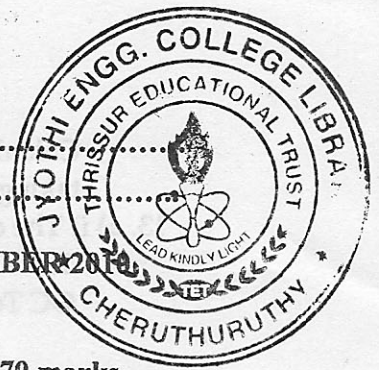


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Name:

Reg.No.



THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2010

EC 09306/PTECO9305 – ELECTRICAL ENGINEERING

Time: Three hours

Maximum: 70 marks

Part – A

(Answer all questions)

1. What is advantage of 4 point starter over a 3 point starter of a D.C. motor?
2. Define voltage regulation of a transformer.
3. Write down the advantages and disadvantages of salient pole rotor of a synchronous machine.
4. An alternator has 9 slots/pole. The coil span is 8 slots. Find pitch factor for fundamental frequency.
5. A 400v, 4 pole, 50 Hz, 3 phase, 10 hp, star connected induction motor has no-load slip of 1% and full load slip of 4%. Find the frequency of rotor currents at full load. (5×2 = 10)

Part - B

(Answer any four questions)

6. A 4 pole d.c. shunt generator having a field and armature resistance of 100Ω and 0.2Ω respectively supplies parallel connected 100 number of 200V, 40W lamps. Calculate the armature current and generated emf. Allow IV per brush contact drops.
7. The equivalent circuit of a 200/400V-step up transformer has the following parameters referred to the low-voltage side. $R_{01} = 0.15\Omega$; $X_{01} = 0.37\Omega$ $R_c = 600\Omega$, $X_m = 300\Omega$ when the transformer is supplying a load at 10A at a power factor of 0.8 lag, calculate the primary current.
8. Explain the method of extending the range of voltmeter with simple example.
9. A 4 pole, 3 phase, 50 Hz, star connected alternator has 60 slots, with 4 conductors/slot. Coils are short pitched by 3 slots. If the phase spread is 60° , find the line voltage induced for a flux per pole of 0.943 Wb distributed sinusoidally in space. All the turns/phase are in series.
10. With neat diagram explain double revolving field theory.
11. With neat diagram explain the operation of 3 point starter. (4×5 = 20)

Part - C

(Answer section (a) or section (b) of each question)

(4×10 = 40)

12. a) i) A 220V compound generator is supplying a load of 100A at 220V. The resistances of its armature, shunt and series windings are 0.1Ω , 50Ω and 0.06Ω respectively. Find the induced emf and the armature current when the machine is connected as (i) short shunt (ii) long shunt. (5 marks)
ii) Draw and explain the electrical and mechanical characteristics of DC series motor. (5 marks)

Or

- b) A d.c. shunt machine while running as generator develops a voltage of 250V at 1000 rpm on no load. It has armature resistance of 0.5Ω and field resistance of 250Ω . When the machine runs as motor, input to it at no-load is 4A at 250V.

Calculate the speed and efficiency of the machine when it runs as a motor taking 40A at 250V. Armature reaction weakens the field by 4%. (10 Marks)

13. a) i) The collected instrument reading obtained from open and short circuit tests on 10KVA, 450V/120V, 50Hz transformer are;

OC Test: $V_D = 120V$; $I_0 = 4.2A$, $W_D = 80W$;

(all the reading were read on the LV side)

Sc Test: $V_{sc} = 9.65V$; $I_{sc} = 22.2A$; $W_{sc} = 120W$

(LV winding short circuited)

Compute:

(i) The approximate equivalent circuit referred to HV side

(ii) Efficiency for an 80% load with unity pf.

(iii) Voltage regulation at half full load and 0.8 pf leading

(10 Marks)

Or

- b) i) Briefly explain the amount of copper saving in auto transformer

(4 Marks)

- ii) With neat diagram explain the working of single phase induction type Energy meter.

(6 Marks)

14. a) i) The stator of a 3 phase, 16 pole alternator has 144 slots and there are 4 conductor/slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375rpm, calculate the emf induced per phase. Resultant flux in the air gap is $5xw^{-2}W$ / pole sinusoidally distributed. Assume the coil span as 150° electrical.

(5 Marks)

- ii) "Synchronous motors are not self starting" explain

(5 Marks)

Or

- b) (i) A 60 KVA, star connected, 440V, 3 phase, 50 Hz alternator, the effective armature resistance is 0.25Ω /phase. The synchronous reactance is 3.2Ω /phase and leakage reactance is 0.5Ω /phase. Determine at rated load and unity power factor.

(a) Internal emf

(b) no-load emf

(c) % regulation on full load

(6 Marks)

- (ii) Explain the effect of power factor in armature reaction of a synchronous generator

(4 Marks)

15. a) (i) With required equation and diagram explain the torque - slip characteristics of a three phase induction motor.

(5 Marks)

- (ii) The power input to the rotor of a 400V, 50Hz, 6 pole, three phase induction motor is 75KW. The rotor electromotive force is observed to make 100 complete alteration per minute. Calculate (i) slip (ii) rotor speed (iii) rotor copper loss/phase (iv) mechanical power developed.

(5 Marks)

Or

- b) (i) Explain the following single phase induction motor with neat diagram

i) Capacitor start capacitor run

ii) Shaded pole

(6 Marks)

- (ii) Explain the operation of a star Delta starter used in three phase induction motor starting

(4 Marks)

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