

BTS-C024(A)

**B.Tech. Degree III Semester Examination,  
January 2002**

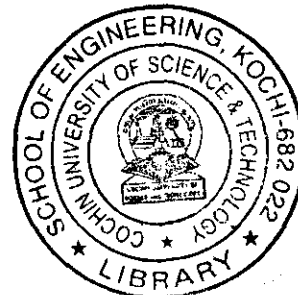
**IT/CS/EC/ME/EB/EI 302 ELECTRICAL TECHNOLOGY**

Time: 3 Hours

Max. Marks: 100

(Answer all questions)

- I
- a) Describe the various losses which can occur in a power transformer and state how they can be reduced in practice.
- b) A 440/110V, single phase transformer has a primary resistance of  $0.25 \Omega$  and a secondary resistance of  $0.015 \Omega$ . At the rated supply voltage the iron loss is measured to be 150W. Find the KW loading to give maximum efficiency at unity power factor. (20)
- OR
- II
- a) What do you mean by C.T and P.T? Where are they used? Give the advantages of their usage.
- b) A 50 KVA, 6600/220V transformer has a primary resistance of  $10 \Omega$  and secondary resistance of  $0.01 \Omega$ . Calculate:  
(i) total resistance referred to primary.  
(ii) total resistance referred to secondary.  
(iii) the full load copper loss. (20)
- III
- a) Derive the emf equation of a d.c machine. (5)
- b) A commutator is essential in a d.c. motor. Why? (3)
- c) The armature resistance and shunt resistance of a 220V shunt generator is  $0.06 \Omega$  and  $55 \Omega$  respectively. The rotational losses at rated speed and excitation are measured to be 3.5 KW. Find the hp of the prime mover if the rated full load current of the generator is 250A. (12)



(P.T.O)

- IV a) Explain the following characteristics of a d.c. series motor.
- torque/armature current
  - speed/armature current
  - speed/torque
- b) A shunt motor takes an armature current of 25A at 220V, when running on full load; at a speed of 800 rpm. The armature resistance is  $0.2 \Omega$ . If the field strength is reduced by 8% and the torque remains the same, determine the steady speed attained and the armature current. (20)
- V a) Derive the speed - frequency equation of an alternator. (4)
- b) Explain the effect of distribution factor and coil span factor on the emf generated. (5)
- c) When an alternator supplies current, internal voltage drops. Why? (6)
- d) At full load and rated speed the terminal voltage of a three phase alternator is set at 440V. When the load is thrown-off the terminal voltage is seen to rise to 500V. Estimate the voltage regulation. (5)
- OR**
- VI a) A synchronous motor is not self starting. Why? What are the starting methods adopted? )  
) (20)
- b) A three-phase star connected synchronous motor has an effective resistance of  $1 \Omega$  /phase and an effective reactance of  $5 \Omega$  /phase. If the applied voltage is 2000V between lines, estimate the back emf/phase necessary when the machine is taking 60KW in order that the power factor may be unity.
- VII The power input to the rotor of a 400V, 50Hz, six-pole, three phase induction motor is 100KW. The rotor emf is observed to make 100 complete alternations per minute. Calculate (a) the slip (b) the rotor speed (c) mechanical power developed (d) the rotor copper loss per phase (d) the rotor resistance per phase if the rotor current is 65A. (20)

Contd.....3

**OR**

- VIII A three phase, 50 HP, induction motor when direct-on started takes a current of six times full-load current and produces a torque of 1.5 times full load torque. Calculate the current taken from the supply and the ratio of the starting torque to full-load torque if the motor is started through an auto - transformer having a 75% tapping. Efficiency of the motor is 82% and operates at a power factor of 0.85 (lagging). (20)
- IX a) What do you mean by skin effect? How will it effect the transmission? How is it reduced? (8)
- b) With necessary schematic diagram explain the working of a hydro - electric power plant? (12)
- OR**
- X Write short notes on
- Circuit breakers
  - Electrical insulators
  - Methods of electrical earthing. (20)

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