

1. All questions are compulsory.
 2. Q. 1 to 5 are Very short Answer type questions (1 Mark each.)
 3. Q. 6 to 12 are short Answer type questions. (2 Marks each.)
 4. Q. 13 to 24 are short answer questions (3 Marks each.)
 5. Q. 25 to 27 are Long Answer type questions, (5 marks each.)
 6. Please write down the serial number of the question before attempting it.
 7. You may use the following values of physical constants where ever necessary:

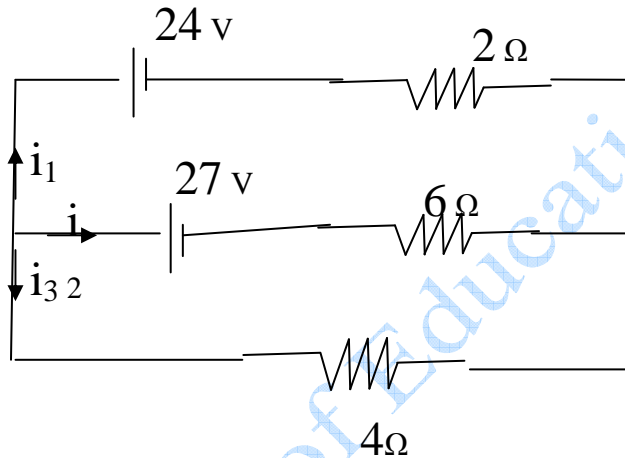
Permittivity in free space (ϵ_0)	= 8.85×10^{-12} F/meter
Permeability in free space (μ_0)	= $4 \pi \times 10^{-7}$ T m A ⁻¹
Mass of Proton (m_p)	= 1.67×10^{-27} kg
Mass of electron (m_e)	= 9.1×10^{-31} kg.
Charge on electron or proton (e)	= 1.6×10^{-19} C
Velocity of Light (C)	= 3×10^8 m/sec
Avogadro's Number (N)	= 6.023×10^{23}
Plank's Constant (h)	= 6.626×10^{-34} J. Sec
 8. Use of calculators is not permitted. However, you may ask log table for Mathematical tables.
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- 1 Under what condition is the force acting on a charge moving through a uniform magnetic field minimum.
- 2 Twenty electric bulbs are connected in series with the mains of 220 v supply. After one bulb are again connected in series with the same mains. What will be the effect on illumination.
- 3 Can Kirchoff's laws be applied both to direct current and alternating current circuits ?
- 4 Microwaves are used in Radar.Why ?
- 5 Give the relative strength of gravitational, coulomb's and nuclear force ie $F_g : F_e : F_n$
- Q.6 Draw the logic symbol of a 2 input NOR gate write down its truth table.
- Q.7 List two advantages of optical fibre over copper cable.
- Q.8 Which process causes depletion region in a p-n junction.
- Q.9 What are the Principle of Van de Graff Generator.
- Q.10 Why terminal voltage of a cell is always less than its emf ?
- Q.11 Using Kirchoff's law deduce the condition for which wheatstone bridge is balanced.
- Q.12 A galvanometer of 24 ohms resistance can carry a full load of 500 μ A. If it is shunted by a resistance of 30ohm, how much current can this system carry now without damage?
- Q.13 A plane electromagnetic wave has electric field oscillating at a frequency of 3×10^{10} Hz and amplitude 50 v/m find the wavelength of the wave and amplitude of the magnetic field.
- Q.14 Calculate the refractive index of the material of an equilateral prism for which the angle of minimum deviation is 60° .
- Q.15 What is the de-Broglie wavelength of a 3 kg object moving with a speed of 2ms^{-1} .
- Q.16 Draw the experimental arrangement of Davison and Germer experiment.
- Q.17 Give two difference between β particle and γ - rays.
- Q.18 Give the explanation for necessary or need of modulation.
- Q.19 Derive the expression for the electric potential at a distance 'r' from a point charge.

Q.20 (a) A wire of resistivity ρ is stretched to three times its length. What will be its new resistivity ?

(b) V-I graph for a metallic wire at different temperature T_1 and T_2 is as shown in the following fig. which of the two temperature T_1 and T_2 is higher and why?

Q.21 Using Kirchoff's laws, determine the currents I_1 , I_2 and I_3 for the network given below -



Q.22. A resistor of 12 ohm, a capacitor of reactance 14 ohm and a pure inductor of inductance 0.1 H are joined in series and placed across 200 V, 50 Hz a.c supply. Calculate –

- (1) current in the circuit .
- (2) phase angle between current and voltage take $\phi = 3$

Q.23 Explain what are eddy currents ? and give two applications of it ?

Q.24 Using Cartesian sign conventions, derive the mirror formula for a concave mirror when real image is formed.

Q.25 What are the following eye defects & how can these be corrected .

- (i) myopia
- (ii) Hypermetropia
- (iii) Presbyopia

Q.26 Give the diagram and expression for height of Antenna.

Q.27 Explain β -decay in radioactive substance.

Q.28 Distinguish the magnetic properties of dia-, para-, and ferro-magnetic substances.

Give one example of each of these materials Draw the field lines due to an external magnetic field near a

- (i) diamagnetic

- (ii) paramagnetic substance.

