. (surface tension of soap solution =3.2 X 10^{-2}N/ m).

SECTION D

Attempt any three of the following [12]

Q27) State any two postulates of Bohr's atomic model. How long will it take for a radioactive sample to reduce to 1% of its original activity.

Q28) State principle of a potentiometer . Define potential gradient .
Two batteries of emf 4 V, 1V and internal resistance 1Ω, 1 Ω respectively are connected in parallel (with like poles together) the combination sends a current through an external resistance of 2Ω . Calculate current through the external resistance .

Q29) Explain conservation of angular momentum . A meter gauge train is moving at 72 Km /hr along a curve railway track of radius of curvature 500 m .Find the elevation of the outer rail above inner rail (g = 10m/s^2)

Q30) With a neat labeled diagram , explain the three lowest mode of vibration of air column in a pipe closed at one end .

Q31) Derive the expression for work done in pulling a conducting loop out of a magnetic field .
