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

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

Common to ALL Branches

First Semester

PH 8151 – ENGINEERING PHYSICS

(Regulation 2012)

Time: 3 Hours Max. Marks: 100

Answer ALL questions

PART A — (10 x 2 = 20 Marks)

1. A tensile force of 100,000 N is applied to a 10 mm × 20 mm cross-section iron bar having a yield strength of 400MPa. Determine whether the bar will plastically deform.
2. Why an I-section preferred for beams?
3. A single mosquito creates a sound level of 0 dB. What will be the total sound intensity level of 100 such mosquitoes?
4. A 49 mm nickel rod produces ultrasonic waves of frequency 50 kHz. Calculate the length of the nickel rod required to double the frequency.
5. A segment of steel railroad track has a length of 30 m when the temperature is 5°C. What is its length when the temperature is 45°C? Linear expansion coefficient for steel = 1.1×10^{-5} $(°C)^{-1}$.
6. State Wien's displacement law.
7. A material of refractive index 1.375 is used as an antireflective coating on a piece of glass. What should the minimum thickness of this film be to minimize reflection of 550 nm light? Refractive index of glass = 1.52.
8. What are the drawbacks of homo-junction lasers?
9. Draw the Bravais lattices belonging to the orthorhombic crystal system.
10. α-Iron has a BCC crystal structure and an atomic radius of 0.1241 nm. Calculate the interplanar spacing for the (211) sets of planes.

PART B — (5 x 16 = 80 Marks)

11. Derive expressions for the rate of absorption of sound energy, growth and decay of sound energy in a hall, and reverberation time.

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12. (a) i) Derive an expression for the depression at the loaded end of a cantilever. (12)

ii) A circular and a square cantilever are made of same material and have the same area of cross-section and length. Find the ratio of their depressions, for a given load. (4)

OR

(b) i) Derive an expression for couple per unit twist on a thin cylinder. (12)

ii) Show that a hollow cylinder is better than the solid cylinder of the same material, same mass and same length for manufacturing shafts. (4)

13. (a) i) What is a bimetallic strip? How it is used as a temperature controller? (6)

ii) Write a note on thermal stress. (6)

iii) A bar of gold and a bar of silver of the same length and area are joined end-to-end. The gold end of the compound bar is maintained at 80°C while the silver end is at 30°C. When the energy transfer reaches steady state, what is the temperature at the junction? Thermal conductivity for gold and silver are 314 and 427 W/m.K, respectively. (4)

OR

(b) Discuss the various strokes of Diesel engine and obtain an expression for its efficiency.

14. (a) Describe Michelson interferometer and explain the formation of fringes in it. How this interferometer is used to find the wavelength of monochromatic light.

OR

(b) i) Derive an expression for the acceptance angle, and also the numerical aperture of an optical fibre. (12)

ii) Distinguish between step index and graded index fibres. (4)

15. (a) i) Show that the atomic packing factor for the BCC crystal structure is 0.68. (8)

ii) Prove that the diamond has a loosely packed structure. (8)

OR

(b) i) Explain Bridgemann and Czochralski methods of growing a single crystal. (12)

ii) What is Burgers vector? Mention the relative orientations of Burgers vector and dislocation line for edge and screw dislocations. (2+2)
