

- vii. In Young's double slit experiment, a thin uniform sheet of glass is kept in front of the two slits, parallel to the screen having the slits. The resulting interference pattern will satisfy **1M**
- a) The interference pattern will remain unchanged
 b) The fringe width will decrease
 c) The fringe width will increase
 d) The fringes will shift.
- viii. Energy stored in a capacitor and dissipated during charging a capacitor bear a ratio. **1M**
- a) 1 : 1 b) 1 : 2 c) 2 : 1 d) 1 : 3
- ix. To find the resistance of a gold bangle, two diametrically opposite points of the bangle are connected to the two terminals of the left gap of a metre bridge. A resistance of $4\ \Omega$ is introduced in the right gap. What is the resistance of the bangle if the null point is at 20 cm from the left end? **1M**
- a) $2\ \Omega$ b) $4\ \Omega$
 c) $8\ \Omega$ d) $16\ \Omega$
- x. Magnetic field of an infinitely long wire is **1M**
- a) proportional to current flowing but inversely proportional to distance from wire
 b) proportional to current flowing and distance from wire.
 c) inversely proportional to current flowing and distance from wire.
 d) proportional to distance from wire but inversely proportional to current flowing.

Q.2 Short Answers (1 Mark Each) 8M

- i. What is force constant? State its unit and dimensions. **1M**
- ii. Define Pascal's Law. **1M**
- iii. What is capacitor? **1M**
- iv. Define Threshold frequency **1M**
- v. Define coefficient of absorption. Write its formula. **1M**
- vi. What is a transistor? **1M**
- vii. Define Centrifugal force & represent in vector form. **1M**
- viii. Define binding energy. **1M**

SECTION B

Attempt Any Eight Questions 16M

- Q.3 Define current ratio α and β for transistor. Obtain the relation between them. **2M**
- Q.4 What is OR gate? Draw the schematic symbol for OR gate. Write its Boolean expression and truth table. **2M**

- Q.5** The threshold wavelength for copper is 2750 \AA . If ultraviolet light of wavelength 1500 \AA is incident on the surface, what would be the maximum energy in eV of the ejected photoelectrons? **2M**
- Q.6** State and explain Faraday's laws of electromagnetic Induction. **2M**
- Q.7** The value of mutual inductance of two coils is 10mH. If the current in one of the coil changes from 5A to 1A in 0.2 s, calculate the value of emf induced in the other coil. Also calculate the value of induced charge passing through the coil if its resistance is 5 ohm. **2M**
- Q.8** Determine the series limit of Balmer, Paschen and Pfund series, given the limit for Lyman series is 912 \AA . **2M**
- Q.9** Obtain expression for magnetic field at a distance r from straight current conducting wire using Ampere's law. **2M**
- Q.10** Explain graphically the variation of stopping potential and saturation current with the frequency of incident radiation. **2M**
- Q.11** Derive an expression for effective capacitance of three capacitors connected in parallel. **2M**
- Q.12** Define the following terms **2M**
i. Isotopes
ii. Isobars
- Q.13** Find the pressure 200 m below the surface of the ocean if pressure on the free surface of liquid is one atmosphere. **2M**
(Density of sea water = 1060 kg/m^3)
- Q.14** Draw and explain phasor diagram for voltage and current in a purely inductive circuit. **2M**

SECTION C

- Attempt Any Eight Questions** **24M**
- Q.15** Obtain an expression relating the torque with angular acceleration for a rigid body. **3M**
- Q.16** Derive an expression of excess pressure inside a liquid drop. **3M**
- Q.17** Calculate the average molecular kinetic energy (i) per kmol (ii) per kg (iii) per molecule of oxygen at 127°C , given that molecular weight of oxygen is 32, R is $8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ and Avogadro's number N_A is $6.02 \times 10^{23} \text{ molecules mol}^{-1}$. **3M**
- Q.18** Distinguish between following thermodynamic processes. **3M**
i. Isothermal process and Adiabatic process
- Q.19** Discuss the maximum and minimum values of displacement, velocity and acceleration of a particle performing linear S.H.M. **3M**

- Q.20** Derive an expression for a one dimensional simple harmonic progressive wave travelling in the direction of the positive X-axis. Express it in different forms. **3M**
- Q.21** Find the ratio of intensities at two points x and y on a screen in Young's double slit experiment, where waves from S_1 and S_2 have path difference of
(i) 0 and (ii) $\frac{\lambda}{4}$. **3M**
- Q.22** With the help of a neat diagram, explain the reflection of light from a plane reflecting surface on the basis of wave theory of light. **3M**
- Q.23** A galvanometer has a resistance of 40Ω and a current of 4mA is needed for a full scale deflection. What is the resistance and how is it to be connected to convert the galvanometer.
i. into an ammeter of 0.4A range and
ii. into a voltmeter of 0.5V range? **3M**
- Q.24** A long solenoid of length 1 m has 1000 turns of wire closely wound on it. If the current in the winding is 3A, calculate the magnetic field at centre of solenoid. **3M**
- Q.25** A bar magnet made of steel has magnetic moment of 2.5 Am^2 and a mass of $6.6 \times 10^{-3} \text{ kg}$. If the density of steel is $7.9 \times 10^3 \text{ kg/m}^3$, find the intensity of magnetization of the magnet. **3M**
- Q.26** The primary of a transformer has 40 turns and works on 100 volt and 100 watt. Find the number of turns in the secondary to step up voltage to 400 V. Also calculate the current in the secondary and primary. **3M**

SECTION D

Attempt Any Three Questions

- Q.27** **a)** If the radius of solid sphere is doubled by keeping its mass constant, compare the moment of inertia about any diameter. **2m**
b) On which factors does amount of heat radiated by a body depend? **2m**
- Q.28** **a)** A pipe at both the ends has a fundamental frequency of 600Hz. The first overtone of a pipe closed at one end has the same frequency as the first overtone of the open pipe. How long are the two pipes? **2m**
b) Find the ratio of the potential differences that must be applied across the parallel and series combination of two capacitors C_1 and C_2 with their capacitances in the ratio 1:2, so that the energy stored in these two cases becomes the same. **2m**
- Q.29** **a)** Explain with the help of formulae how moving coil galvanometer can be converted into a voltmeter in detail. **2m**
b) An iron rod is subjected to a magnetizing field of 1200 Am^{-1} . The susceptibility of iron is 599. Find the permeability and the magnetic field produced. **2m**
- Q.30** Derive an expression for the impedance of an LCR circuit connected to an AC power supply. **4m**
- Q.31** What is thermodynamic system? How are the systems classified on the basis of transfer of heat and matter? **4m**

Together we will make a difference