Sample MCQ

Engineering Physics: PHY110

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1. Whether the vectors (-2,1,-1) and (0,3,1) are parallel or not

a. Parallel

b. Collinearly parallel

c. Not parallel

d. Data insufficient

2. Find div (curl **F**), where $\boldsymbol{F} = -x^2 y\hat{\imath} + xz\,\hat{\jmath} + 2yz\hat{k}$

a. 1

b. -1

c. 0

d. -3

3. Find curl (grad r^n), where n is constant and **r** is position vector.

a. 1

b. -1

c. 0

d. -3

4. A field is irrotational if

a. grad A = 0

b. div **A** = 0

c. Curl **A** = 0

d. None

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5. If $F = x\hat{i} + y\hat{j} + zk$ then its divergence is ___.

a. $\hat{i} + \hat{j} + \hat{k}$

b. 3

c. x + y + z

d. None

6. The Stoke's theorem is

a. $\iint \vec{A}.\overrightarrow{dS} = \oint \vec{A}.\overrightarrow{dr}$

b. $\oint \vec{A}.\overrightarrow{dr} = \iint curl\ \vec{A}.\overrightarrow{dS}$

c. $\iint \vec{A}.\overrightarrow{dS} = \iiint div\ \vec{A}.dV$

d. $\iint \vec{A}.\overrightarrow{dS} = \iiint grad\ \vec{A}\ dV$

7. Dielectric are the substances which are

a. Conductor

b. Insulator

c. Semiconductor

d. None

8. A non-polar molecule is the one in which the center of gravity of +ve and –ve charges

a. coincides

b. gets separated by 1Å

c. gets separated by 10^{-8} m

d. None

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9. Maxwell's 2nd equation div **B** = 0 indicates that

a. Magnetic monopole exist

b. Magnetic monopole doesn't exist

c. None

10. Equation of continuity states that

a. $\vec{\nabla}.\vec{J} + \partial\rho/\partial t = 0$

b. $\vec{\nabla}.\vec{J} - \partial\rho/\partial t = 0$

c. $-\vec{\nabla}.\vec{J} + \partial\rho/\partial t = 0$

d. None

11. Which one of these is/are correct?

a. div **B** =0

b. curl **B** = $-\frac{\partial \vec{B}}{\partial t}$

c. curl **B** = $\frac{\partial \vec{B}}{\partial t}$

d. Both a & b

12. The Poisson's equation in SI system is

a. $\nabla^2 V = -\rho/\varepsilon_0$

b. $\nabla^2 V = -4\pi\rho$

c. $\nabla^2 V = -4\pi\sigma$

d. None

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13. The direction of grad F is

a. Tangential to the level surface

b. Normal to the level surface

c. Inclined at 45^0 at level surface

d. Arbitrary

14. A field has zero divergence and zero curl. The field is said to be

a. divergent and rotational

b. solenoid and rotational

c. solenoid and irrotational

d. divergent and irrotational

15. The Divergence's theorem is

a. $\iint \vec{A}.\overrightarrow{dS} = \oint \vec{A}.\overrightarrow{dr}$

b. $\oint \vec{A}.\overrightarrow{dr} = \iint curl\ \vec{A}.\overrightarrow{dS}$

c. $\oint_s \ \vec{A}.\overrightarrow{dS} = \oint_v \ div\ \vec{A}.dV$

d. $\iint \vec{A}\ .\overrightarrow{dS} = \iiint grad\ A\ dV$

16. Which one of these is/are correct?

a. div **B** =0

b. curl **E** = $-\frac{\partial \vec{B}}{\partial t}$

c. div **E** = $\frac{\rho}{\epsilon_0}$

d. All

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17. Find the divergence of the vector $F = y\hat{\imath} + z\hat{\jmath} + x\hat{k}$

a. -1

b. 0

c. 3

d. 1

18. The Ampere's modified law is based on which theorem

a. Divergence theorem

b. Green's theorem

c. Stoke's theorem

d. Maxwell's theorem

19. Maxwell's 4th law satisfies that

a. Conduction current only

b. displacement current only

c. Sum of conduction and displacement current

d. None

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1. The optical fiber is working on which principle

a. Refraction

b. Total internal reflection

c. Diffraction

d. Interference

2. 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

3. The condition for total internal reflection to take place (θ = Angle of incidence, N_1 = RI of core and N_2 = 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. $sin\ \theta \geq \frac{N_1}{N_2}$

4. The core of the optical fiber is

a. Outer part of fiber

b. Inner part of fiber

c. Optical fiber axis

d. None

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5. Multi-mode fibers are

a. Free from intermodal dispersion

b. Suffer intermodal dispersion

c. Partially suffer from intermodal dispersion

d. None

6. For multimodal step index fiber

a. RI of core is constant.

b. RI of cladding is constant.

c. RI of core is varied.

d. RI of core and cladding remains constant.

