CONTROLLER OF EXAMINATIONS AU CHENNAI 600 025 ADDITIONAL

Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech (Full Time) - END SEMESTER EXAMINATIONS, NOV/ DEC2024

COMMON TO ALL BRANCHES
I Semester
PH3151 / **PH23C01 ENGINEERING PHYSICS**
(Regulation 2023)

Time: 3hrs Max. Marks: 100

CO1	Understand the significance of crystal structure and bonding. Learn to grow crystals.
CO2	Obtain knowledge on important mechanical and thermal properties of materials and determine them through experiments.
CO3	Conceptualize and visualize the oscillations and sound.
CO4	Grasp optical phenomenon and their applications in real life.
CO5	Appreciate and evaluate the quantum phenomenon.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Define space lattice.	2	CO1	L1
2	If the distance between (110) planes in a body centred cubic structure is 0.203nm, what is the radius of the atom?	2	CO1	L5
3	Why are steel girders made in the form of I?	2	CO2	L2
4	What is meant by surface tension?	2	CO2	L1
5	Calculate the increase in the acoustic intensity level when the sound intensity is doubled?	2	CO3	L5
6	How is heat transferred by conduction in solids?	2	CO3	L2
7	How is population inversion achieved in a semiconductor laser?	2	CO4	L2
8	The numerical aperture of an optical fiber is 0.39. If the difference in the refractive indices of the material of its core and cladding is 0.05, find the refractive index of the core material.	2	CO4	L5
9	An electron is travelling at a velocity of 220m/s measured at an accuracy of 0.005%. Calculate the uncertainty in position of the electron.	2	CO5	L5
10	What is quantum tunneling?	2	CO5	L2

PART- B (5x 13=65Marks)

Q.No.	Questions	Marks	CO	BL
11(a)(i)	Show that the packing factor of FCC and HCP structures is the same.	9	CO1	L2
(ii)	Describe edge and screw dislocations in a crystal.	4	CO1	L2
	OR			
11(b)(i)	With a neat diagram explain the Czockrlaski method of growing crystals. Mention the advantages.	9	CO1	L2
(ii)	Write a note on molecular beam epitaxy.	4	CO1	L2

12(a)(i)	Obtain an expression for depression at the free end of a cantilever due to load. Using the expression determine the Young's modulus of the material of a beam and a rod.	9	CO2	L4
(ii)	A cylindrical rod of diameter 14mm rests on two knife edges 0.8 m apart and a load of 1kg is suspended from its midpoint. Neglecting the weight of the rod, calculate the depression of the mid-point if the Young's modulus of the material is 204GPa.	4	CO2	L5
	OR			
12(b)(i)	With necessary theory, derive an expression for the torsional couple per unit angular twist, when a thin cylinder is twisted.	9	CO2	L4
(ii)	A 500g uniform sphere of 7.0 cm radius spins frictionless at 30revolutions /second on an axis through its centre. Find its K.E, angular momentum and radius of gyration.	4	CO2	L5
13(a)(i)	Explain free vibrations, damped vibrations, forced vibrations and resonance. How does the sharpness of resonance depend on damping?	9	CO3	L3
(ii)	A particle of 6.0 kg is executing simple harmonic motion along the x axis under the influence of a spring. The particle moves according to the equation $x = 0.20\cos(3.0t)$ where x is measured in meters and t in seconds. What is the frequency and maximum speed of the motion? Find the spring constant of the spring.	4	CO3	L5
	OR			
13(b)(i)	What is Doppler effect? With theory explain how ultrasonic Doppler shift technique is applied to measure the velocity of blood flow.	9	CO3	L3
(ii)	Two metal rods A and B are having their initial lengths in the ratio 2:3 and coefficient of linear expansion in the ratio 3:4. Calculate the ratio of their linear expansion, if they are heated through the same temperature.	4	CO3	L5
14(a)	Explain the construction and working of a Michelson interferometer. Discuss the formation of different types of fringes in it.	13	CO4	L3
	OR			
14(b)	Explain the modes of vibrations of a CO_2 molecule. Describe the construction and working of CO_2 laser with necessary diagrams.	13	CO4	L3
15(a)	Derive the Schrodinger's time dependent and time independent wave equations of matter waves. Explain the physical significance of the wave function 'ψ'.	13	CO5	L4
	OR			
15(b)	Show that the energy of an electron confined in a 1-D potential well of length L and infinite depth is quantized. Find out the wave function associated with the free electrons.	13	CO5	L4

PART- C (1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16 (i)	Discuss the formation of interference fringes in a wedge shaped air film. Describe a method to determine the thickness of a thin wire using the air-wedge set up.	10	CO4	L3
(ii)	What is a black body? Discuss the Planck's hypothesis of black body radiation.	5	CO5	L2

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