DECEMBER 2008

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 best alternative in the following: (2x10)

a. If V represent voltage, R represent resistance, I represent current, W represent power then which of the following relation is incorrect

(A) $I = \sqrt{W/R}$ **(B)** $V = \sqrt{WR}$
(C) $W = V^2/R$ **(D)** None of the above

b. Ohms law is not applicable to

(A) Electronic resistors **(B)** High voltage
(C) High current densities **(D)** Vacuum diode

c. An induction motor is

(A) Self starting with zero torque.
(B) Self starting with very high torque.
(C) Self starting with smaller torque.
(D) None of the above.

d. In an a.c circuit the ratio kW/kVA is known as

(A) Form factor. **(B)** Peak factor.
(C) Power factor. **(D)** Load factor.

e. Which motor would you be select as a drive for an electric clock?

(A) D.C series motor. **(B)** Universal motor.

(C) Synchronous motor. **(D)** Squirrel cage induction motor.

f. For three phase star connected circuit

(A) Line voltage = phase voltage.
(B) Line current = phase current.
(C) Line current = $\sqrt{3}$ phase current.
(D) None of the above.

g. Iron losses in a DC machine take place in

(A) Yoke. **(B)** Commutator.
(C) Main body. **(D)** Armature.

h. The efficiency of a Transformer is maximum when

(A) it runs at half of full Load.
(B) it runs at full Load.
(C) its Copper Loss equal to Iron Loss.
(D) it runs at overload.

i. A three phase 440 V, 50 Hz induction motor has a speed of 950 rpm, if the machine has 6 poles, the % slip would be

(A) 10% **(B)** 5%
(C) 1% **(D)** 0.5%

j. Starting torque of a single phase induction motor is

(A) Uniform **(B)** High
(C) Low **(D)** Zero

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

Q.2 a. State and explain Kirchoff's Current Law and Kirchoff's Voltage Law with example. **(8)**

b. Determine the current flowing in each branch of the circuit shown in Fig.1 **(8)**

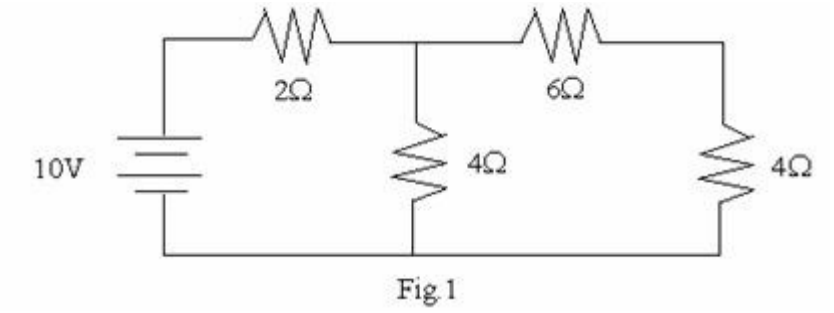

Fig.1

Q.3 a. Define the following A.C quantities

(i) R.M.S value of alternating current.
(ii) Instantaneous value of alternating current.
(iii) Average value or mean value of alternating current.
(iv) Amplitude.

(8)

b. The equation of an alternating current is i = 42.42 sin 628t.
Calculate

(i) its maximum value
(ii) its frequency
(iii) its R.M.S value
(iv) its average value

(8)

Q.4 a. What are the different methods of speed control of D.C motors. Explain in brief. **(8)**

b. A 6-pole, wave wound shunt generator has 1200 conductors. The useful flux per pole is 0.02wb, the armature resistance 0.4 ohm and the speed 400rpm. If the shunt resistance is 220ohm, calculate the maximum current which the generator can deliver to an external load if the terminal voltage is not to fall below 440V. **(8)**

Q.5 a. What are the different losses in a transformer. How these losses varies with the load? **(6)**

b. A 50 kVA single phase transformer has on full load a copper loss of 560W and iron loss of 500W.Calculate the efficiency at 50% of full load for a power factor of unity. **(10)**

Q.6 a. Explain the principle of operation of 3-phase Induction motor? **(8)**

b. A 3-phase, 50Hz induction motor has 8 poles. It runs at a speed of 700rpm. Determine

(i) Synchronous speed.
(ii) Slip
(iii) Rotor frequency at the time of starting.
(iv) Rotor frequency at the given speed. **(8)**

Q.7 a. Explain the terms Capacity factor, Maximum load, Annual load factor and Diversity factor. **(8)**

b. What factors are considered for the selection of motor for specific engineering application? **(8)**

Q.8 a. Give a Brief note on the various Renewable Energy Resources. **(10)**

b. If a generating station has a maximum load of 20MW for the year and the maximum load on the substations were 7.5MW, 6.0MW, 5.5MW, & 4.5MW. Calculate the diversity factor. **(6)**

Q.9 Write short notes on

(i) Energy storage. **(8)**

(ii) E.M.F equation of 1-Phase transformer. **(8)**