Total No. of Questions – [5] Total No. of Printed Pages: 4

G.R. No.	

Paper Code - U127-104B (ESE)

MAY 2018/ ENDSEM

F. Y. B. TECH. (COMMON) (SEMESTER - II)

COURSE NAME: BASIC ELECTRICAL ENGINEERING

COURSE CODE: 10174B

(2017 PATTERN)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4 and Q.5.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Assume suitable data wherever required.**

Q.1) a) A 8 pole wave wound DC shunt motor has 400 conductors and draws a line current of 12 A from the supply. Its field winding takes a current of 2 A. If the flux per pole is 0.05 Wb, calculate the torque developed by an armature and speed of the motor if the back emf developed by motor is 200 V. **[6]**

b) Draw and explain torque-armature current, speed-armature current and speed-torque characteristics of a dc shunt motor. **[6]**

c) Explain function of commutator and brushes in D.C. Generator and state material used for these components. **[4]**

OR

Q.2) a) Derive the torque equation of a dc motor with usual notations. **[6]**

b) A 4 pole wave connected DC shunt generator has 600 armature conductors and runs at 1200 rpm. This generator has a flux per pole of 6 mWb. Calculate i) the emf induced in the above dc generator ii) Find the speed at which it should be driven to produce the same emf when lap connected **[6]**

c) State any two significant applications of i) dc shunt motor ii) dc series motor. **[4]**

Q.3) a) A 6 pole, 3-phase squirrel cage induction motor operates from a 400 V three phase ac supply whose frequency is 50 Hz. Calculate: **[4]**

i. Synchronous speed of the motor
ii. Speed of the motor when the slip is 0.04
iii. Frequency of the rotor current when the slip is 0.03
iv. Frequency of the rotor current at standstill

b) State any two applications of i) squirrel cage and ii) slip ring three phase induction motors. **[4]**

c) Write a note on resistance split phase single phase induction motor with respect to the following points: i) Neat circuit diagram with proper labels ii) Advantages iii) Disadvantages iv) Applications **[6]**

OR

Q4) a) A three phase slip ring induction motor is wound for 4 poles and is supplied from 415 V, 50 Hz three phase ac supply. Calculate:

i. Synchronous speed
ii. Rotor speed, when slip is 8%
iii. Rotor frequency and percentage slip when rotor runs at 1200 rpm **[4]**

b) Draw torque-slip characteristics of three phase induction motor and indicate starting torque and full load torque on it. **[4]**

c) Explain why single-phase induction motor is not self-starting. How is it made self-starting? State any two types of single-phase induction motor. **[6]**

Q.5) Attempt following multiple choice questions: **[10x2=20 marks]**

a) For a series R-L circuit if R is 20 Ω, X_L is 15 Ω then power factor of this circuit will be: **[2]**

i. 0.8 leading
ii. zero lagging
iii. 0.8 lagging
iv. zero leading

b) For a series R-C circuit if R is 8 Ω, C is 0.05 F and supply frequency is 50 Hz then total impedance Z of this circuit in Ω will be: **[2]**

i. 8 + j 0.064

ii. 8 - j 0.064

iii. 8 - j 15.70

iv. 8 + j 15.70

c) According to Kirchhoff's voltage law in any closed loop of a network **[2]**

i. The algebraic sum of all the e.m.f.s is zero

ii. The algebraic sum all the voltage drops is zero

iii. The algebraic sum of all e.m.f.s and voltage drops is zero

iv. The algebraic sum of all currents is zero

d) For a single phase A.C. circuit if the supply voltage is 200 V, current is 2 A and phase angle Φ is 90^0 then the reactive power will be **[2]**

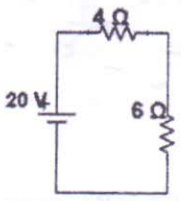
i. 400 VAR

ii. Zero

iii. 57.5 VAR

iv. 92 VAR

e) Find voltage drop across 6Ω resistance in the following circuit. **[2]**



i. 20 V

ii. 10 V

iii. 27 V

iv. 12 V

f) The transformation ratio of a single phase 200 V/100 V, 1KVA transformer is _____. [2]

i. 1

ii. 1.15

iii. 2

iv. 0.5

g) In a three phase symmetrical AC circuit, the phasor sum of all three voltages at any instant is: [2]

i. infinity

ii. zero

iii. one

iv. none of the above

h) A transformer has 70 turns on secondary and maximum flux in core is 0.06 Wb. If supply frequency is 60 Hz, induced e.m. f. in secondary will be: [2]

i. 932.4 V
ii. 1118.88 V
iii. 1776 V
iv. 1276 V

i) Full load Copper loss of a transformer is 1000 W. At half load, the copper loss will be: [2]

i. 500 W

ii. 1000 W

iii. 250 W

iv. 4000 W

j) The two-wattmeter method is applicable for measurement of power in [2]

i. Both star connected and delta connected balanced load.

ii. Only delta connected unbalanced load.

iii. Both star connected and delta connected balanced and unbalanced load.

iv. None of these.