7. Find the V-number of step-index fiber having a 25um core radius,n1=1.48, n2= 1.46 and wavelength = 0.82nm.

a. 64.203

b.46.45

c. 41.50

d. 0

8. The numerical aperture of the fiber (n_1 = RI of core and n_2 = RI of cladding) is

a. $\sqrt{(n_1{}^2 - n_2{}^2)}$

b. $\sqrt{(n_1 - n_{2)}}$

c. $\sqrt{(n_2{}^2 - n_1{}^2)}$

d. $\sqrt{(n_2 - n_{1)}}$

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

a. V < 2.405
b. V > 2.405
c. V = 2.405
d. None

10. The maximum number of modes supported by a graded index fiber is determined by

a. $N_{max} > \frac{V^2}{2}$

b. $N_{max} \cong \frac{V^2}{2}$

c. $N_{max} < \frac{V^2}{4}$

d. $N_{max} \cong \frac{V^2}{4}$

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

a. 4.5042

b. 2.6565

c. 1.6556

d. 1.2383

12. The sensing medium of intrinsic optical fiber sensor is

a. Light detector

b. Laser light

c. Fiber

d. None

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13. A glass cladding fiber is made with core glass of refractive index 1.50 and the cladding is doped to give a fractional index difference 0.0005. Find the cladding index ?

a. 1.203

b.1.011

c. 1.500

d.1.4992

14. For multimodal graded index fiber

a. RI of core is constant.

b. RI of cladding is not constant.

c. RI of core is varied.

d. RI of core and cladding remains constant

15. If V-number of the multi-mode step index fiber is 9.493, find the maximum number of supported guided mode ?

a. 45.95

b. 45.0

c. 44.06

d. 45.06

16. Which of the following loss occurs inside the fibre ?

a) Radiative loss

b) Scattering

c) Absorption

d) Attenuation

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17. The refractive index of core (N_1) and cladding (N_2) of an optical fiber satisfy the relation.

a. $N_2^{\,2} > N_1^{\,2}$
b. $N_2^{\,2} < N_1^{\,2}$
c. $N_2^{\,2} = N_1^{\,2}$
d. $N_2^{\,2} \geq N_1^{\,2}$

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1. What is the full form of LASER

a. Light Amplification by Spontaneous Emission of Radiation

b. Light Amplification by Stimulated Emission of Reaction

c. Light Amplification by Spontaneous Emission of Reaction

d. Light Amplification by Stimulated Emission of Radiation

2. The population inversion necessary for laser action used in ruby laser is

a. electric discharge

b. Optical pumping

c. Direct conversion

d. Inelastic atom-atom collision

3. A He-Ne laser is a

a. 2-level

b. 3-level

c. 4-level

d. None

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4. Which of the following is not true for laser ?

a. Extremely intense light

b. Perfect monochromatic

c. Coherent

d. Divergent

5. If a laser operate at wavelength of 496 nm. What is the energy of each photon in eV?

a. 0.5 eV

b. 2.5 eV

c. 1 eV

d. 1.5 eV

6. The ratio of Einstein Co-efficient A and B can be written as

a. $(8\pi hc^3)/\nu^3$

b. $(8\pi hc)/\nu$

c. $(8\pi hc)/\nu^3$

d. $(8\pi h \nu^3)/c^3$

7. Temporal coherence is

a. Longitudinal

b. Transverse

c. both a & b

d. None

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8. Spontaneous emission of two atoms produces radiations

a. have random phase and random direction

b. have same phase and same direction

c. have random phase and same direction

d. have same phase and random direction

9. Nd: YAG Laser is

a. 2-level

b. 3-level

c. 4-level

d. None

10. Holography is an _____ phenomenon.

a. Dispersion

b. Diffraction

c. Interference

d. None

11. Each part of hologram contains the information about

a. Particular part of the object

b. Entire object

c. Important part of object

d. Front side of object

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12. In holographic data storage, the information is stored in _____
a) Pendrives
b) Cells
c) Crystals
d) Diode

13. The technique by which image is obtained from a hologram is called as _____
a) Formation
b) Construction
c) Reconstruction
d) Projection

14. Which of the following is used for the formation of holograms?
a) X-ray
b) Visible Light
c) Infrared
d) Lasers

15. The information in the hologram exists in _____
a) Colored Image form
b) Black and white image form
c) 3-D image form
d) Coded form

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16. In He-Ne Laser, the most favorable ratio of helium to Neon for satisfactory laser action is

a. 1:4

b. 4:1

c. 1:7

d. 10:1

17. Each part of hologram contains the information about

a. Particular part of the object

b. Entire object

c. Important part of object

d. Front side of object

18. GaAs Laser is

a. Ruby laser

b. He-Ne laser

c. Semiconductor laser

d. None

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