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B.E/B.TECH.(FULL TIME) DEGREE ARREAR EXAMINATION-APRIL/MAY 2014

**First Semester
(Branch : Common to all Branches)**

**PH 8151 – ENGINEERING PHYSICS
(Regulations 2012)**

Time: Three hours

Maximum : 100 marks

(Answer ALL questions)

PART –A

(10 x 2 = 20 marks)

1. What is Poisson's ratio? What are its significances?
2. What is the bulk modulus of an incompressible fluid?
3. Define intensity and loudness. What are the differences between them?
4. What is meant by NDT and what are its advantages?
5. On heating an object, how does thermal stress occur?
6. Calculate the efficiency of a diesel engine assuming $\gamma = 1.4$ and the adiabatic compression ratio is 20 and the adiabatic expansion ratio is 5.
7. State the two important principles in achieving anti-reflection.
8. What is an active fiber optic sensor?
9. What is the need for growing single crystals?
10. What are Bravais lattices?

PART –B

(5 x 16 = 80 marks)

11. (i) Obtain the packing factor for the HCP structure. (10)
(ii) Give any two advantages and disadvantages of crystal defects. (4)

(iii) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (110) and (212) planes. (2)

12. (a) (i) Give the theory of non-uniform bending. Describe an experimental technique to determine Young's modulus of the material of a beam by this method. (12)

(ii) A 1 m long gold wire of 1.2 mm in diameter elongates by 1 mm when stretched by a force of 0.5 N and twists through one radian when a twisting couple of 100 Nm is applied. Find the value of Poisson's ratio for gold. (4)

(OR)

(b) (i) Determine the rigidity modulus of a material in the shape of a thin wire by using the torsional pendulum. (12)

(ii) For the same cross sectional areas, show that the beam of a square cross section is stiffer than one of circular cross section of the same material. Also show that for a given load, the depressions are in the ratio $3 : \pi$. (4)

13. (a) Derive the Sabine's formula for the reverberation time and also explain the growth and decay of intensity of sound waves in a hall. (16)

(OR)

(b) (i) Discuss in detail about the generation of ultrasonic waves using inverse Piezo-electric effect. (10)

(ii) Discuss in detail about the industrial applications of ultrasonic waves. (6)

14. (a) Describe the theory and experiment to determine the thermal conductivity of a good conductor. (16)

(OR)

(b) With neat diagrams, explain the construction and working of Otto engine and hence obtain the expression for the efficiency of the same. (16)

15. (a) Discuss the construction and working of Michelson interferometer. Also describe its applications. (16)

(OR)

(b) Derive the expressions for Einstein's coefficients and discuss their physical significances. Explain why stimulated emission is essential for lasing. (16)