Patuakhali Science and Technology University

B.Sc.Engg.(CSE) L-2/S-1 Final Examination -2013 (Jan-Jun), Session: 2011-12

Course Code: EEE-211 Course Title: Electrical Technology

Credit Hour: 3.0 Full Marks: 70 Duration: 3 hours

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

[Use figures where necessary]

Answer any 5 of the following questions:

1. (a). What are the advantages of a three phase system over a single phase system? 3

(b). Derive the relationship between line and phase voltages and currents in a 3-phase, 3- wire system. 7

(c). A balanced 3-phase, 3-wire system with Y-connected load for which the line voltage is 230v and impedance of each phase is (6+j8) ohm. Find the line current and power absorbed by three phases.

2. (a). What is back E.M.F.? Write down the significance of back E.M.F. for D.C. Motor. 4

(b). Show that $T_a \propto I_a$, where the symbols having usual meanings. 4

(c). "The mechanical power developed by the motor is maximum when back E.M.F. is equal to half the applied voltage". Prove the statement with usual meaningful symbols. 7

3. (a). Analyze the performance of three types of D.C. motor in terms of characteristic curves. 3

Or

Briefly classify D.C. generators according to method of field excitation. 8

(b). What is a stepper motor? How stepper motor works? 6

4. (a). Show that $\eta_c = \eta_m \times \eta_e$ for D.C. generator where the symbols having usual meanings. 3

(b). Derive the E.M.F equation of a D.C. generator. 5

(c). Derive the condition for maximum efficiency of a D.C. generator. 6

5. (a). Define and classify transducers? What are the functions of transducers? 5

(b). What is electrical transducer? Write down the parameters of the electrical transducers. 5

(c). What are piezoelectric transducers? How it works? 4

6. (a). What is thyristor? Explain the switching characteristics of a thyristor. 5

(b). What is LVDT? Describe the working principle of LVDT. Where it is used? 5

(c). Show that $Z_\Delta = 3Z_Y$, where the symbols having usual meanings. 4

Pabna University of Science and Technology

B.Sc.Engg.(CSE) Level-2, Semester-I Final Examination-2015 (Jan-June)

Course Code: EEE 211 Course Title: Electrical Technology

Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

Answer any 5 of the following questions

[1] a. Define electric generator. Describe construction and working of a simple loop generator. 05

b. Sketch and identify different parts of a practical generator. 03

c. In a long shunt compound generator, the terminal voltage is 230V when generator delivers 150A. Determine (i) induced emf (ii) total power generated and (iii) distribution of this power. Given that shunt field, series field, divertor and armature resistance are 92Ω, 0.015Ω, 0.03Ω and 0.3Ω respectively. 03

d. A 10kW, 250V, d.c, 6 pole shunt generator runs at 1000 rpm when delivering full load. The armature has 534 lap connected conductors. Full load Cu loss is 0.64 kW. The total brush drop is 1 volt. Determine the flux per pole. Neglect shunt current. 04

[2] a. Explain the commutation phenomena of a D.C generator. 03

b. Discuss the advantages of parallel operation of shunt generators. 03

c. Two shunt generators operating in parallel deliver a load current of 250A. One of the generators is rated 50kW and the other 100kW. The voltage rating of both machines is 500V and have regulations of 6 percent and 4 percent. Assuming linear characteristics, determine (a) the current deliver by each machine (b) terminal voltage. 04

d. Define electric motor. Show the comparison between generator and motor action. What are the significance of back emf? 04

[3] a. Drive the emf equation of a transformer. 02

b. Draw the equivalent circuit of a transformer. 05

c. The parameters of a 2300/230 V, 50Hz transformer are given below:

R_1=0.286 Ω	R_2'=0.319Ω	R_0=150 Ω
X_1=0.73 Ω	X_2'=0.73 Ω	X_0=1050 Ω

The secondary load impedance Z_L=0.387+j0.29. Solve the exact equivalent circuit with normal voltage across the primary to find input power factor, power input, power output, primary Cu loss, secondary Cu loss, efficiency and regulation.

d. Define alternator. What are the advantages of stationary armature? 03

[4] a. Find the all-day efficiency of 500-kVA distribution transformer whose copper loss and iron loss at full load are 4.5 kW and 3.5kW respectively. During a day of 24 hours, it is loaded as under: 04

