

C 3212

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Aeronautical Engineering

EE 1161 — BASIC ELECTRICAL ENGINEERING

(Common to Production Engineering/Automobiles Engineering/
Mechanical Engineering)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Explain the terms (a) instantaneous value and (b) average value for an a.c. signal.
2. In a series R-L circuit, $R = 20$ ohms and $L = 60$ mH. The input current lags the supply voltage by 60° . Obtain the value of applied frequency.
3. Draw neat diagram of the 4 point starter used for DC shunt motor.
4. The synchronous machine produces reactive power when operated in over excited state. Why?
5. What is leakage reactance of transformer.
6. What is the advantage of the Delta-Delta connection of three-phase transformer?
7. For an AC motor define the term slip.
8. Give two reasons why induction motors are used extensively for industrial drives.
9. What is the importance of calibration in measuring instruments?
10. What is the cause of creeping error in energy meters?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw and explain the characteristics of a dc shunt generator.
- (ii) A 4-pole, lap wound DC shunt generator has a useful flux per pole of 0.06 wb. The armature winding consists of 220 turns each of 0.004 Ω resistance. Calculate the terminal voltage, load current when it runs at 900 rpm, if the armature current is 30 A. (8 + 8)

Or

- (b) (i) Derive the emf equation of an alternator.
- (ii) Explain the various methods of starting synchronous motor. (8 + 8)

12. (a) (i) What is power factor?
- (ii) Draw the phasor diagram for a series RLC circuit energized by a sinusoidal voltage showing relative positions of current, voltage when $X_L > X_C$ and $X_L = X_C$. (8 + 8)

Or

- (b) (i) Derive the expression for resonance in parallel RLC circuit. Also obtain the expression for its quality factor.
- (ii) A series circuit having pure resistance of 40 Ω , pure inductance of 50 mH and a capacitor is connected across a 400 V, 50 Hz a.c supply. This R, L, C circuit draws a current of 10 A. (8 + 8)

Calculate :

- (1) Power factor of the circuit
- (2) Capacitor value.

13. (a) Draw the equivalent circuit of a 1 ϕ transformer and derive the relevant parameters. (16)

Or

- (b) (i) Write briefly on the various techniques of three-phase to three-phase conversions of transformers.
- (ii) A single phase transformer has 50 primary and 1000 secondary turns. Net cross sectional area of the core is 500 cm². If the primary winding is connected to 50 Hz supply at 400 V, calculate the value of maximum flux density in the core and the emf induced in the secondary.

14. (a) Explain the double field revolving theory. (16)

Or

(b) Explain different methods of starting an induction motors.

15. (a) With neat figures explain the principle, construction of the (i) attraction type moving iron instrument and the (ii) permanent magnet type moving coil instrument. (8 + 8)

Or

(b) Write briefly about the following :

(i) Dynamometer wattmeter

(ii) Induction type energy meter. (8 + 8)