Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-III Regular / Remedial Examination December 2010

Subject code: 131901
Subject Name: Electrical Machine and Electronics

Date: 13 /12 /2010 **Time: 10.30 am – 01.00 pm**
Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Draw and explain the construction of a dc generator. Mention the material used and functions of : **07**
1) Yoke
2) Poles
3) Armature

(b) A 4-pole lap-wound, shunt generator has armature with 750 conductors. The flux per pole is 20 mWb and the generator supplies 100 nos. of 220 V, 60 W lamps. Determine the speed of the generator. Armature and field winding resistances are 0.1 Ω and 100 Ω respectively. **07**

Q.2 **(a)** Armature resistance of a d.c. shunt motor is 5 Ω. On full-load it runs at 1600 r.p.m. taking an armature current of 10 A from 220 V supply. Determine full-load torque and starting torque. **07**

(b) Compare rheostatic control and field control methods for speed control of d.c. shunt motor. **07**

OR

(b) Draw and explain the construction of a three point starter for d.c. shunt motor. Explain the function of Hold-on Coil and Overload Coil in it. **07**

Q.3 **(a)** Explain the production of rotating magnetic field for a 3-ph. Induction motor using analytical method and phasor diagrams at $\theta = 0°$ and $\theta = 60°$. **07**

(b) A 10 h.p., 440 V, 3-ph., 4-pole induction motor works on 50 Hz supply. Determine: **07**
1) Synchronous speed
2) Motor speed at a slip of 5 %
3) Frequency of current in rotor circuit when slip is 7.5 %
4) Rotor speed when slip is 4 %.

OR

Q.3 **(a)** Explain the principle and working of Capacitor Start Capacitor Run 1-ph. Induction Motor. What are its advantages and applications? **07**

(b) Draw the construction of an alternator. What do you mean by synchronizing of an alternator? What are the conditions to be fulfilled for proper synchronization of alternators? **07**

Q.4 **(a)** Explain the working principle of a transformer. Draw the construction of shell type and core type transformer. **07**

(b) With the help of layout of an electrical power system, explain the transmission and distribution of 3-ph. a.c. power. **07**

OR

Q.4 **(a)** What is the meaning of tariff? What are the criteria for deciding tariff? Explain the principle of power factor improvement. **07**

(b) Find the most economical power factor for a HT consumer having tariff as follows. The tariff is Rs. 100 per KVA per annum of maximum demand plus a flat rate per kWh for a HT consumer. Assume additional cost of capacitors for power factor improvement of Rs. 80 per KVAR. Rate of interest and depreciation is together to be taken as 10 %. **07**

Q.5 **(a)** What is the purpose of substations in electrical power system? Explain briefly the function of following equipments in a substation: **07**

1) Bus-bar
2) Circuit Breaker
3) Isolator
4) Lightning Arrester
5) Insulator

(b) Draw the circuit diagram for full-wave bridge rectifier. Explain its working during positive and negative cycles using the waveforms of voltage on transformer secondary and load voltage. **07**

OR

Q.5 **(a)** Give the symbol Boolean expression and logical operation for the following logic gates: **07**

1) NOT
2) AND
3) OR
4) NAND
5) NOR
6) Exclusive OR
7) Exclusive NOR

(b) With reference to architecture of 8085 microprocessor, explain the following: **07**

1) General purpose registers
2) Accumulator
3) ALU
4) Program Counter

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