BTS 165 (A)

B.TECH. DEGREE III SEMESTER (SUPPLEMENTARY) EXAMINATION IN
INFORMATION TECHNOLOGY/COMPUTER SCIENCE AND ENGINEERING
JUNE 2002

IT/CS 304 ELECTRICAL TECHNOLOGY
(1998 Admissions)

Time: 3 Hours   Maximum Marks: 100

(All questions carry *EQUAL* marks)

I.   (a)   Explain the operation of a transformer on load condition. Draw
             the vector diagram of a transformer supplying lagging p.f. load.

      (b)   Obtain the equivalent circuit of 200/400V, 4KVA 1φ transformer
             referred to HV side, from the following data:
             OC test : 200V, 0.7A, 70W on LV side
             SC test : 15V, 10A, 85W on HV side.

   Also find the % efficiency at $\frac{1}{2}$ load, 0.8 p.f.

OR

II.   (a)   Discuss the constructional features of single phase transformer.

      (b)   The efficiency of a 400KVA, 1φ transformer is 98.77% when deliv-
             ering full load at 0.8 pf and 99.13% when delivering half full load at
             upf. Calculate the iron loss and the FL Cu loss of the transformer.

III. (a)   With neat sketches, explain the process of commutation in d.c.
             machines and the methods of improving commutation.

      (b)   A 4 pole, wave wound d.c. machine has an armature of 25cm diam-
             eter and runs at 1200 rpm. If the armature current is 160A, thick-
             ness of brush is 12mm and the self inductance of each armature
             coil is 0.1mH, calculate the reactance voltage of the coil during
             commutation. Neglect mica insulation and assume commutation
             to be linear.

OR
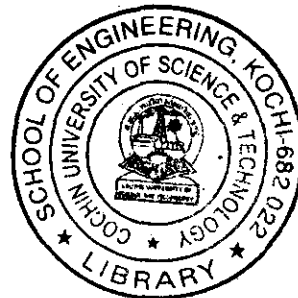
IV. (a) What are the reasons for voltage drop when a generator is loaded? Explain the typical load characteristics of a shunt generator and the experimental procedure to obtain them.

(b) A 4 pole shunt generator with lap connected armature having field and armature resistances of 50Ω and 0.1Ω respectively supplies 60 numbers of 40W lamps at 100V. Calculate the total armature current, current per parallel path and the generated emf. Assume a voltage drop of 1V/brush.

V. (a) Explain how torque is developed in a d.c. motor and derive the expression for torque developed.

(b) A 250V shunt motor runs at 1000 rpm on no load and takes 5A. The field and armature resistances are 250Ω and 0.25Ω respectively. Calculate the speed when the motor is loaded such that it takes 41A from the lines, if armature reaction weakens flux by 3%.

OR

VI. (a) With typical performance curves, discuss the applications of series, shunt and compound motors.

(b) A long shunt dc generator supplies 22KW at a terminal voltage of 220V. The resistance of armature, shunt field and series field are 0.05, 110 and 0.06Ω respectively. The overall efficiency at above load is 88%. Find
  (i) iron and friction losses,
  (ii) copper losses in the machine.

VII. (a) Explain the construction of rotors of two types of alternators. Mention the circumstances under which these two types are normally used.

(b) From the following test results, determine the voltage regulation of a 2000V, 1ϕ alternator delivering a current of 100A at (i) 0.8 pf lead (ii) 0.707 pf lag.

Test results : Full load current of 100A is produced on short circuit by a field excitation of 2.5A.

An emf of 500V is produced on open circuit by the same excitation. Armature resistance is given as 0.8Ω.

OR

VIII. (a) What is meant by reguation of an alternator and describe one method for determining it.

(b) Calculate the no load terminal voltage of a 3 ϕ, 8 pole, star connected alternator running at 750 rpm having the following data:
  Sinusoidally distributed flux/pole = 55 mwb
  Total number of slots in the armature = 72
  Number of conductors/slot = 10
  Assume full pitch coils.

IX. (a) Describe the principle of operation of 3 phase induction motor. What is meant by slip?

(b) A 3 phase, 4 pole, 50 Hz induction motor develops 10 metric HP at 1440 rpm. What is the stator input if the stator losses are 500 watts?

OR

X. (a) With the help of torque-slip curves of single phase induction motor, explain why they do not have starting torque.

(b) Describe the working principle of -
  (i) Capacitor start and run motor.
  (ii) Split phase motor.
  (iii) Hysterisis motor.

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