

Registration No.: 11714226

Paper Code: A

PNR No.: 117181PHY51718

COURSE CODE : PHY109

COURSE TITLE : ENGINEERING PHYSICS

Time Allowed: 01 hr

Max. Marks: 40

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.
2. This paper contains 40 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
3. Do not write or mark anything on the question paper except your registration no. on the designated space.
4. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q1.

Complete the following statement: According to Gauss's Law of magnetism, magnetic monopoles

- a) Have no mass.
- b) Have no charge.
- c) Are found in abundance in the most distant parts of the universe.
- d) Do not exist anywhere in the universe.

Q2. Work done per unit charge between two points in an electrical field is called?

- a) Flux
- b) Potential difference
- c) Intensity
- d) Permittivity

Q3. Flux will be minimum when electric field lines to area are

- a. parallel
- b. perpendicular
- c. at angle
- d. at distance

Q4. The rate of change of potential with respect to the distance is called as?

- a) Potential difference
- b) Potential Gradient
- c) Capacitance
- d) Potential energy

Q5. When the surface is charge free and has a uniform permittivity, the Poisson's equations reduces to

- a) Gauss equation
- b) Coulomb Law
- c) Stokes Theorem
- d) Laplace equation

Q6. The curl of a physical quantity highlights its

- a) Directional properties
- b) Derivative properties
- c) Diverging properties
- d) Rotational properties

Q7. Which of the following may be determined using Ampere's law?

- a) Electric fields due to current carrying wires
- b) Magnetic forces between two current carrying wires
- c) Magnetic fields due to current carrying wires
- d) Magnetic forces acting on charged particles

Q8. The total electric flux through any closed surface surrounding charges is equal to the amount of charge enclosed".

The above statement is associated with

- (a) Coulomb's square law
- (b) Gauss's law
- (c) Maxwell's Ampere law
- (d) Maxwell's second law

Q9. Choose the correct statement.

- (a) Gradient of the scalar field is a scalar field.
- (b) Gradient of the vector field is a vector field.
- (c) Gradient of the scalar field is a vector field.
- (d) Gradient of the vector field is a scalar field

Q10. The Electric potential at point in zx plane is given by  $V = (4x^2 + 4z^2)/m^2$ . In unit vector notation, Electric field at point (2,0,1) will be

- a)  $x^2 \hat{i} + y^2 \hat{j} + z^2 \hat{k}$
- b)  $8x \hat{i} + y^2 \hat{j} + 8z \hat{k}$
- c)  $16 \hat{i} + 0 \hat{j} + 8 \hat{k}$
- d)  $16x \hat{i} + 0 \hat{j} + 8z \hat{k}$

Q11. Divergence of curl of a any vector  $\vec{A}$  ( $\nabla \cdot (\nabla \times \vec{A})$ ) is

