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SE-8085

B. E. - II (Sem. III) (Electrical) Examination

May / June – 2011

Electrical Machines-I

(New Syllabus)

Time : Hours] [Total Marks :

Instructions :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 3) (ELECTRICAL)

Name of the Subject :

☛ Electrical Machines-I (New)

☛ Subject Code No. : 8 0 8 5 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

1) Attempt all question.
2) Figure to the right indicates full marks.
3) Scientific calculator up to Casio-100D, 100MS series is permitted.

Section - I

Q-1 (a) **Do as Directed** **10**

(1) _____ brushes used in DC machines.
(2) Effect of armature field on main field is known as _____.
(3) _____ converts AC in to DC in DC machines.
(4) Speed of DC motor increases with _____ in flux.
(5) For simplex wave winding, numbers of parallel path is equal to _____.
(6) The motor converts _____ energy in to _____ energy.
(7) Two alternators can be connected in parallel at different phase sequence. **(True or False)**
(8) Field control method is used to obtain speed above base speed. **(True or False)**
(9) Generated voltage of DC series generator is increases with increase in load. **(True or False)**
(10) Alternator never runs at synchronous speed. **(True or False)**

Q-1 (b) Derive emf equation of DC generator **06**

Q-2 (a) Explain construction of DC machines **08**

Q-2 (b) A shunt generator has a full load current of 196 A at 220 V. The stray losses are 720 W and the shunt field coil resistance is 55Ω. If it has a full load efficiency of 88 %, find the armature resistance. Also calculate load current at maximum efficiency. **08**

OR

Q-2 (a) Explain speed control of DC series motor by Field control method **08**

Q-2 (b) A 4-pole dc shunt generator has a wave winding. The armature and field resistances are 0.2 ohm and 60 ohm respectively. The brush contact drop is 1 volt per brush. The generator is supplying 50 lamps of 60 W each at 120V. Find, (i) armature current and (ii) generated voltage. **08**

Q-3 **Attempt any three** **18**

(a) Explain Synchronous impedance method on three phase alternator

(b) Explain ward Leonard method of speed control

(c) Write conditions or voltage build up in DC shunt generator

(d) Discuss three-point starter

(e) Explain external-Internal characteristics of DC shunt generator

Section II

Q-4 (a) **Do as Directed:** **(05)**

1. Define: Transformer.
2. Write down the condition for maximum efficiency in case of a transformer.
3. State: Types of transformer as per construction.
4. Classify: AC motors as per construction.
5. In case of transformer, the ideal value of voltage regulation is _____%.

(b) **Match the following** **(05)**

(i)	Transformation ratio (K)	(i)	$4.44\, f \varnothing_m$
(ii)	Primary induced emf	(ii)	(Ns-N)/Ns
(iii)	Per turn emf	(iii)	sf
(iv)	Slip	(iv)	N_2/N_1
(v)	Rotor emf frequency	(v)	$4.44\, f \varnothing_m T_p$

(c) Explain: Operation of an Ideal transformer under no load condition. **(6)**

(d) A 4 pole, three-phase, Induction motor operates from a supply of frequency 50 Hz. Calculate: **(4)**

1. The speed at which the magnetic field of the stator is rotating.
2. The speed of the rotor when the slip is 4 %.
3. The frequency of the rotor current when the slip is 3 %.
4. The frequency of the rotor current at standstill.

Q-5 (a) Draw the vector diagrams of transformer working at lagging, leading and unity power factor. Assume resistance and leakage reactance to be negligible. **(6)**

(b) Describe construction of an induction motor. Also explain working principle of the same. **(6)**

OR

Q-5 (a) State: Essential and desirable conditions for parallel operation of transformer. **(6)**

(b) The following data were obtained on a 20 kVA, 50 Hz, 2000/200 V Distribution Transformer:

Open Circuit Test=200 V, 4 A, 120 W **(6)**

Short Circuit Test=60 V, 10 A, 300 W

Draw the complete equivalent circuit.

Q-6 **Attempt any three:** **(18)**

(a) Write short note: Open Circuit test and Short Circuit test of a transformer.

(b) Draw the vector diagrams of transformer working at lagging and unity power factor.

(c) Explain: Operation of transformer under no load condition.

(d) Write short note on slip measurement of an induction motor.

(e) Explain torque-slip characteristic of an induction motor.