OR

- (a) Deduce the expression for magnetic field at the centre of a circular current carrying coil
- (b) Two concentric coils X and Y of radii 16cm and 10 cm respectively lie in the same vertical plane containing the north-south direction. Coil X has 20 turns and carries a current of 1.6 A; coil Y has 25 turns and carries a current of 18 A. The sense of current in X is anticlockwise and in Y is clockwise, for an observer looking at the coils facing west. Give the magnitude and direction of the net magnetic field due to the coils at their centre.

Q.29 (a) Draw a labeled ray diagram to show the formation of an image by a compound microscope. Write the expression for its magnifying power.

- (b) How does the resolving power of a Compound microscope change, when
- (i) refractive index of the medium between the object and the objective lens increases and
- (ii) wavelength of the radiation used is increased ?

OR

- (a) Draw a labeled ray diagram for astronomical telescope. How will its magnifying power be affected on increasing for its eyepiece (i) the focal length and (ii) the aperture ? justify your Answer.
- (b) An astronomical telescope consists of two thin lenses set 36 cm apart and has a magnifying power 8 . Calculate the focal lengths of the lenses.

Q.30 (i) Explain the use of a p-n junction diode as a rectifier. Draw the circuit diagram of a full wave rectifier and explain its working . Draw the input and output wave form.

OR

- (ii) The collector current and base current of a transistor are 2mA and 100 μ A respectively. Calculate the values of β , I_c and α .

MARKING SCHEME

Q.1 .Correct answer -1 mark

Q.2 . Correct answer -1 mark

Q.3 Correct answer -1 mark.

Q.4 Correct answer -1 mark

Q.5 $F_g : F_e : F_n = 1 : 10 : 10$

Q.6 correct symbolic representation 1 mark

Q.7 each advantages 1mark 1 + 1

Q.8 diffusion & redistribution of electrons & holes

Q.9 (i) the electric discharge takes place in air readily at pointed conductors 1 mark
 (ii) charges reside on the surface of a conductor, enabling it to accept large amount of charge to build up very high potential.
 1 mark

Q.10 $E - IR$ 1 mark
 when current is drawn a drop of internal voltage is observed. 1 marks

Q.11 correct derivation with diagram 1 mark
 $P/Q = R/S$ 1 mark

Q.12 formula used $S = I_g G/I - I_g$ 1mark
 $I = 5 \times 10^{-4} (1 + 24/3) = 4500 \mu A$ 1 mark

Q.13 $E = E_0 \cos w(t - x/c)$
 $B_0 = E_0/C$ 1 mark
 $B_0 = 0.167 \times 10^{-6}$
 $\lambda = c/v = 0.01 \text{ m}$ 1 mark

Q.14 $n = \sin(A + \delta)/2 / \sin A/2 = \sqrt{3}$ 2 marks

Q.15 $\lambda = h/mv$ 1 mark
 $= 1.1 \times 10^{-34} \text{ m}$ 1mark

Q.16 correct diagram 1 mark
 Correct labelling 1 mark

Q.17 Two difference between β particle and γ - rays 1 + 1 marks

Q.18 explanation for necessary or need of modulation. 2 marks

Q.19 correct expression 1 mark
 Correct derivation 2 mark

Q.20 (a) no Change
 (b) V-I graph for a metallic wire at different temperature T_1 and T_2
 T_2 is greater than T_1

Q.21 Give 1 mark for finding equal resistance for each mesh (1 + 1 + 1)

Q.22. correct diagram 1 mark

Calculation for current 1 mark

Calculation for phase angle 1 mark

Q.23 Correct Explanation 1 mark

Two applications of it 1 + 1 marks

Q.24 Correct ray diagram 1 mark

Correct derivation 2 marks

Q.25 (i) myopia defect and correction 1 mark

(ii) Hypermetropia defect and correction 1 mark

(iii) Presbyopia defect and correction 1 mark

Q.26 correct diagram 1 mark

and expression for height of Antenna. 2 marks

Q.27 correct explanation 3 marks.

Q.28 Distinguish the magnetic properties of dia-, para-, and ferro-magnetic substances- 1 ½ marks

one example of each of these materials 1 ½ marks

Draw the field lines due to an external magnetic field near a

(iii) diamagnetic 1 mark

(iv) paramagnetic substance. 1 mark

OR

(a) Deduce the expression for magnetic field at the centre of a circular current carrying coil – 3 marks

(b) For calculation correct magnitude and direction -2marks

Q.29 (a) ray diagram 1 mark

Correct derivation for expression for its magnifying power. 2 mark

(b)

(i) refractive index of the medium between the object and the objective lens increases 1 mark

(ii) wavelength of the radiation used is increased 1 mark

OR

(c) labeled ray diagram. 1 mark

(d) (i) the focal length – 1 ½ mark

(e) (ii) the aperture ? for correct justification. 1 ½ marks

(f) Calculation of correct focal lengths of the lenses. 1 marks

Q.30 (i)Explanation with diagram. 1 mark

circuit diagram of a full wave rectifier 1 ½ marks
and explanation its working . 1 ½ marks
Draw the input and output wave form. 1 mark

OR

- (i) Correct explanation 2 marks
determination of voltage gain 1 ½ 20 marks
(ii) values of $\beta =$, $I_e = 2.1$ mA and $\alpha = 0.95$

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