- a) One
- b) zero
- c) cannot defined
- d) infinite

Q12. Vector  $\vec{A} = yz \hat{i} + xz \hat{j} + xy \hat{k}$  is a

- (a) solenoidal
- (b) irrotational
- (c) both a and b
- (d) none of the above

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- Q13. The Gradient of a scalar function  $\phi = x^2yz + 2xz^2$  at  $(1, -1, -1)$  is ( $i, j, k$  are unit vectors)
- a)  $2i + 2j + 3k$       b)  $2i + j + 5k$       c)  $4i - j - 5k$       d)  $4i + 2j + 5k$
- Q14. In LASER, S stands for
- a. Spontaneous      b. Stimulated      c. Synchronous      d. Segmentation
- Q15. In four level laser, the lasing action happens between ( $E_1$  = ground State,  $E_4$  = excited state,  $E_3$  &  $E_2$  metastable state)
- a.  $E_4$  and  $E_3$       b.  $E_3$  and  $E_2$       c.  $E_4$  and  $E_2$       d.  $E_3$  and  $E_1$
- Q16. In three level laser, the level between  $E_1$  (ground state) and  $E_3$  is called
- a. Quasi static state      b. Metastable state      c. Excited state      d. Ground state
- Q17. Nd-YAG laser is an example of
- a. Two level laser      b. Three level laser      c. Four level laser      d. None of these
- Q18. Which of the following is not the property of laser?
- a. Coherent      b. Monochromatic      c. Intense      d. Polarised
- Q19. The Einstein's coefficients are
- a. A for emission and B for absorption  
b.  $A_{21}$  for spontaneous emission and  $B_{12}$  and  $B_{21}$  for absorption and stimulated emission  
c.  $A_{12}$  for absorption and  $B_{12}$  and  $B_{21}$  for spontaneous and stimulated emission  
d.  $A_{12}$  for stimulated emission and  $B_{12}$  and  $B_{21}$  for stimulated absorption and spontaneous emission
- Q20. The life time of electron in excited state is
- a)  $10^0$  sec      b)  $10^2$  sec      c)  $10^3$  sec      d)  $10^8$  sec
- Q21. The ratio of He to Ne in He-Ne laser is
- a. 1:10      b. 100:1      c. 1:2      d. 10:1
- Q22. In relation between Einstein coefficients  $\frac{A_{21}}{B_{21}} = \frac{8\pi h \nu^3}{c^3}$ , c is
- a. Speed of light      b. Length of the resonant cavity  
c. Intensity of incident radiation      d. None of these
- Q23. The image formed in holography is
- a. One dimensional      b. Two dimensional      c. Three dimensional      d. None of these
- Q24. The image formed by the technique of holography is called
- a. Hologram      b. Holograph      c. Holoimage      d. None of these
- Q25. In relation between Einstein coefficients  $\frac{A_{21}}{B_{21}} = \frac{8\pi h \nu^3}{c^3}$ , h is
- a. Boltzman constant      b. Hall coefficient      c. Rydberg's constant      d. Planck's constant
- Q26. The purpose of pumping in a laser is
- a. To create coherent laser beam      b. To create three level laser  
c. To create population inversion      d. None of these
- Q27. Optical fiber operates on the principle of
- (a) Total internal reflection      (b) Tyndall effect      (c) Photo-electric effect      (d) Laser technology
- Q28. The core of an optical fiber has a
- (a) Lower refracted index than air      (b) Lower refractive index than the cladding  
(c) Higher refractive index than the cladding      (d) Similar refractive index with the cladding
- Q29. Step index fiber sustains only
- (a) Single mode propagation      (b) Multi-mode propagation      (c) Both (a) and (b)      (d) None of these
- Q30. How does the refractive index vary in Graded Index fibre?
- (a) Tangentially      (b) Radially      (c) Longitudinally      (d) Transversely



- Q31. In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of  
 (a) Light Collection (b) Light Scattering (c) Light Dispersion (d) Light Polarization
- Q32. The loss in signal power as light travels down a fiber is called  
 (a) Dispersion (b) Scattering (c) Absorption (d) Attenuation
- Q33. Consider the following statements:  
 In optical communication, the losses in optical fibers can be caused by  
 (a) Impurities (b) Microbending (c) Attenuation in glass (d) Stepped indexed operations  
 Which of these statements are correct?  
 (a) 1, 2, and 3 (b) 1, 3, and 4 (c) 1, 2, and 4 (d) 2, 3, and 4
- Q34. For total internal reflection  
 (a) Light must travel from rarer to denser medium (b) Light must travel from denser to rarer medium  
 (c) Light must travel from denser to denser medium (d) Light must travel from rarer to rarer medium
- Q35. The normalized frequency of a step index fiber is 28 at 1300 nm wavelength. What is the total number (approximately) of guided modes that can be supported by the fiber?  
 (a) 50 (b) 200 (c) 400 (d) 800
- Q36. In which of the following situations, the phenomenon of total internal reflection is not possible?  
 (a) Light propagating in water ( $n=1.33$ ) strikes a water-air interface  
 (b) Light propagating in a glass ( $n=1.52$ ) strikes a glass-water interface  
 (c) Light propagating in water strikes a water-glass interface  
 (d) None of the above
- Q37. Which of the following is (are) the use of optical fibers?  
 (a) To transmit the information of telephone communication (b) To transmit the optical images  
 (c) To act as sensors (d) All the above
- Q38. Which of the following is (are) responsible for attenuation in optical fibers?  
 (a) Scattering losses (b) Absorption losses (c) Radiative losses (d) All the above
- Q39. A fiber has a numerical aperture of 0.266. What is acceptance angle (in degrees) for this fiber if the fiber is surrounded by vacuum?  
 (a) 15.426 (b) 0.266 (c) 0.269 (d) None of the above
- Q40. In graded index fibre, Refractive index is maximum at-  
 (a) center of core (b) core-cladding interface (c) in the cladding (d) none

- End of Question Paper -

