Code No: 1103

VASAVI COLLEGE OF ENGINEERING *(Autonomous)* HYDERABAD
B.E. I/IV (All Branches) I-Semester(Main) Examinations, Feb.2015

Engineering Physics– I

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** questions from **Part-B***

Part-A (Marks: 20)

1. In a simple harmonic motion amplitude is 5cm and time period is 10π sec. What is the maximum speed? [2]
2. A 0.3 kg mass is attached to a spring and oscillates at 2 Hz with a Q-factor of 60. Find the spring constant and damping constant. [2]
3. How displacement current is different from conduction current . [2]
4. In electromechanical analogy what are the electrical analogous terms for the following mechanical terms – (i) displacement, (ii) driving force, (iii) mass, and (iv) spring constant. [2]
5. List the conditions for producing good interference pattern. [2]
6. Light of wavelength 500 nm falls normally on a plane transmission grating having 15000 lines in 3 cm. (a) Find the angle of diffraction for first order and (b) find the highest order that can be observed. [2]
7. Can we have a two level laser? Justify your answer. [2]
8. Distinguish single mode and multi mode fibers. [2]
9. Draw the B – H curve of a hard magnetic material and indicate the important points on the curve. [2]
10. Briefly explain the existence of electronic polarizability in neutral atoms? [2]

Part-B (Marks: 50)

11. (a) A 8kg body performs SHM of amplitude 30cm. The restoring force is 60N, when the displacement is 30cm. Find Time period, acceleration, potential and kinetic energy when displacement is 12cm. [4]

    (b) Derive differential equation of damped harmonic oscillator and discuss different cases using its solution. [6]

12. (a) State and explain Maxwell's equation's in both integral and differential form [6]

    (b) A series LCR circuit with L =160 mH, C = 100 μF, and R = 40 Ω is connected to a sinusoidal voltage V (t) = 40 sin (ωt), with ω = 200 rad/s. [4]
    (i) What is the impedance of the circuit?
    (ii) Find resonating frequency.
    (iii) What is the phase constant ϕ?

13. (a) Explain theory of interference due to thin film and derive conditions for maximum and minimum intensities. [6]

    (b) A diffraction grating is having 15000 lines per inch. (i) Show that if we use white light the second and third order spectra overlap. (ii) What will be the angular separation of D_1 (5896 Å) and D_2 (5890 Å) lines of sodium in the second order spectra? [4]

Contd..2..

14. (a) Explain construction and working of He-Ne Laser using energy level diagram. How it is different from Ruby Laser. [7]

(b) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.5 and cladding refractive index of 1.47. Calculate (i) the critical angle at core cladding interface, (ii) the numerical aperture for the fiber, and (iii) the acceptance angle. [3]

15. (a) What are the differences between ferromagnetic metals and ferrites? Give two examples and three applications for each. [5]

(b) Explain the frequency and temperature dependence of total polarizability for a dielectric substance. [5]

16. (a) By using the Maxwell's equations derive an expression for the speed of propagation of electromagnetic waves in free space. [6]

(b) Write at least four differences between holography and photography. [4]

17. (a) Write a note on sharpness of resonance. [4]

(b) Explain principle, construction working and limitations of Nicol Prism. [6]

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