Hall Ticket No:

Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
B. Tech I Semester Regular Examinations November - 2015
(Regulations: R15)
ENGINEERING PHYSICS

Date: **Time: 3 hours**   **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1 a) i) State and Explain first law of thermodynamics.   2+2
   ii) Write any two applications of first law of thermodynamics.

  b) Explain the different stages of a Carnot cycle and derive an expression for the efficiency of a Carnot engine. A Carnot engine takes 300 Calories of heat at 450 K and rejects 200 Calories of heat to the sink. What is the temperature of the sink and the efficiency of the engine.   6+2

OR

2 a) i) State third law of thermodynamics.   1+3
   ii) Distinguish between reversible and irreversible processes.

  b) State and explain the concept of Entropy and how is it related to disorder. Discuss the entropy change in the case of reversible and irreversible processes. Compute the change in entropy when 2 Kg of water at $0\ ^0C$ is heated to $50\ ^0C$. Specific heat of water is 4190 J/Kg-K.   6+2

UNIT-II

3 a) i) State Faraday's and Lenz law of electromagnetic induction.   2+2

  b) What is the importance of Maxwell's equations? Write the Maxwell's equations in differential and integral form and derive wave equation in free space.   2+2+4

OR

4 a) i) Write the properties of ultrasonic waves.
   ii) What is magnetostriction?   2+2

  b) Explain the production of Ultrasonics using Piezoelectric method. Write the applications of ultrasonics.   5+3

UNIT-III

5 a) i) What are the conditions for obtaining sustainable interference pattern?   2+2

ii)The wavelength of the light used in Newton's rings experiment is $5600A^{o}$. The diameter of 12th dark ring 0.418 cm. Find the radius of curvature of the convex lens.

b) Give the theory of Newton's rings and explain how Newton's rings can be used to determine the radius of curvature of the convex lens.   8

OR

6 a) i) Distinguish between Fresnel and Fraunhofer diffraction.

ii) Write a short note on quarter wave plate.   2+2

b) Describe the construction and working of Nicol's prism. How it can be used as a polarizer and analyzer.   8

UNIT-IV

7 a) Explain the following   1+1+1+1

i) Spontaneous emission   ii) Stimulated emission   iii) Population inversion iv) Pumping

b) With neat diagram discuss the construction and working of He - Ne gas laser. Write various applications of lasers.   5+3

OR

8 a) i) What is an optical fiber?

ii) Explain the principle of propagation of light in optical fibres.   1+3

b) Derive the expression for acceptance angle and numerical aperture in optical fibers. What are the advantages of optical fibers in communication?   6+2

UNIT-V

9 a) i) State the Planks quantum hypothesis.

ii) Explain the physical significance of Wave function.   2+2

b)Write the differences between Maxwell Boltzmann, Bose – Einstein and Fermi Dirac statistics.   8

OR

10 a) i) State and explain the Heisenberg uncertainty principle.

ii) Calculate the de-Broglie wavelength of an electron accelerated through a potential difference of 100V.   2+2

b) Derive Schrodinger time independent wave equation. Obtain the Eigen values of energy and Eigen functions of a particle moving in one dimensional box.   4+4

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UNIT-I

1 a) i) State Carnot theorem. 2+2

   ii) Write a short note on concept of heat and work.

 b) What is Carnot cycle? Explain the different operations involved in Carnot cycle and hence derive the efficiency of Carnot engine in terms of source and sink temperatures. 8

OR

2 a) i) Discuss about Entropy and Probability. 2+2

   ii) Compute the change in entropy when 2 Kg of water at $0\ ^0C$ is heated to $50\ ^0C$. Specific heat of water is 4190 J/Kg-K.

 b) State and explain the Claussius and Kelvin statements of second law of thermodynamics. Explain the second law of thermodynamics in terms of entropy. 6+2

UNIT-II

3 a) i) State and explain Poynting vector. 2+2

   ii) Write the Maxwell's equations in differential and integral form.

 b) Define self induction. Derive the expression for self inductance of a solenoid. Calculate the self inductance of a solenoid of length 20cm, 500 turns and of area of cross section $2cm^2$. 1+4+3

OR

4 a) i) What are ultrasonics? 2+2

   ii) What is Piezoelectric effect?

 b) Explain the production of Ultrasonics by using magnetostriction method. Write the applications of ultrasonics. 5+3

UNIT-III

5 a) i) State and explain principle of superposition. 2+2

   ii) What are coherent sources of light and coherence? Explain.

 b) Explain the interference of light in thin parallel film and derive the conditions for maximum and minimum intensities in reflected light. 8

OR

6 a) i) Write the differences between Interference and Diffraction. 2+2

ii) Explain the phenomenon of double refraction of light.

b) What are different types of polarized lights? Explain the production and analysis of polarized lights. 8

UNIT-IV

7 a) i) What are the characteristic properties of laser light? 2+2

ii) Write a short note on lasing action.

b) With neat diagram explain the construction and working of Ruby laser.   Write different applications of lasers. 5+3

OR

8 a) i) Write the differences between step index and graded index optical fibres. 2+2

ii) Write the applications optical fibre sensors.

b)Explain, with block diagram, the communication system using optical fibre. What are the advantages of optical fibers in communications? 5+3

UNIT-V

9 a) What is wave function? What are the properties of wave function? 1+3

b) Derive Schrodinger time dependent wave equation. Apply   Schrodinger time independent wave equation to obtain the Eigen values of energy and wave function for a particle in one dimensional box. 4+4

OR

10 a)i) Explain the Fermi Dirac distribution function. 2+2

ii) State and explain the Heisenberg uncertainty principle.

b)Explain the De-broglie concept of matter waves and deduce an expression for wavelength of matter waves. Write the properties of matter waves. 8