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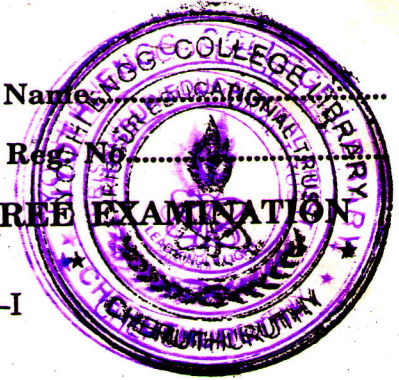
Name: .....

Reg. No: .....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
JUNE 2007**

**EE 04 405—ELECTRICAL MACHINES—I**

(2004 admissions)



Time : Three Hours

Maximum : 100 Marks

*Answer all questions.  
Assume missing data.*

- I. (a) Write a short note on equaliser rings.  
(b) Enumerate the methods used for improving commutation and explain any *one* of them in detail.  
(c) Write some applications of the following :—  
(i) Separately Excited generator.  
(ii) Shunt generator.  
(iii) Series generator.  
(d) What are requirements or conditions of paralleling D.C. generators ?  
(e) Write the advantages and disadvantages of Swinburne's test.  
(f) Draw and explain the mechanical characteristics of a  
(i) shunt motor ; and  
(ii) series motor.  
(g) Mention the advantages and disadvantages of auto transformer.  
(h) Write a note on the following parts of a transformer :  
(i) Conservator.  
(ii) Breather.

(8 × 5 = 40 marks)

- II. (a) Explain the following terms as applied to a D.C. armature winding :—  
(i) Front pitch.  
(ii) Back pitch.  
(iii) Pole pitch.  
(iv) Commutator pitch.  
(v) Front end connection.  
(vi) Back end connection.

(15 marks)

Or

Turn over

(b) (i) What is the action of a compensating winding in a D.C. machine and in what way compensating winding is connected to the armature ? (5 marks)

(ii) What do you mean by reaction voltage ? How is it neutralized in a D.C. machine ? (10 marks)

III. (a) The O.C.C. of a D.C. shunt generator running at 300 r.p.m. is as follows :—

Field current (A)	:	0	2	3	4	5	6	7
Armature Volts (V)	:	7.5	92	132	162	183	190	212

(2 marks)

(i) Plot the O.C.C. for 375 r.p.m. and determine the voltage to which the machine will excite if the field resistance is  $40 \Omega$ . (6 marks)

(ii) What additional resistance would have to be inserted in the field circuit to reduce the voltage to 200 V at 375 r.p.m. ? (3 marks)

(iii) Without the additional resistance, determine the load current supplied by the generator, when its terminal voltage is 200 V. Take armature resistance =  $0.3 \Omega$ . Assume speed to be constant and armature reaction may be ignored. (4 marks)

Or

(b) Enumerate the three most important characteristics of D.C. generators and also explain with the neat sketch the characteristics of a separately excited generator. (15 marks)

IV. (a) (i) A 100 V series motor when taking 40 A runs at 200 r.p.m. The armature resistance is  $0.1 \Omega$  and there are four field coils, each of  $0.01 \Omega$  in series with it. Find the speed if the load torque be doubled and the coils arranged in series-parallel. [two in series, two sets in parallel]. (8 marks)

(ii) Explain the various methods employed for controlling the speed of D.C. shunt motor with relevant diagram. (7 marks)

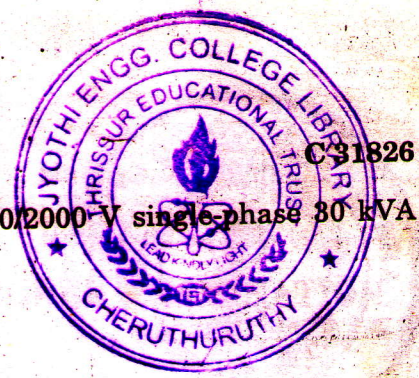
Or

(b) (i) Draw and explain all the characteristics of a series motor. (7 marks)

(ii) Write the advantages of Hopkinson's test. (4 marks)

(iii) A 230 V motor has an armature circuit resistance of  $0.6 \Omega$ . If the full-load armature current is 30 A and no-load armature current is 4 A, find the changes in back e.m.f. from no-load to full-load. (4 marks)





V. (a) Obtain the approximate equivalent circuit of a given 200/2000-V single-phase 30 kVA transformer having the following test results :—

O.C. test : 200 V 6.2 A 360 W on l.v. side  
S.C. test : 75 V 18 A 600 W on h.v. side

(15 marks)

Or

(b) (i) Explain the constructional details of a single-phase transformer.

(12 marks)

(ii) Write the advantages of an autotransformer.

(3 marks)

[4 × 15 = 60 marks]