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I/IV B.Tech (Regular / Supplementary – Repeat Exam) DEGREE EXAMINATION

January, 2021

First Semester

Time: Three Hours

Answer All Questions from Part - A

Answer ANY FOUR questions from Part - B.

Common to all branches

Engineering Physics -I

Maximum: 60 Marks

(1X12 = 12 Marks)

(4X12=48 Marks)

Part - A

1. Answer all questions
 - a) Define cosine law.
 - b) What is meant by diffraction?
 - c) What is coherence?
 - d) What is meant by active medium?
 - e) What is the principle involved in Holography?
 - f) Define the principle involved in an optical fiber.
 - g) State Gauss's law in electricity.
 - h) What is Hall coefficient?
 - i) What is resonant frequency in LCR?
 - j) Write any two properties of matter waves.
 - k) State Heisenberg's uncertainty principle applications.
 - l) What is physical significance of wave function?

(1X12=12 Marks)

Part – B

2.
 - a) Give the theory of Fraunhofer diffraction due to single slit. 6M
 - b) Explain briefly the construction of Michelson's interferometer. 6M
3.
 - a) Explain the construction and working of a Nicol prism. 8M
 - b) Define quarter wave plate and half wave plate 4M
4.
 - a) Explain the construction and working of a ruby laser. 6M
 - b) Explain recording and reproduction of holography. 6M
5.
 - a) What are the properties of Lasers? 4M
 - b) What is acceptance angle of an optical fiber? Derive an expression for it. 6M
 - c) Write the applications of lasers? 2M
6.
 - a) With a neat diagram, explain the construction, working and limitations of a cyclotron. 6M
 - b) Derive the impedance of L, C and R in series A.C. circuit. 6M
7.
 - a) Write Maxwell equations and give its significance. 8M
 - b) What are electromagnetic waves? Obtain expression for velocity of EM wave. 4M
8.
 - a) Give the experimental support for de-Broglie's hypothesis. 6M
 - b) State and explain the Heisenberg's uncertainty principle. 6M
9.
 - a) What is tunneling and explain Scanning tunneling microscope. 6M
 - b) Derive Schrodinger time independent wave equation. 6M

I/IV B.Tech (Regular) DEGREE EXAMINATION
(First Semester)
Engineering Physics – I
(Common to all Branches)

Time: Three Hours

Maximum Marks: 60

Answer Question No.1 compulsorily

(1 x 12 = 12 Marks)

Answer ONE question from each unit

(4x12 = 48)

1. Answer all questions

(12 x 1 = 12 Marks)

- a) Write the difference between interference and diffraction.
- b) What is meant by double refraction?
- c) What is Kerr effect?
- d) What is meant by population inversion?
- e) What is the principle involved in Holography?
- f) Define the principle involved in an optical fiber.
- g) State Gauss's law in magnetism.
- h) What is Hall effect?
- i) Define quality factor.
- j) Write the properties of matter waves.
- k) State Heisenberg's uncertainty principle.
- l) What is normalized wave function?

UNIT – I

2. a) Give the theory of plane diffraction grating for normal incidence. (6M)
- b) Explain briefly the working of Michelson's interferometer. (6M)

(OR)

3. a) Explain the construction and working of a Nicol prism. (8M)
- b) Plane polarized light is incident on a piece of quartz cut parallel to the axis. Find the least thickness for which the ordinary and extra-ordinary rays combine to form plane polarized light. Given $\mu_o = 1.5442$, $\mu_e = 1.5533$ and $\lambda = 5 \times 10^{-5} \text{cm}$ (4M)

UNIT - II

4. a) Explain the construction and working of a He-Ne laser. (6M)
- b) Explain recording and reproduction of holography. (6M)

(OR)

5. a) What are the characteristics of Lasers? (4M)
- b) What is numerical aperture of an optical fiber? Derive an expression for it. (6M)

c) Write the applications of Holography? (2M)

UNIT-III

6. a) With a neat diagram, explain the construction and working of a cyclotron. (6M)

b) Calculate the impedance of L, C and R in series A.C. circuit. (6M)

(OR)

7. a) Write Maxwell equations in integral and differential form. (8M)

b) What are electromagnetic waves? Obtain expression for velocity of electromagnetic wave. (4M)

UNIT-IV

8. a) Give the experimental support for de-Broglie's hypothesis. (6M)

b) State and explain the applications of Heisenberg's uncertainty principle. (6M)

(OR)

9. a) What is de-Broglie hypothesis? The K.E of neutron is 0.025 eV. Calculate its de-Broglie's wavelength. (4M)

b) Write a short note on Scanning tunneling microscope. (8M)