Reg. No. | | | | | | | | | | | | |

Question Paper Code : 27291

M.Sc. (5 Year) DEGREE EXAMINATION, MAY/JUNE 2016

First Semester

Software Engineering

ESE 011 – APPLIED PHYSICS

(Common to 5 Year M.Sc. Software Systems)

(Regulations 2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Give the working principle of Penning gauge in the measurement of Vacuum.
2. Write a brief note on I-shaped girders.
3. What is meant by cold welding ?
4. An ultrasonic generator consists of a quartz plate of thickness 0.5 mm and density 2800 kg/m^3. Find the fundamental frequency of the generator with a quartz plate of Young's modulus 8.8×10^{10} Nm^2.
5. Define the term thermal conductivity.
6. Write about the working of a Carnot engine as a refrigerator.
7. Why are antireflection coatings given ?
8. What are the uses of scanning electron microscopes ?
9. What is the difference between spontaneous emission and stimulated emission ?
10. The refractive indices of core and cladding materials of an optical fiber are 1.50 and 1.45 respectively. Obtain the numerical aperture of the fiber.

PART – B (5 × 16 = 80 Marks)

11. (a) A circular and a square cantilever are made of same material and have equal area of Cross-section and length. Find the ratio of their depressions for a given load. **(16)**

OR

(b) Describe the principle used in vacuum pumps and gauges. Describe one of the pumps and its working. Also explain how low pressure is measured using the gauges. **(16)**

12. (a) Derive Sabine's formula of reverberation time. **(16)**

OR

(b) (i) Discuss the magnetostriction method of producing ultrasonic waves. **(12)**

(ii) Briefly discuss the engineering applications of ultrasonics. **(4)**

13. (a) (i) Explain how the thermal conductivity of a bad conductor can be determined using Lee's Disc method. **(8)**

(ii) Define Entropy. Explain the entropy – temperature diagram of Carnot's cycle. **(8)**

OR

(b) (i) State and prove Carnot's theorem. **(8)**

(ii) Describe the cycle of operations involved in an ideal Otto engine along with its efficiency. **(8)**

14. (a) (i) Discuss the principle and method involved in the comparison of illumination between two light sources using Lummer-Brodhum photometer. **(8)**

(ii) Using the schematic diagram of a Scanning Electron Microscope explain the principle and working of it. **(8)**

OR

(b) (i) Derive an expression for the bandwidth of the fringe formed due to the interferences in an air wedge. How is it used in determining the thickness of a thin wire ? **(10)**

(ii) What is sextant ? What is the principle involved in the determination of angular variation using sextant. **(6)**

15. (a) Explain the basic principle used in lasers. Explain with a neat diagram the working of a semiconductor laser and discuss its merits and dements over other lasers. **(4 + 9 + 3)**

OR

(b) Derive an expression for Numerical aperture and angle of acceptance of a fiber interms of refractive indices of the core and cladding. What are different types of fiber optical sensors ? Explain the working of pressure sensor. **(7 + 2 + 7)**
