ALL QUESTIONS ARE SOLVED ON THIS CHANNEL

Just LPU Things

PHY -110 COMPLETE PLAYLIST

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Paper 1

Registration No.: [redacted]

22231P31Y1987

Course Code:PHY110

Course Title:ENGINEERING PHYSICS

Paper Code:A

Time Allowed: 01:30hrs. **Max Marks: 30**

Read the following instructions carefully before attempting the question paper.

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2. This question paper contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
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Q1) The temperature at any point within or on earth's surface at a certain time defines a
(a) scalar field (b) vector field (c) both scalar and vector field (d) none of these

CO1, L1

Q2) If there exists a vector **V** (x, y, z) at each point (x, y, z) of a region R in space, then the field V defined in region R is called a
(a) scalar field (b) vector field (c) both scalar and vector field (d) none of these

CO1, L1

Q3) A scalar field is defined by $\varphi(x, y, z) = 4x^3 - yz^2 + 7$. What is the value of at the point (0, 0, 0)?

(a) 10 (b) 4 (c) 7 (d) 0

CO1, L1

Q4) If we define del operator, $\nabla \equiv i\frac{\partial}{\partial x} + j\frac{\partial}{\partial y} + k\frac{\partial}{\partial z}$ = Operator **D**, then the Operator **D** is a
(a) scalar operator (b) vector differential operator (c) both scalar and vector operator (d) none of the above

CO1, L1

Q5) A point in space having positive divergence is called a
(a) sink (b) source (c) drain (d) none of these

CO1, L1

Q6)
If the divergence of a vector field (F) vanishes everywhere, i.e. if $\nabla . F = 0$ *(everywhere), then* F can be expressed as the curl of a vector potential **A**, i.e., $F = \nabla \times A$. The vector field F in this case is called
(a) solenoidal (b) irrotational (c) divergence-less (d) Both (a) and (c)

CO1, L1

Q7) If a vector field **A** is curl-less, i.e., $\nabla \times A = 0$, the field is called
(a) solenoidal (b) irrotational (c) divergence-less (d) both (a) and (c)

CO1, L1

Q8)
If V is the volume bounded by a closed surface S and A is a vector function of position with continuous derivatives, then

$$\iiint_V (\nabla . A)\, dV = \iint_S A . dS = \oiint_S A . dS$$

This theorem is called
(a) divergence theorem (b) curl theorem (c) Gauss theorem (d) both (a) and (c)

CO1, L1

Q9)
If S is a open two-sided surface bounded by a closed non-intersecting curve C and if A is a vector function having continuous derivatives in the region, then

$$\iint_S (\nabla x A).\hat{n}\,dS = \oint_C A.dr$$

where C is in the positive direction. This theorem is known as
(a) fundamental theorem of curl (b) Stokes theorem (c) both (a) and (b) (d) none of the above

CO1, L1

Q10)
If V is the electric potential, ρ is the volume charge density and ϵ is the permittivity of a medium, which one of the following describes the correct form of Poisson's equation?
(a) $\nabla^2 V = -\frac{\rho}{\epsilon}$ (b) $\nabla V = -\frac{\rho}{\epsilon}$ (c) $\nabla^2 V = 0$ (d) $\nabla V = 0$

CO1, L1

Q11) LASER stands for
(a) Light Amplification by Spontaneous Emission of Radiation (b) Light Amplification by Stimulated Emission of Radiation
(c) Light Amplification by Spontaneous Emission of Reaction (d) Light Amplification by Stimulated Emission of Reaction

CO2, L2

Q12) Stimulated emission of two atoms produces radiations
(a) Have random phase and direction (b) Have same phase and direction
(c) Have random phase and same direction (d) Have same phase and random direction

CO2, L2

Q13) Spatial coherence is
(a) Longitudinal (b) Transverse (c) Both (a) & (b) (d) None

CO2, L2

Q14) Which of the following is a unique property of laser ?
(a) Speed (b) Power (c) Wavelength (d) Coherence

