Reg. No. :

Question Paper Code : X11217

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

First Semester

Civil Engineering

PH 8151 – ENGINEERING PHYSICS

(Common to Aeronautical Engineering/ Aerospace Engineering/Agriculture Engineering/ Automobile Engineering/Biomedical Engineering/Computer Science and Engineering/ Computer and Communication Engineering/Electrical and Electronics Engineering/ Electronics and Communication Engineering/Electronics and Instrumentation Engineering/Electronics and Telecommunication Engineering/ Environmental Engineering/Geoinformatics Engineering/Industrial Engineering/Industrial Engineering and Management/Instrumentation and Control Engineering/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich) Mechanical and Automation Engineering/Mechatronics Engineering/Medical Electronics/Petrochemical Engineering/ Production Engineering/Robotics and Automation/Safety and Fire Engineering/ Biotechnology/ Chemical Engineering/Chemical and Electrochemical Engineering/ Fashion Technology/Food Technology/Handloom and Textile Technology/Information Technology/Petrochemical Technology/Petroleum Engineering/Pharmaceutical Technology/Plastic Technology/Polymer Technology/Textile Chemistry/Textile Technology/ safety and Fire Engineering/ Artificial Intelligence and data science/ computer Science and Business System/ Biotechnology and biochemical Engineering)

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define torsional rigidity of a wire.
2. What are the uses of I beam girders ?
3. Identify the type of damped oscillations for which

   a) ω is positive b) ω is nearing zero c) ω is negative.

4. How the fiber optic displacement sensor does works ?
5. Give day to day examples for convection and radiation.
6. List any four characteristics of thermal insulating materials.

7. Explain the significance of a wave function.
8. What is the working principle of SEM ?
9. Define coordination number.
10. Brief about Burger vectors.

PART – B **(5×16=80 Marks)**

11. a) i) Draw and explain the stress-strain diagram of material. **(8)**

ii) Illustrate the working of torsion pendulum and write its uses. **(8)**

(OR)

b) i) Demonstrate the experimental determination of Young's modulus of a beam in uniform bending. **(10)**

ii) In an experiment to determine Young's modulus of a rod of diameter 1.26×10^{-2} cm it was supported on knife edges placed 0.7 m apart. On applying a load of 0.9 kg exactly mid way between the knife edges, the depression of midpoint was observed to be 0.025 cm. Calculate the Young's modulus of the rod. **(6)**

12. a) i) Obtain the solution for the damped oscillatory motion. **(8)**

ii) Construct the wave equation of a plane progressive wave and identify the wave velocity. **(8)**

(OR)

b) i) Derive Einstein's A and B coefficients and list its significance. **(8)**

ii) The refractive indices of core and cladding materials of an optical fiber are 1.6 and 1.5 respectively. Calculate

a) Critical angle b) acceptance angle c) numerical aperture

d) angle of cone. **(8)**

13. a) i) Analyze the theory of thermal expansion in solids and liquids and explain the factors responsible for this. **(10)**

ii) Copper and zinc strips have the same length of 20 cm at a temperature of 20°C. What will be the difference in length of the strips at a temperature of 100°C ? **(6)**

(OR)

b) i) Illustrate Lee's disc method to determine the thermal conductivity of a poor conductor. **(10)**

ii) Summarize the advantages and applications of thermal insulators. **(6)**

14. a) i) Discuss the Plancks theory of blackbody radiation and arrive at Plancks radiation formula. **(10)**

ii) A photon of frequency γ_o scatters from an electron at rest and moves in a direction making an angle of 60° with the incident direction. If the frequency of scattered photon is half that of incident photon, calculate the frequency of the incident photon. **(6)**

(OR)

b) i) Derive Schrodinger time-independent wave equation, also mention few points on Hamiltonian 'H'. **(8+2)**

ii) A particle is moving in a ID box of width 1nm, calculate the probability of finding the electron within tan interval of 0.1nm at the center of the box when it is in its state of the least energy. **(6)**

15. a) i) Copper has FCC crystal structure with lattice parameter 0.361nm. Calculate the interplanar spacing for the following planes : (111), (220), (100). **(4)**

ii) Sketch the structure of sc, bcc and fcc crystals and evaluate the packing factors. **(12)**

(OR)

b) i) Illustrate various types of defects and discuss how these imperfections affect the mechanical behavior of the materials. **(8)**

ii) Demonstrate the Czochralski method of single crystal growth. **(8)**
