





PART B — (5 × 16 = 80 marks)

11. (a) Derive an expression for the twisting couple of a wire. Discuss the use of it in the theory of a torsion pendulum and hence deduce an expression for the time period of oscillation. (16)

Or

- (b) (i) Discuss the principle and working of a rotary pump. (8)  
(ii) Explain the experimental procedure of comparison of viscosities using Ostwald viscometer. (8)
12. (a) Define reverberation time. Deduce expressions for the sound energy growth and decay in an auditorium and hence obtain an expression for the reverberation time. (2 + 14)

Or

- (b) (i) Explain the principle and working of the piezoelectric method of producing ultrasonic waves. List the merits and demerits of the method. (8)  
(ii) Discuss the industrial applications of ultrasonics. (8)
13. (a) (i) Discuss the theory and experimental procedure of determining thermal conductivity of a good conductor using Forbe's method. (12)  
(ii) Explain the method of providing thermal insulation in buildings. (4)

Or

- (b) (i) Explain the principle, theory and working of a Diesel engine and obtain its efficiency. (12)  
(ii) Draw and discuss the entropy-temperature diagram of a Carnot cycle. (4)
14. (a) With necessary diagrams, discuss the theory and working of  
(i) Lummer-Brodhum photometer and  
(ii) Air-wedge. (8 + 8)

Or

- (b) With necessary diagrams, discuss the theory and working of  
(i) Michelson's interferometer and its fringe patterns and  
(ii) Sextant. (8 + 8)



15. (a) (i) Explain the working of a Nd:YAG laser and discuss the energy level transition scheme. (8)
- (ii) Discuss the energy band scheme and working of a homo-junction semiconductor laser. (8)

Or

- (b) (i) For an optical fiber, derive expressions for the numerical aperture and acceptance angle. (8)
- (ii) Discuss the application of optical fibers as temperature and displacement sensors. (8)
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