| Reg. No. | | | | | | | | | | | | | | | | |
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| Question Paper Code | 13120 |
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024**

First Semester

**Civil Engineering**

(Common to All Branches Except CSBS)

**20BSPH101 - ENGINEERING PHYSICS**

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

**PART - A (MCQ) (20 × 1 = 20 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 1. | Coordination number in simple cubic crystal structure<br>(a) 4 (b) 1 (c) 6 (d) 3 | 1 | K1 | CO1 |
| 2. | Number lattice points in primitive cell is<br>(a) 1 (b) 2 (c) 4 (d) 6 | 1 | K1 | CO1 |
| 3. | The number of Bravais lattices is<br>(a) 256 (b) 7 (c) 14 (d) 32 | 1 | K1 | CO1 |
| 4. | What is the role of Helium atoms in Carbon dioxide lasers?<br>(a) to populate carbon dioxide molecule (b) to depopulate carbon dioxide molecule<br>(c) act as a coolant (d) All the above | 1 | K1 | CO2 |
| 5. | Which one of the following lasers belongs to a heterojunction semiconductor laser?<br>(a) GaAs laser (b) InP laser (c) GaAs-GaAlAs laser (d) GaAlAs laser | 1 | K1 | CO2 |
| 6. | The applications of Carbon dioxide lasers are<br>(a) Industry (b) Remote sensing (c) Medical (d) All the above | 1 | K1 | CO2 |
| 7. | Which of the following is not a characteristic of LASERS?<br>(a) Monochromatic (b) Coherent (c) Divergent (d) Intense | 1 | K1 | CO3 |
| 8. | An example of active sensor is<br>(a)Pressure sensor (b) Temperature sensor (c) Displacement sensor (d) Both (a) and (b). | 1 | K1 | CO3 |
| 9. | In a graded-index fiber, the refractive index<br>(a) Varies with distance from the optic axis<br>(b) Does not vary with distance from optic axis<br>(c) Varies only for some distance from optic axis<br>(d) depends on the color of the wavelength of light used. | 1 | K1 | CO3 |
| 10. | Strain has<br>(a) No units (b) No dimensions<br>(c) Only units and dimensions (d) No units and dimensions. | 1 | K1 | CO4 |
| 11. | Longitudinal strain is<br>(a) Change in volume/original volume (b) Change in area/original area<br>(c) Change in length / original length (d) Change in displacement /original position | 1 | K1 | CO4 |
| 12. | The unit of stress is<br>(a) Pascal (b) Newton/$m^2$ (c) Newton (d) both (a) and (b) | 1 | K1 | CO4 |
| 13. | Compton effect is based on collision of<br>(a) Particle-Particle (b) Wave-Particle (c) Particle-wave (d) Wave-Wave | 1 | K1 | CO5 |
| 14. | G.P.Thomson experiment proved the wave nature of particle by observing the phenomenon of<br>(a) Polarization (b) Refraction (c) Interference (d) Diffraction | 1 | K1 | CO5 |
| 15. | Wavelength of the particle<br>(a) $\frac{k}{mv}$ (b) $\frac{h}{mv}$ (c) $\frac{h}{kT}$ (d) $\frac{mv}{h}$ | 1 | K1 | CO5 |

16. By Planck's theory, ground state energy of an atom is *1 K1 CO5*
(a) 8eV (b) 5eV (c) 3eV (d) 0 eV.

17. Heat is transferred from one end to another without the necessity of the intervening medium ……. *1 K1 CO6*
(a) Conduction (b) Convection (c) Radiation (d) Forced Convection

18. Expansion in length of the solids is called as……... *1 K1 CO6*
(a) Volume expansion (b) Superficial expansion
(c) Cubical expansion (d) Linear expansion

19. Bimetallic thermometer accuracy is between ……...of the scale *1 K1 CO6*
(a) ± 2% to 5% (b) ± 2% to 4% (c) ± 2% to 6% (d) ± 2% to 3%

20. Unit of coefficient of thermal conductivity *1 K1 CO6*
(a) $WK^{-1}$ (b) $m^{-1}K^{-1}$ (c) $Wm^{-1}K^{-1}$ (d) K

**PART - B (10 × 2 = 20 Marks)**

Answer ALL Questions

21. What are Bravais Lattices? *2 K1 CO1*
22. Define atomic radius. *2 K1 CO1*
23. What is meant by population inversion? *2 K1 CO2*
24. Summarize the vibration modes involved in producing $CO_2$ laser. *2 K2 CO2*
25. Define total internal reflection. *2 K1 CO3*
26. Classify the fibres based on mode. *2 K2 CO3*
27. ExplainPoisson's ratio. *2 K2 CO4*
28. What are I-shape girders? *2 K1 CO4*
29. Write downthe physical significance of wave function. *2 K1 CO5*
30. What arebimetallic strip? *2 K1 CO6*

**PART - C (6 × 10 = 60 Marks)**

Answer ALL Questions

31. a) Examine the BCC and FCC structures and derive the number of atoms, Co-ordination number, atomic radius and packing factor. *10 K2 CO1*

**OR**

b) Explain the Czocharalski's method to grow single crystals. *10 K2 CO1*

32. a) Derive the expression for the Einstein's coefficient of spontaneous and stimulated emissions *10 K2 CO2*

**OR**

b) Outline the principle, construction and working of a Semiconductor laser. *10 K2 CO2*

33. a) Develop the expressions for the acceptance angle and numerical aperture. *10 K2 CO3*

**OR**

b) Illustrate with example the working of a fiber optic pressure and displacement sensors. *10 K2 CO3*

34. a) Deduce an expression for the couple to produce a unit twist in a long cylindrical wire fixed at one end. *10 K2 CO4*

**OR**

b) Obtain expression for the depression at the loaded end of cantilever whose other end is fixed as summing that its own weight is not effective in bending. *10 K2 CO4*

35. a) Derive an expression for the wavelength of the scattered photon in Compton effect. *10 K2 CO5*

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| | b) | Derive Schrodinger's wave equation for a particle in a box. Solve it to obtain Eigen Value. | *10* | *K2* | *CO5* |
| 36. | a) | Describe Lee's disc method for determining thermal conductivity of bad conductors. | *10* | *K2* | *CO6* |
| | | **OR** | | | |
| | b) | Write a short note on (i) Solar water heater (ii) Refrigerator | *10* | *K2* | *CO6* |