CO2, L2

Q15) In which of the following LASERS optical pumping is used?
(a) Ruby laser (b) Helium-Neon laser
(c) Semiconductor laser (d) Dye laser

CO2, L2

Q16) Nd: YAG Laser is
(a) 2-Level (b) 3-Level (c) 4-Level (d) None

CO2, L2

Q17) GaAs Laser is
(a) Ruby laser (b) He-Ne laser (c) Semiconductor laser (d) None

CO2, L2

Q18) A Hologram contains the information about
(a) Amplitude of the object
(b) Phase of the object
(c) Both amplitude and phase of the object
(d) Nither amplitude nor phase of the object

CO2, L2

Q19) A He-Ne laser is a
(a) 4-level (b) 3-level (c) 2-level (d) None

CO2, L2

Q20) Which of the following is not true for laser ?
(a) Extremely intense light (b) Perfect monochromatic (c) Coherent (d) Divergent

CO2, L2

Q21) The optical fiber is working on which principle
(a) Refraction (b) Total internal reflection (c) Diffraction (d) Interference

CO2, L2

uous derivatives

Q22)
A step-index fiber has a core with a refractive index of 1.45 and a cladding with a refractive index of 1.40. Its numerical aperture is ___
(a) 0.1562 (b) 0.2441 (c) 0.3775 (d) 0.4863

CO2, L2

Q23) The condition for total internal reflection to take place (θ = Angle of incidence, = RI of core and = RI of cladding) is
(a) $sin\ \theta \leq \frac{N_2}{N_1}$ (b) $\sin\theta \geq \frac{N_2}{N_1}$ (c) $\sin\theta = \frac{N_2}{N_1}$ (d) $sin\ \theta \geq \frac{N_1}{N_2}$

CO2, L2

CO1, L1

Q24) Which of the following loss occurs inside the fibre ?
(a) Radiative loss (b) Absorption (c) Attenuation (d) Scattering

owing describes the

CO2, L2

Q25) The refractive index of the core (N1) and cladding (N2) of an optical fiber satisfies the relation:
(a) $N_2^2 > N_1^2$ (b) $N_2^2 < N_1^2$ (c) $N_2^2 = N_1^2$ (d) $N_2^2 \geq N_1^2$

CO2, L2

CO1, L1

Q26) The numerical aperture of the fiber (n_1 = refractive index of core,cladding)
(n_2 = refractive index of core, cladding)

on of Radiation
n of Reaction

CO2, L2

(a) $\sqrt{(n_1^2 - n_2^2)}$ (b) $\sqrt{(n_1 - n_2)}$ (c) $\sqrt{(n_2^2 - n_1^2)}$ (d) $\sqrt{(n_2 - n_1)}$

CO2, L2

Q27) A step-index fiber has a numerical aperture of 0.26, a core refractive index of 1.5 and a core diameter of 100 micrometer. Calculate the acceptance angle.

CO2, L2

(a) 1.47° (b) 15.07° (c) 2.18° (d) 24.15°

CO2, L2

Q28) The V-number of the single mode fiber is ___.

CO2, L2

(a) V < 2.405 (b) V > 2.405 (c) V = 2.405 (d) None

CO2, L2

Q29) The maximum number of modes supported by a graded index fiber is determined by

CO2, L2

(a) $N_{max} > \frac{V^2}{2}$ (b) $N_{max} \cong \frac{V^2}{2}$ (c) $N_{max} < \frac{V^2}{4}$ (d) $N_{max} \cong \frac{V^2}{4}$

CO2, L2

Q30) If V-number of the single mode step index fiber is 2.305, find the maximum number of supported guided mode ?

