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Question Paper Code : Q 2217

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009

Second Semester

Mechanical Engineering

EE 1161 — BASIC ELECTRICAL ENGINEERING

(Common to Aeronautical Engineering/Automobile Engineering/
Production Engineering and First Semester Marine Engineering)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give the relation between R.M.S. value and maximum value of pure sine wave. Also calculate the peak voltage if $E_{rms} = 64$ V.
2. State Kirchoff's laws.
3. What is the difference between line voltage and phase voltage?
4. Write the emf equation of a d.c. machine.
5. Name the starting methods of synchronous motor.
6. What is effect of Hysterisis Loss on the performance of a transformer?
7. Explain the term 'all-day efficiency' for a transformer.
8. For an induction motor explain the terms slip and slip frequency.

9. How is range of measurement increased in a voltmeter?
10. What are the different types of errors in an energy meter?

PART B — (5 × 16 = 80 marks)

11. (a) A RLC series circuit with a resistance of 30Ω , impedance of 0.2 H and a capacitance of $0.2 \mu\text{F}$ is supplied with a 150 V supply to variable frequency. Find the following : (16)
- (i) frequency at resonance
 - (ii) power
 - (iii) power factor
 - (iv) voltage across R, L, and C
 - (v) Quality factor of circuit
- Draw the phasor diagram.

Or

- (b) (i) Explain how the power factor can be calculated by two Wattmeter method.
- (ii) A 3-phase, 12 kVA load has a p.f. of .452. The power is measured by two wattmeters. Find the values of each wattmeter when p.f. is leading and p.f. lagging. (8 + 4 + 4)

12. (a) Draw and explain the characteristic of a DC shunt generator. A 4 pole, lap wound DC shunt generator having useful flux/pole of 0.07 Wb consists of 340 turns. The resistance of each turn is 0.003 ohm . Find the terminal voltage when its armature current is 45 A and runs at a speed of 1600 rpm . (10 + 6)

Or

- (b) Draw and discuss on the construction and operation of the DC motor. Derive an expression for the e.m.f. generated in the armature winding. (10 + 6)

13. (a) How are transformers classified? Explain the construction and operation of the transformer and derive its emf equation. (6 + 10)

Or

- (b) Explain the various types of 3-phase transformer connections with neat diagram. Enumerate on the effect of variation in load, supply frequency and supply voltage on the losses incurred in a transformer. (10 + 6)

14. (a) Give the construction and principle of operation of a three phase squirrel cage type induction motor. Briefly discuss on the starting torque of the machine. (10 + 6)

Or

- (b) With a neat sketch explain the operation of a shaded pole motor with its characteristics and applications. (16)

15. (a) Write briefly with figures, on construction and principle of (8 + 8)

- (i) Induction type energy meter
- (ii) Dynamometer wattmeter.

Or

- (b) What is importance of torque in indicating instruments? What are instrument errors? With neat figure explain the working of permanent magnet type moving coil instrument. (4 + 4 + 8)