No. of hours	Loading in KW	Power factor
6	450	0.9
5	300	0.8
5	250	0.85
4	100	0.75
4	0	-

b. What are the main parameters of a transformer? Describe transformer tests to find out those parameters. 05

c. Show the advantages and disadvantages of induction motor. 03

d. Draw different three-phase transformer connections. 02

[5]	a.	Define stepper motor. Classify stepper motor. P-1538	02
	b.	Describe construction and modes of operation of variable reluctance stepper motor. P-1539	06
	c.	What is servomotor? What are the features of application of servomotor? Explain DC servomotor. P-1562 / 1562	04
	d.	Define speed regulation of a motor. may be 1000 P-1542	02
[6]	a.	Describe construction and working of permanent magnet stepping motor.	04
	b.	Explain construction, working, performance, speed control, advantages, disadvantages and applications of permanent magnet dc motor. P-1547	06
	c.	Define synchros. Write down the types of synchros. P-1552	02
	d.	Make a comparison between VR stepper motor and SR motor. P-1559	02

$$\beta = \frac{N_s - N_r}{N_s \cdot N_r} \times 360^\circ$$

$$\beta = \frac{360^\circ}{m N_r}$$

$$\beta = \frac{N_s - N_r}{N_s \cdot N_r} \times 360^\circ$$

$$\beta = \frac{360^\circ}{m N_r}$$

resolution = No. of steps / revolution

$= 360^\circ / \beta$

slewing.

$$n = \frac{\beta \times f}{360^\circ} \text{ r.p.s}$$

Patuakhali Science and Technology University

B.Sc. Engg. (CSE) Level-2 Semester-1 Final Examination-2017 (January- June)

Course Code: EEE 211 Course Title: Electrical Technology

Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any 5 of the following questions

1. (a). Show the significance of back e.m.f. in motor action. 3
   (b). Justify the condition for maximum power of a motor with electric theories. 4
   (c). Compare the operating principle of generator and motor in applications. 3
   (d). A 20 kW, 250 V d.c. shunt generator has armature and field resistance of 0.04 Ω and 200 Ω respectively. Determine the total armature power developed when working as a motor taking 25 kW input. 4

2. (a). Show the comparison between series motor and shunt motor based on the characteristics and applications. 4
   (b). Show the characteristics curves of T_a/I_a , N/I_a for series motor with proper justifications. 4
   (c). Prove that the relationship as $N \propto \frac{E_b}{\phi}$. 3
   (d). A d.c. motor takes an armature current of 120 A at 460 V. The armature circuit resistance is 0.1 Ω. The machine has 4-poles and the armature is lap connected with 846 conductors. The flux per pole is 0.05 Wb. Calculate the speed and armature torque for the motor. 3

3. (a). How speed can be controlled of a shunt motor? 3
   (b). Define electric generator. Describe construction and working of a simple loop generator. 2
   (c). Define simplex lap winding and wave winding. 3
   (d). Describe the reasons of parallel operation of shunt generators. 2
   (e) What are the differences between dc generator and alternator?

4. (a). Explain different transformer tests for finding parameters. 5
   (b). Derive the E.M.F. equation of a transformer. 3
   (c). Draw different three-phase transformer connections. 3
   (d). A 50 kVA, 2200/110-V, 50 Hz transformer has a high voltage winding resistance 0f 0.1 Ω and a leakage reactance of 0.22 Ω. The low voltage winding resistance is 0.035 Ω and the leakage reactance is 0.012 Ω. Find the equivalent winding resistance, reactance and impedance reffered to the (i) high voltage side and (ii) the low voltage side. 3

5. (a). A 800-kVA, 3 phase,50 Hz transformer has a voltage ratio of 33/11 kV and is delta/star connected. The resistances per phase are: high voltage 35 Ω, low voltage 0.876 Ω and the iron loss is 3000 W. Calculate the value of efficiency at full load and one-half of full load respectively (i) at unity p.f and (ii) 0.7 p.f. 4
   (b). Sketch the detailed construction of alternator. Write down the advantages of stationary armature. 4
   (c). Explain construction, working, performance, speed control, advantages, disadvantages and applications of permanent magnet dc motor. 6

6. (a). Describe construction and modes of operation of variable reluctance stepper motor. 4
   (b). What is servomotor? What are the features of application of servomotor? Explain AC servomotor. 4
   (c). A shunt generator delivers 195 A at terminal voltage of 250 V. The armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950 W. Find: (a) EMF generated (b) Cu losses (c) Output of the prime mover (d) commercial, mechanical and electrical efficiencies. 4
   (d). Draw the equivalent circuit of a transformer. 2