Reg. No.															

Question Paper Code	13357

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024 (JAN – 2025)

First Semester

Civil Engineering

(Common to All Branches)

24BSPH101 - ENGINERING PHYSICS

Regulations - 2024

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The ratio of lateral strain to the linear strain within elastic limit is known as (a) Young's modulus (b) Bulk modulus (c) Rigidity modulus (d) Poisson's ratio	1	K1	CO1
2.	In bending of a beam, which layer is neither elongated nor shortened? (a) Axis of load (b) Neutral axis (c) Center of gravity (d) None of mentioned	1	K1	CO1
3.	In which type of bending every element of the beam is bent with the same radius of curvature? (a) Uniform bending (b) Non-uniform bending (c) Both uniform and Non-uniform (d) None of the mentioned	1	K1	CO1
4.	What type of wave is characterized by oscillations occurring perpendicular to the direction of wave travel? (a) Transverse waves (b) Longitudinal waves (c) Sound waves (d) Mechanical waves	1	K1	CO2
5.	When two waves of same frequency and amplitude move with the same speed in the opposite direction produces --------- (a) stationary waves (b) beat (c) progressive waves (d) None of the above	1	K1	CO2
6.	The life time of electron in meta stable state is of the order of (a) 10^{-9} S (b) 10^{-3} S (c) 10^{-8} S (d) 10^{-7} S	1	K1	CO2
7.	Which one is wrong regarding electromagnetic waves? (a) They does not require any medium for propagation (b) The E and H are perpendicular to each other. (c) Deflected by electric and magnetic fields. (d) Not deflected by electric and magnetic fields.	1	K1	CO3
8.	Which of the following law do not form a Maxwell equation (a) Planck's law (b) Gauss's law (c) Faraday's law (d) Ampere's law	1	K1	CO3
9.	A travelling wave is described by the equation y(x,t) = [0.05sin (8x – 4t)] m. The velocity of the wave is (a) 8 ms^{-1} (b) 4 ms^{-1} (c) 0.5 ms^{-1} (d) 2 ms^{-1}	1	K2	CO3
10.	As the wavelength of radiation decreases the intensity of the black body radiation ---------- (a) Increases (b) Decreases (c) First increases then decreases (d) First decreases then increases	1	K1	CO4
11.	If the kinetic energy of an electron becomes 9 times, then de-Broglie wavelength becomes (a) 9 times (b) 1/9 times (c) 3 times (d) 1/3 times	1	K2	CO4
12.	What is the quantum mechanical phenomenon in which a wavefunction can be nonzero in a classically forbidden region? (a) Refraction (b) Reflection (c)Tunneling (d) Radiation	1	K1	CO4

13. The axial relationship of a monoclinic crystal system is given as _____ *1 K1 CO5*
(a) $a = b = c$ (b) $a = b \neq c$ (c) $a \neq b = c$ (d) $a \neq b \neq c$

14. Which of the following lattices has the least packing fraction? *1 K1 CO5*
(a) FCC (b) BCC (c) SC (d) HCP

15. The Miller indices of a material in a plane are proportional to *1 K1 CO5*
(a) The reciprocal of numerical parameters of intercepts
(b) The square of unit cell dimensions
(c) The intercepts of the planes on the coordinate axis
(d) The inert planar spacing.

16. Molecular beam epitaxy is a _____ *1 K1 CO5*
(a) Chemical vapour deposition (b) Lithography
(c) Physical vapour deposition (d) Template based synthesis

17. This type of heat transfer can occur in a vacuum: *1 K1 CO6*
(a) Conduction (b) Convection (c) Radiation (d) Blackbody

18. Which of the following has a minimum thermal conductivity? *1 K1 CO6*
(a) Silver (b) Gold (c) Glass (d) Steel

19. Which one is not used as a refrigerant in refrigerators? *1 K1 CO6*
(a) Ammonia (b) Methyl chloride (c) Freon (d) CO

20. What are the drain back systems in solar water heating systems? *1 K1 CO6*
(a) The system that reverses the direction of flow of transfer fluid
(b) The system that tracks the sun
(c) The system that pumps excess transfer of fluid
(d) The system that drains the transfer fluid.

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. State Hooke's law. *2 K1 CO1*

22. What is non-uniform bending and why is it said to be non-uniform? *2 K1 CO1*

23. State laws of refraction. *2 K1 CO2*

24. Differentiate spontaneous emission and stimulated emission. *2 K2 CO2*

25. Write the expression for velocity of EM wave in free space. *2 K1 CO3*

26. What is meant by radiation pressure? *2 K1 CO3*

27. Write any two characteristics of the black body radiation spectrum. *2 K1 CO4*

28. Write the principle of scanning tunneling microscope. *2 K1 CO4*

29. Calculate the inter planar spacing for the (101) plane in a simple cubic lattice whose lattice constant is 4.2 Å. *2 K2 CO5*

30. State the principle of refrigeration. *2 K1 CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Describe how the rigidity modulus of the material in the form of a wire may be determined by symmetrical mass and a torsional pendulum. *10 K2 CO1*

OR

b) Derive an expression for the depression produced at the end of a cantilever beam. *10 K2 CO1*

32. a) Explain the formation of interference fringes in an air-wedge shaped film. How is the thickness of the wire determined by this method? *10 K2 CO2*

OR

b) Explain the modes of vibrations of CO_2 molecule. Describe the construction and working of CO_2 laser with necessary diagrams. *10 K2 CO2*

33.	a)	Derive Maxwell's equations in integral and differential form.	*10*	*K2*	*CO3*
		OR			
	b)	Discuss propagation EM wave from vacuum to a non conducting medium.	*10*	*K2*	*CO3*
34.	a)	Derive an equation for Planck's quantum theory of black body radiation.	*10*	*K2*	*CO4*
		OR			
	b)	Apply the Schrodinger wave equation for energy levels enclosed in a one-dimensional potential box of infinite height to obtain Eigen values and the corresponding Eigen function.	*10*	*K2*	*CO4*
35.	a)	Show that for an HCP structure c/a = $\sqrt{8}$ /$\sqrt{3}$ and hence calculate packing fraction for HCP structure.	*10*	*K2*	*CO5*
		OR			
	b)	Explain Czochralski method of growing crystal. Mention its merits and demerits.	*10*	*K2*	*CO5*
36.	a)	Describe Forbe's method to determine the thermal conductivity of metals with relevant theory and experiment.	*10*	*K2*	*CO6*
		OR			
	b)	Explain in detail about various types of heat exchangers.	*10*	*K2*	*CO6*