13/7/24 (FN)

ADDITIONAL CONTROLLER OF EXAMINATIONS AU CHENNAI 600 025

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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B. Tech / B. Arch (Full Time) - END SEMESTER ARREAR EXAMINATIONS, APR / MAY 2024

COMMON TO ALL BRANCHES

First Semester

PH3151- Engineering Physics

(Regulation 2023)

Time: 3hrs Max. Marks: 100

CO1	Students shall Understand the important mechanical properties of materials
CO2	Students shall Express the knowledge of oscillations, sound and applications of Thermal Physics
CO3	Students shall Know the basics of optics and lasers and its applications
CO4	Students shall Understand the basics and importance of quantum physics
CO5	Students shall Understand the significance of crystal physics.

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 Poisson's ratio	2	1	L1
2	What are the advantages of I shaped girders	2	1	L2
3	What is sound intensity level and threshold of human ear?	2	2	L2
4	State seebeck effect	2	2	L2
5	What is polarization?	2	3	L1
6	When the total internal reflection will occur?	2	3	L2
7	What are matter waves?	2	4	L1
8	List out the physical significance of wave function	2	4	L2
9	What are Miller indices? Draw the crystallographic plane for the values (111) and (110).	2	5	L2
10	What are the various types of crystal imperfections?	2	5	L1

PART- B (5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q. No.	Questions	Marks	CO	BL
11 (a) (i)	Explain the stress-stain diagram and what do understand ductility?, Give some examples of Britile materials	10	1	L4
(ii)	Two balls of masses 500g and 200g are connected by a thin rod of length 50 cm. if the system is rotated by an axis passing through the center of the rod and perpendicular to it. Determine the moment of inertia of the system	3	1	L3
	OR			
11 (b) (i)	Explain the theory and experimental technique to determine the Young's modulus of the given material in non-uniform bending	10	1	L3
(ii)	Water is being carried by a horizontal pipe of 25 cm^2 cross section at a velocity of 3 m/s. The supply feeds into a small-bore pipe of 15 cm^2 cross section. Determine the velocity of water in the pipe of smaller cross section.	3	1	L3
12 (a) (i)	Derive the expression for twisting couple per unit twist for a cylindrical rod.	10	2	L4

(ii)	An ultrasonic transducer of 2 MHz is used to measure the blood speed. The probe is inclined at an angle of 30° and the blood is moving with the speed of 3 m/s. if the velocity of the ultrasonic wave through the human blood is 800 m/s. Calculate the Doppler shifted frequency.	**3**	2	L3
	OR			
12 (b) (i)	Describe the Medical imaging using ultrasonic waves	**10**	2	L4
(ii)	A copper rod of length 0.19 m and area of cross section is 785×10^{-7} m^2 which is thermally insulated is heated at one end to 100°C, while the other end is kept at 30°C. Calculate the amount of heat flow in 10 minutes along the way if the thermal conductivity of copper is 380 $Wm^{-1}K^{-1}$.	**3**	2	L3
13 (a) (i)	How to determine the thickness of a micro-object by forming wedge shaped air film? Explain with necessary diagram	**10**	3	L4
(ii)	Light of wavelength 5×10^{-5} cm falls on the narrow slit. The pattern formed is observed on a screen. The width of the slit is 0.065cm and the first maxima lies 0.07cm on either side of the central maximum. Calculate the location of the screen with reference to the slit.	**3**	3	L3
	OR			
13 (b) (i)	With necessary schematic diagram explain principle construction and working of Nd:YAG laser. Mention it's limitations and applications	**10**	3	L4
(ii)	Calculate the numerical aperture of an optical fiber whose core and cladding are made of materials of refractive indices of 1.6 and 1.5 respectively.	**3**	3	L3
14 (a) (i)	Derive the time independent and time dependent Schrodinger wave equation.	**11**	4	L4
(ii)	What is black body radiation? Give an example	**2**	4	L1
	OR			
14 (b) (i)	With necessary diagram explain particle in an infinite potential well.	**11**	4	L4
(ii)	What do you understand degenerate energy state?	**2**	4	L2
15 (a) (i)	Determine the atomic packing density of BCC, FCC and HCP structures.	**10**	5	L5
(ii)	Based on the crystal structure knowledge, calculate the density of diamond (r=0.071 nm)	**3**	5	L3
	OR			
15 (b) (i)	With schematic diagram discuss about the crystal growth by Czocharalski method	**10**	5	L4
(ii)	Short note on X-Ray Diffractometer	**3**	5	L4

PART- C (1x 15=15Marks)

(Q.No.16 is compulsory)

Q. No.	Questions	Marks	CO	BL
16.(i)	Discuss about CO_2 laser- Working principle with energy level diagram, Construction with schematic diagram, and Medical applications of the laser	**10**	3	L4
(ii)	Write brief note on barrier penetration and quantum tunneling	**5**	4	L4