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Reg. No. :

Question Paper Code: 51003

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

First Semester

Civil Engineering

15UPH103- ENGINEERING PHYSICS

(Common to ALL branches)

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer all the Questions

PART A - (10 x 1 = 10 Marks)

1. There are _____ crystal systems and _____ Bravais lattices   CO1 -R

    (a) 14 and 7   (b) 7 and 14   (c) 32 and 234   (d) 4 and 14

2. Atomic packing factor is same for the following lattices   CO1 -R

    (a) SC and FCC   (b) SC and BCC   (c) BCC and FCC   (d) FCC and HCP

3. Sound waves having frequency more than 20000 Hz are_____   CO2- R

    (a) Infrasonic waves   (b) Ultra sonic waves   (c) Audible sound   (d) Music

4. Weber-Fechner law relates the   CO2 -R

    (a) Loudness and intensity   (b) Frequency and wave length

    (c) Frequency and decibel   (d) Sound and heat

5. Nicol prism is an example of   CO3 -R

    (a) Polarizer   (b) Analyzer   (c) Detector   (d) Both polarizer and analyzer

6. Pumping technique used in CO_2 laser is _____ CO3 -R

   (a) Direct conversion (b) Optical pumping

   (c) Electric discharge method (d) Injection technique

7. de Broglie explained the concept of _____ CO4- R

   (a) Particle nature of wave (b) Wave nature of particle

   (c) Particle nature of energy (d) Wave nature of energy

8. Compton effect can be explained by _____ CO4 -R

   (a) Photo electric effect (b) Classical theory

   (c) Electromagnetic theory (d) Quantum theory

9. The ratio of shear stress to shear strain is _____ CO5- R

   (a) Bulk modulus (b) Young's modulus (c) Poison's ratio (d) Rigidity modulus

10. Lee's disc method is used to determine the thermal conductivity of CO5 -R
    _____

    (a) Conductor (b) Insulator (c) Semiconductor (d) Magnets

PART – B (5 x 2= 10Marks)

11. Define unit cell CO1- R

12. Mention the properties of ultrasonic waves CO2- R

13. Distinguish between laser source and ordinary light source. CO3 -R

14. What is Compton effect? CO4 -R

15. State Newton's law of cooling. CO5 -R

PART – C (5 x 16= 80Marks)

16. (a) Prove that the packing factor for HCP and FCC are same CO1 -App (16)

Or

   (b) (i) Distinguish single crystals from poly crystalline solids CO1- App (4)

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(ii) How do you grow single crystals by Bridgman technique?	CO1 -App (12)

17. (a) (i) How do you measure the wavelength of ultrasonic waves in water by acoustic diffraction method? — CO2 -App (8)

(ii) Calculate the velocity of ultrasonic wave in a certain liquid using the following data obtained in an acoustic grating experiment. Frequency of ultrasonic wave is 100 MHz Wavelength of the monochromatic light is 600 nm (red). The angle of first order diffracted beam is 5° — CO2 -App (8)

Or

(b) (i) Construct a circuit for producing ultrasonic waves using the following components. — CO2 -Ana (8)
    i)   A nickel rod of length 10 cm
    ii)   An npn transistor
    iii) A variable capacitor
    iv)   A power supply
    v)   Two coils L_1 and L_2 and
    vi)   A milli ammeter

(ii) A ferromagnetic rod has a length of 40 mm and the density of the material is 7250 kg/m^3. Evaluate the natural frequency of the rod if Young's modulus of the material is 11.5×10^{10} Nm^{-2}. Will it produce ultrasonic waves? Justify your answer. — CO2- Ana (8)

18. (a) Discuss the probability of stimulated absorption, spontaneous emission and stimulated emission, from the discussion deduce the expression for the probability constants. — CO3 -Ana (16)

Or

(b) Explain the laser action in different modes of vibration of CO_2 molecule — CO3- Ana (16)

19. (a) Derive Schrödinger's time dependent and time independent wave equations. — CO4- U (16)

Or

(b) Apply quantum theory to deduce the expression for the increase in wave length of the X ray photons scattered by the substance with low atomic number. — CO4- Ana (16)

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20. (a) You are given with card board, thermometers, screw guauge, vernier caliper etc. How will you determine the thermal conductivity of the card board by Lee's disc method?   CO5- App   (16)

Or

(b) (i) Draw the stress-strain diagram for ductile material and explain the various parts of the diagram.   CO5- U   (8)

(ii) Discuss the various factors affecting the elasticity of the Material.   CO5- U   (8)

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