CO2, L2

(a) 4.5042 (b) 2.6565 (c) 1.6556 (d) 1.2383

CO2, L2

--End of Question paper--

CO2, L2

L2

L2

Paper 2

Registration No.: [redacted] Paper Code: B

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Q(1) What is the fundamental process by which lasers generate light?
(a) Absorption of light (b) Spontaneous emission of light
(c) Stimulated emission of light (d) Refraction of light CO1,L2

Q(2) Which of the following is NOT one of the three types of energy levels in an atom?
(a) Ground state (b) Excited state (c) Metastable state (d) Intermediate state CO1,L2

Q(3) Which of the following is a way in which matter can interact with electromagnetic radiation?
(a) Absorption (b) Refraction (c) Reflection (d) interference CO1,L2

Q(4) What happens to an atom when it absorbs a photon of light?
(a) It moves to a lower energy level (b) It moves to a higher energy level
(c) It emits a photon of light (d) Nothing happens CO1,L2

Q(5) Which of the following is a type of emission of light that occurs naturally and randomly?
(a) Absorption (b) Spontaneous emission (c) Stimulated emission (d) Refraction CO1,L2

Q(6) Which of the following is a type of emission of light that occurs as a result of the interaction between an incoming photon and an excited atom?
(a) Absorption (b) Spontaneous emission (c) Stimulated emission (d) Refraction CO1,L2

Q(7) What is population inversion in a laser?
(a) When more atoms are in the ground state than the excited state
(b) When more atoms are in the excited state than the ground state
(c) When there are equal numbers of atoms in the ground and excited states
(d) When no atoms are in the ground or excited state CO1,L2

Q(8) What is the lasing medium in a Nd:YAG laser?
(a) Neon (b) neodymium (c) aluminium (d) Silicon CO1,L2

Q(9) What is the typical wavelength of a He-Ne laser?
(a) 632.8 nm (b) 1064 nm (c) 1550 nm (d) 980 nm CO1,L2

Q(10) What is the excitation mechanism in a Nd:YAG laser?
(a) Electric discharge (b) Optical pumping
(c) Electron beam excitation (d) Chemical reaction CO1,L2

Q(11) In an optical fibre, relation between refractive index of core (n1) and cladding (n2) is
(a) n1= n2 (b) n1>n2 (c) n1<n2 (d) n1≤n2 CO1,L2

Q(12) In an optical fibre, light is guided by means of
(a) Diffraction (b) Interference (c) Total internal reflection (d) polarization CO1,L2

Q(13) Core of an optical fibre is made of transparent rod of
(a) clear plastic or glass (b) aluminium (c) copper (d) none of these CO1,L2

Q(14) Angle of acceptance is maximum for a filter, when
(a) the critical angle is minimum (b) the critical angle is zero
(c) the critical angle is maximum (d) the critical angle is negative CO1,L2

Registration No.:[redacted]

Q(15) Total internal reflection takes place when light travels from
(a) rarer to denser medium (b) denser to rarer medium
(c) air to glass (d) glass to air
CO1,L2

Q(16) Numerical aperture of an optical fibre is equal to
(a) $n_1\sqrt{2\Delta}$ (b) $\frac{n_1}{n_2}\sqrt{2\Delta}$ (c) $\frac{n_1}{\sqrt{2\Delta}}$ (d) $\frac{n_2}{\sqrt{2\Delta}}$
CO1,L2

Q(17) The numerical aperture of an optical fibre depends on
(a) core refractive index (b) critical angle (c) both (a) and (b) (d) none of these
CO1,L2

Q(18) In an optical fibre, the propagation angle of light must be equal to or less than
(a) acceptance angle (b) incident angle (c) critical angle (d) refraction
CO1,L2

Q(19) In an optical fibre, dispersion means
(a) pulse distortion (b) pulse narrowing (c) pulse rise-time (d) pulse broadening
CO1,L2

Q(20) In Graded Index optical fibres (multimode)
(a) the refractive index of the core has a constant value
(b) the refractive index of the core is equal to that of the cladding
(c) the refractive index of the core decreases continuously between the axis and the cladding
(d) none of these
CO1,L2

Q(21) Solenoidal condition is related to
(a) grad of vector is zero (b) divergence of vector is zero
(c) curl of vector is zero (d) all of these
CO1,L2

