DECEMBER 2009

DipIETE – ET (OLD SCHEME)

Code: DE05 **Subject: ELECTRICAL ENGINEERING**
Time: 3 Hours **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2 × 10)

a. Application of Norton's theorem to a circuit yields

(A) Equivalent current source
(B) Equivalent impedance
(C) Equivalent current source and impedance in series
(D) Equivalent current source and impedance in parallel

b. In d.c generator the brushes are always placed along

(A) Geometrical Neutral Axis (GNA)
(B) Magnetic Neutral Axis (MNA)
(C) Bisector of GNA and MNA
(D) There is no hard and fast rule for this

c. The speed of a d.c motor may be varied by varying

(A) Field Current
(B) Applied voltage
(C) Resistance in series with armature
(D) Any of the above

d. Open circuit test of a transformer gives

(A) Hysteresis loss
(B) Eddy current loss
(C) Sum of hysteresis and eddy current loss
(D) Copper loss

e. A 3-phase 440 V, 50 Hz induction motor has slip of 3%. The frequency of rotor e.m.f will be

(A) 150 Hz **(B)** 15 Hz
(C) 3 Hz **(D)** 1.5 Hz

f. The starting torque of a capacitor start motor is

(A) Zero **(B)** Low
(C) Same as rated torque **(D)** More than rated torque

g. A motor generally used in toys is

(A) Hysteresis motor **(B)** Shaded pole motor
(C) Two value capacitors motor **(D)** Reluctance motor

h. The capacitor for power factor correction are rated in terms of

(A) Voltage **(B)** VA

(C) kW **(D)** kVAR

i. Which of the following is not the voltage at which power is transmitted in India?

(A) 132 kV **(B)** 66 kV
(C) 33 kV **(D)** 20 kV

j. Batteries used for electrical energy storage are

(A) Laclanche Cells **(B)** Edison Cells
(C) Lead acid Cells **(D)** Any of the above

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. What are the different network theorems? State Thevenin's theorem. **(8)**

b. Give the relationship between the phase values and line values of current and voltage in star connected circuit. Three, 100 Ω resistors are connected in a star across 440 V, 3-phase lines. Calculate the line and phase currents and the power taken from the mains. **(2+6)**

Q.3 a. What are the different methods of measurement of power in 3-phase circuit? Explain any two methods in brief. **(8)**

b. A coil having a resistance of 10 ohms and an inductance of 0.2H is connected to a 100 V, 50 Hz supply. Calculate:-

(8)

(i) Impedance of the coil
(ii) Reactance of the coil
(iii) Current taken
(iv) Phase difference between the current and the applied voltage

.

Q.4 a. Derive e.m.f equation of 1-phase transformer. **(8)**

b. A single phase transformer has a net core area of 60 cm^2. The primary with 400 turns is connected to a 500 V supply. Estimate the flux density in the core and the no load secondary terminal voltage. The number of turns in the secondary is 1000. The frequency of supply is 50 Hz. **(8)**

Q.5 a. What are the different types of d.c motor? Explain the different methods of speed control of d.c shunt motors. **(10)**

b. A 4-pole d.c generator runs at 750 r.p.m and generates an e.m.f of 240 V. The armature is wave–wound and has 792 conductors. Calculate total flux /pole. **(6)**

Q.6 a. Why single-phase induction motors are not self starting? Explain. **(8)**

b. A 400 V,50 Hz, 50 HP, 3-phase, 6 pole induction motor runs at 960 r.p.m on full load. Calculate the full load slip. **(8)**

Q.7 a. What are the advantages of high voltage transmission? Explain. **(8)**

b. A consumer requires 2,000,000 kWh per year and his yearly load factor is 30%. Calculate the maximum demand. **(8)**

Q.8 a. Explain the construction and working of solar cell. **(8)**

b. What are the various non-conventional source of electrical energy generation? Give advantages and disadvantages of wind power. **(8)**

Q.9 Write short notes on:-

(i) Various modes of power generation **(8)**

(ii) Selection of motors for specific engineering application **(8)**