Code No. 6051 / M

FACULTY OF ENGINEERING

B.E. 2/4 (EE) II – Semester (Main) Examination, June 2014

Subject: Electrical Machinery – I

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A

1 Draw the block diagram to explain the flow of energy in electromechanical devices. (2)
2 Mention various causes for the failure of the dc generator to build up voltage. (3)
3 A 4-pole generator has a wave wound armature with 800 conductors and it delivers 100A on full load. If the brush lead is 10^{o}, calculate the armature dc magnetizing and cross magnetizing ampere turns per pole. (3)
4 What are advantages of Hopkinson's test over Swinburne's test on dc motor? (2)
5 Write various applications of dc series generator. (2)
6 Explain the significance of back e.m.f. in a dc motor. (3)
7 List out various losses in a 1-ϕ transformer. (2)
8 Draw the phasor diagram of a 1-ϕ transformer on no-load. (2)
9 Calculate the stepping angle for a 3-phase, 16 tooth variable reluctance stepper motor. (3)
10 Define All-day efficiency of a transformer. (3)

PART – B

11 Two coils have self and mutual inductances of $L_{11} = L_{12} = \frac{2}{(1+2x)}$; $L_{12} = \frac{1}{(1+2x)}$
Calculate the time average force and coil currents at x = 0.5m if, both the coils connected in parallel across voltage source of 100cos314t. (10)
12 (a) Explain O.C.C and load characteristics of DC series generator. (5)
(b) Derive e.m.f. equation of a DC generator. (5)
13 (a) Derive the condition for maximum efficiency of a DC generator. (5)
(b) A long shunt DC compound generator delivers 110 kw at 220 V. If $R_a = 0.01\,\Omega$, $R_{sc} = 0.002\,\Omega$ and shunt field has a resistance of $110\,\Omega$, calculate the value of induced e.m.f. (5)
14 A 250 V, shunt motor with an armature resistance of $0.5\,\Omega$ and shunt field resistance of $250\,\Omega$ drives a load of constant torque. The motor draws from the supply a line current of 21A when the speed is 600 rpm. If the speed is to be raised to 800rpm, what change must be affected in the shunt field resistance? Assume the magnetization curve is a straight line. (10)
15 Explain how Swinburne's test is conducted on DC machines. What are the advantages and disadvantages of this test? (10)
16 (a) Explain Sumpner's test on1-ϕ transformers. (5)
(b) A 100 kVA, single phase transformer has an iron loss of 600 W and a copper loss of 1.5 kW at full load current. Calculate the efficiency at 100 kVA output at 0.8 p.f. lag. (5)
17 Explain briefly about the following:
a) Utilization factor of a transformer b) Stepper motor applications (3 + 3)
c) Interpoles in a DC machine. (4)

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