Q(22) Gradient is a
(a) Vector (b) Scalar (c) Both a and b (d) None of these
CO1,L2

Q(23) Divergence of any vector is
(a) Vector (b) Scalar (c) Both A and B (d) None of these
CO1,L2

Q(24) The conservative charge of any vector A is related to
(a) CurlA =0 (b) DivA=0 (c) GradA = 0 (d) None of these
CO1,L2

Q(25) Maxwell's second equation is related to
(a) $\int Bdl = 0$ (b) $\int Bds = 0$ (c) $\int Bdv = 0$ (d) None of these
CO1,L2

Q(26) What is the relationship between magnetic field intensity, magnetic flux density, and magnetic permeability?
(a) B = μoH (b) H = μoB (c) H =- B/μo (d) None of these
CO1,L2

Q(27) How is the electric field is related to charge carrying conductor, where E is electric fiel, V is potential difference and L is the length of the conductor ?
(a) V = E/L (b) E = VL (c) V = EL (d) E= V/L
CO1,L2

Q(28) Poisson equation is related to
(a) $\nabla^2 V = -q$ (b) $\nabla^2 V = -\frac{q}{\varepsilon 0}$ (c) $\nabla^2 V = q\varepsilon o$ (d) $\nabla^2 V = -q\varepsilon o$
CO1,L2

Q(29) Maxwell's first equation is related to
(a) Electrostatic Gauss law (b) Magnetostatic Gauss law
(c) Faraday's law (d) Ampere's law
CO1,L2

Q(30) Maxwell's third equation is related to
(a) Electrostatic Gauss law (b) Magnetostatic Gauss law
(c) Faraday's law (d) Ampere's law
CO1,L2

--End of Question paper--

Paper 3

examination hall.

Q1. If $\nabla . V = 0$ then v is
a) irrational field b) solenoidal field c) Rotational d) (a) and (b)

Q2. 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

Q3. Which of the following equations is correct?
a) c= f / K b) c = f/n c) T = 1/m d) $f = c/\lambda$

Q4. Equation of continuity involve
a. Charge density & Current density b. Electric field c. Magnetic intensity d. All of these

Q5. Maxwell's 1st equation is also known as
a. Gauss Law for electricity b. Gauss Law for magnetism c. Faraday's law for induction d. Ampere's law

Q6. According to Maxwell's first equation in differential form
a. $\nabla . D = \rho$ b. $\int Dds = \int (\nabla . D) dv$ c. $\int Hdl = \int (\nabla XH) ds$ d. $\nabla XH = Jc + Jd$

Q7. Mass ,electric charge, distance, energy, temperature etc are examples of
a) Scalar quantity (b) Vector quantity (c) Both (d) None

Q8. According to Maxwell's first equation in integral form
a. $\nabla . D = \rho v$ b. $\int Dds = \int (\nabla . D) dv$ c. $\int Hdl = \int (\nabla XH) ds$ d. $\nabla XH = Jc + Jd$

Q9. Which one is correct
a. $\int Hdn = Ienc$ b. $\int fds = I$ c. Both (a) and (b) d. None

Q10. If $F = x^2 i + y^2 j + z^2 k$ then F is
a. irrational field b. solenoidal field c. neither (a) nor (b) d. both (a) and (b)

Q11. When there is change in magnetic flux, emf is induced. This declaration is
a. Fermi s law b. Faraday s law c. coulomb s law d. ampere s law

Q12. Which of the following is true for electrostatics?
a) $E = -\nabla V$ b) $V.\nabla P.B = 0$ c) Both (a) and (b) d) None of these

Q13. The Gauss's divergence theorem associates
a) line integral to volume integral b) Surface integral to volume integral
c) volume integral to line integral d) line integral to surface integral

Q14. Which of the following pumping method is used in Nd-YAG laser?
a) Chemical pumping b) Optical pumping c) Electrical pumping d) Direct conversion

Q15. In Nd-YAG what is full form of YAG ?
a) Yimmium Aluminium Garnet b) Yttrium Aluminium Gallium
c) Yttrium Aluminium Garnet d) Yttrium Argon Garnet

Q16. How much energy is associated with photon of wavelength 650 nm?
a) 1.91 eV b) 5.91 eV c) 4. 91 eV d) 3.91 eV

Q17. In He-Ne lasing action, the red laser beam is trapped as it lies in
a) ultrasonic region b) Infrared region c) None d) X-ray region

Q18. The population inversion in preparing laser beam can be achieved
a) When one of the ground state in more populated that the excited state
b) When one of the excited state is equally populated as the ground state
c) Neither (a) nor (b)
d) both (a) and (b)

Q19. In laser, lasing action takes place due to
a) both spoutaneous emission and absorption b) Spontaneous emission
c) Absorption d) Stimulated smmission

Q20. In spontaneous emission process the photon is
a) Lost b) Created c) Neither lost nor created d) Both (a) and (b)

Q21. Laser source is highly
a) Coherent b) monochromatic c) Neither coherent nor monochromatic d) both (a) and (b)

Q22. Ordinary light emits
a) Coherent light b) Niether coherent nor uni-directional c) Stimulated light d) Uni- directional

Q23. In stimulated emission process the number of coherent photons are
a) 1/2 b) 1 c) 3 d) none of these

Q24. In population inversion the number of atoms in excited state is _____ as compared to the ground state
a) Smaller b) Greater c) Equal d) none of the above

Q25. How many photons of yellow light of wavelength 550 nm constitutes 2 joule of energy?
a) 5.5×10^{18} b) 7.5×10^{26} c) 8×10^{3} d) 9×10^{-26}

Q26. In Ruby Laser active medium is
a) chromium doped AL_2O_3 b) AL_2O_3 c) chromium d) Mixture of He and Ne

Q27. What are the properties of optical fibres?
a) Light weight b) Flexible c) Low loss d) All of these

Q28. When a beam of light travels through media of two different densities, if the angle of incidence is greater than the critical angle _____ occurs.
a) reflection b diffraction c)incidence d) interference

Q29. The inner core of an optical fiber is _____ in composition.
a) glass or plastic b)gas c)plasma d)liquid

Q30. In an optical fiber, the inner core is _____ the cladding.
a) denser than b)less dense than c)the same density as d)rarer

Q31. What is the major factor that makes coaxial cable less susceptible to noise than twisted-pair cable?
a)inner conductor b)diameter of cable c)outer conductor d)insulating material

Q32. An optical fibre has N.A. of 0.20 and a cladding refractive index of 1.59. Determine the refractive index of core.
a) 0.6025 b) 1.6025 c) 2.6025 d) 3 .0625

Q33. Which of the following primarily uses guided media?
a) cellular telephone system b)local telephone system c)satellite communications d)radio broadcasting

Q34. In fibre optics the signal is _____ waves.
a) light b)radio c)infrared d)very low-frequency

Q35. Calculate the refractive index of cladding material of a fibre from the following data NA=0.22 , $\Delta = 0.012$ where NA is numerical aperture and Δ is fractional refractive index.
a) 1.424 b) 1.41 c) 1.240 d) 1.242

Q36. Light is confined within the core of a simple optical fibre by
a) Refraction b) Total internal reflection c) reflection d) none of these

Q37. The numerical aperture of an optical fibre depends on
a) Core refractive index b) Critical angle c) Both a and b d) None of these

Q38. In the structure of a fiber, which component provides additional strength and prevents the fiber from any damage?
a. Core b. Cladding c. Buffer Coating d. None of the above

Q39. Number of possible modes in step index optical fiber is
a. $V^2/4$ b. $V^2/2$ c. V^2 d. $2V^2$

Q40. Acceptance angle is defined as the _____ angle of incidence at the end face of an optical fibre, for which the ray can be propagated in the optical fibre
a) maximum b) minimum c) Either a or b d) none of the above

-- End of Question Paper --

Paper 4

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2. This paper contains 40 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.
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Q1. Identify the devices that do not use electromagnetic energy.
a) Television b) Washing machine c) Microwave oven d) Mobile phones

Q2. The Gaussian surface is
a) Real boundary b) Imaginary surface c) Tangential d) Normal

Q3. In electromagnetic waves, the electric field will be perpendicular to which of the following?
a) Magnetic field intensity b) Wave propagation
c) Both magnetic field and wave propagation d) It propagates independently

Q4. Divergence of a vector is always
(a) Scalar (b) Vector (c) Both A and B (d) Zero

Q5. When a potential satisfies Laplace equation, then it is said to be
a) Solenoidal b) Divergent c) Lamellar d) Harmonic

Q6. Maxwells equations are based on _____ law(s).
(a) Faraday (b) Gauss (c) Ampere (d) All of these

Q7. Poissons equation for electric potential is given by
(a) $\nabla^2 V = -\rho/\varepsilon_0$ (b) $\nabla^2 V = 0$ (c) $\nabla^2 V = \rho/\varepsilon_0$ (d) $\nabla^2 V = 1$

Q8. The Stoke's theorem uses which of the following operation?
a) Divergence b) Gradient c) Curl d) Laplacian

Q9. Equation of continuity is given by
(a) $\vec{\nabla}\cdot\vec{J} = -\partial\rho/\partial t$ (b) $\vec{\nabla}\cdot\vec{J} = \partial\vec{E}/\partial t$ (c) $\vec{\nabla}\cdot\vec{J} = 0$ (d) $\vec{\nabla}\cdot\vec{J} = -\partial\vec{B}/\partial t$

Q10. Faraday's law is
(a) $\vec{\nabla}\times\vec{B} = \mu_0\vec{J} + \mu_0\varepsilon_0\frac{\partial\vec{E}}{\partial t}$ (b) $\vec{\nabla}\times\vec{E} = -\frac{\partial\vec{B}}{\partial t}$ (c) $\vec{\nabla}\cdot\vec{D} = \rho$ (d) $\vec{\nabla}\cdot\vec{B} = 0$

Q11. Gauss theorem uses which of the following operations?
a) Gradient b) Curl c) Divergence d) Laplacian

Q12. The stokes theorem transforms
(a) line integral to volume integral (b) surface integral to volume integral
(c) volume integral to line integral (d) line integral to surface integral

Q13. The physical quantity that has only magnitude is called
a) A scalar quantity b) A vector quantity
c) A chemical quantity d) A magnitude quantity

Q28. _____ the reduction in the amplitude and the intensity of a singal as it is guided through an optical fiber is known as
a. dispersion b. attenuation c. diffraction d. diffusion

Q29. Which type of photonic crystal fiber exhibit/s its/their similarity to the periodic crystalline lattice in a semiconductor?
a. Index guiding fiber b. Photonic bandgap fiber c. Both a and b d. None of the above

Q30. If a light travel in a certain medium and it gets reflected off an optically denser medium with high refractive index, then it is regarded as _____
a. External Reflection b. Internal Reflection c. Both a and b d. None of the above

Q31. The refractive index of the core (μ_1) and the cladding (μ_2) of the fibre are
a. different b. equal c. $\mu_1 < \mu_2$ d. None of the above

Q32. The refractive index of the core (μ_1) and the cladding (μ_2) of the fibre are 1.50 and 1.48 respectively then its fractional refractive index is
a. 0.0133 b. 0.133 c. 0.00133 d. 1.33

Q33. Properties of Fibre optics is
a. carry less data, more susceptible to interface, thicker than metal wires
b. can carry more data, more susceptible to interface, thinner than metal wires
c. can carry more data, less susceptible to interface, thinner than metal wires
d. can carry more data, less susceptible to interface, thicker than metal wires

Q34. The refractive index of the core (μ_1) and the cladding (μ_2) of the fibre are 1.62 and 1.52 respectively, then value of $Sin\theta_A$ is: (where θ_A is acceptance angle)
a. 0.56 b. 5.6 c. 0.056 d. 5.006

Q35. The acceptance angle is given by _____ where μ_1 and μ_2 are the refractive index of the core of the fibre and that of cladding
a. $\theta_A = \sqrt{\mu_1^2 - \mu_2^2}$ b. $\theta_A = Sin^{-1}\sqrt{\mu_1^2 - \mu_2^2}$
c. $\theta_A = Cos^{-1}\sqrt{\mu_1^2 - \mu_2^2}$ d. $\theta_A = Tan\sqrt{\mu_1^2 - \mu_2^2}$

Q36. In an optical fiber, the light is transmitted through the _____
a. Core b. Cladding c. Buffer d. Jacket

Q37. The incident angle at which the angle of refraction (transmitting) is equal to 90o is called
a. thermal angle b. critical angle c. attenuation angle d. displacement angle

Q38. If a light travel in a certain medium and it gets reflected off an optically denser medium with high refractive index, then it is regarded as _____
a. Refraction b. Internal Reflection c. External Reflection d. Polarisation

Q39. Three classes of optical fibre are
a. Display multimode fibre, display monomode fibre and display index multimode fibre
b. communication multimode fibre, communication monomode fibre and communication index multimode fibre
c. stepped index multimode fibre, stepped index monomode fibre and graded index multimode fibre
d. coupler multimode fibre, coupler monomode fibre and coupler index multimode fibre

Q40. Optical fibre can be used in
a. Communication b. Medical field c. Defence d. All of the above

Q14. Which of the following is not true for LASER
a. Extremely intense light b. Highly monochromatic c. Highly Coherent d. Divergent

Q15. LASER stands for
a. Light amplification by spontaneous emission of radiation
b. Light absorption by stimulated emission of radiation
c. Light amplification stimulated emitted radiation
d. Light amplification by stimulated emission of radiation

Q16. Components of laser are
a. Optical Resonator b. Pumping Source c. Active medium d. All of the above

Q17. Einstein coefficient B21 is
a. Probability of spontaneous emission from level 2 to 1.
b. Probability of absorption emission from level 1 to 2.
c. Probability of stimulated emission from level 2 to 1.
d. Both (a) and (c)

Q18. Which of the following is true
a. Spontaneous emission can be controlled
b. In general photon emitted from spontaneous emission are identical
c. Photons from stimulated emission are identical
d. All of the above.

Q19. The light from a laser source is monochromatic because all the photons
a. are in phase b. have same energy
c. are in the same direction d. All of the above

Q20. In laser which of the following processes is used to amplify the light
a. Absorption b. Spontaneous emission c. Stimulated emission d. None of these

Q21. Pumping source in He-Ne laser is
a. Optical pumping b. Electrical discharge c. Chemical pumping d. X-Rays pumping

Q22. Laser beam is made of
a. Electrons b. Very light and elastic particles
c. Highly coherent photons d. None of these

Q23. The active centers in Nd:YAG laser is
a. Nd b. YAG crystal c. Y d. O

Q24. The role of He in He-Ne laser is
a. He is an active medium b. Population inversion takes place in He
c. Stimulated emission takes place in He d. He atoms help in exciting Ne atoms to achieve population inversion

Q25. Hologram is the result of
a. Interference of object and reference beam
b. Polarization of object and reference beam
c. Diffraction of object and reference beam
d. Both polarization and diffraction of object and reference beam

Q26. Relationship between Einstein's A and B coefficient is

a. $\frac{B_{21}}{A_{21}} = \frac{8\pi h\upsilon^3}{c^3}$ b. $\frac{A_{21}}{B_{21}} = \frac{8\pi h\upsilon}{c}$ c. $\frac{B_{21}}{A_{21}} = \frac{8\pi h\upsilon}{c^3}$ d. $\frac{A_{21}}{B_{12}} = \frac{8\pi h\upsilon^3}{c^3}$

Q27. The propogation angle of light must be equal to or less than..... in optical fibre
a. acceptance angle b. incident angle c. critical angle d. refraction