Total No. of Questions – [5]

Total No. of Printed Pages: 4

G.R. No.	

Paper code- U128-104B (CBE-FF)

MAY 19 / BACKLOG

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

COURSE NAME: BASIC ELECTRICAL ENGINEERING

COURSE CODE: 10174B

(2017 PATTERN)

[Max. Marks: **50**]

Time: [**2 Hours**]

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

b) A 6 pole wave connected DC shunt generator has 800 armature conductors and runs at 1500 rpm. This generator has a flux per pole of 8 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]**

OR

Q.2) a) Derive an emf equation of a dc generator with usual notations. **[6]**

b) A 4-pole DC shunt motor takes 10A from 200V supply. The armature and field resistances are 0.8 Ω and 200 Ω respectively. The armature is wave connected with 300 conductors. If the flux per pole is 10 mWb, calculate the speed and gross torque developed. **[6]**

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

Q.3) a) A 4 pole, 3-phase squirrel cage induction motor operates from a 415 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 0.05

iii. Frequency of the rotor current when the slip is 0.02

iv. Frequency of the rotor current at standstill

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

c) Differentiate between squirrel cage and slip ring type of induction motor. (Any 6 significant points) **[6]**

OR

Q4) a) A three phase slip ring induction motor is wound for 6 poles and is supplied from 400 V, 50 Hz three phase ac supply. Calculate:

i. Synchronous speed

ii. Rotor speed, when slip is 5%

iii. Rotor frequency and percentage slip when rotor runs at 900 rpm **[4]**

b) Explain why single-phase induction motor is not self-starting. How is it made self-starting? **[4]**

c) Write a note on capacitance start capacitor run single phase induction motor with respect to the following points:

i) Neat circuit diagram with proper labels ii) Advantages iv) Applications **[6]**

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

a) For a single phase A.C. circuit if the supply voltage is 220 V, current is 3 A and phase angle Φ is 60^0 then the active power will be: **[2]**

i. 330 W

ii. Zero

iii. 330 VA

iv. 330 VAR

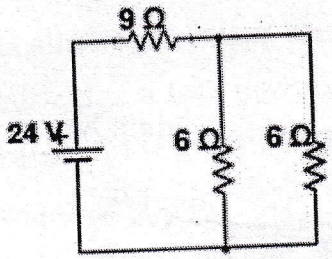
b) For a series R-C circuit if R is 10 Ω, X_C is 8 Ω then power factor of this circuit will be: [2]

i. 0.99 leading
ii. zero lagging
iii. 0.99 lagging
iv. zero leading

c) For a series R-L circuit if R is 3 Ω, L is 0.1 H and supply frequency is 50 Hz then total impedance Z of this circuit in Ω will be: [2]

i. 3 + j 0.032
ii. 3 - j 31.42
iii. 3 - j 0.032
iv. 3 + j 31.42

d) Total current in the given network is : [2]



i. 3 A
ii. 1 A
iii. 2 A
iv. 4 A

e) If three resistances each of 2 Ω are connected in star then value of each resistance in equivalent delta connection is: [2]

i. 3 Ω
ii. 1Ω
iii. 2Ω
iv. 6Ω

f) Full load current on secondary side of a single phase 100 V/220 V,

i. 4.54 A

ii. 10 A [2]

iii. 45.45 A

iv. 100 A

g) A transformer has 40 turns on secondary and maximum flux in core is 0.06 Wb. If supply frequency is 50 Hz, induced e.m. f. in secondary will be: [2]

i. 5328 V

ii. 5.328 V

iii. 53.28 V

iv. 532.8 V

h) Half load Copper loss of a transformer is 500 W. At full load, the copper loss will be: [2]

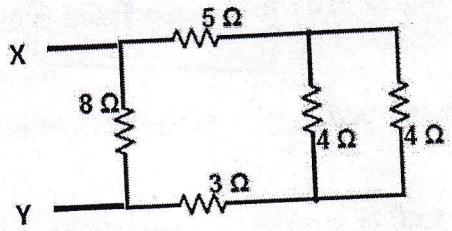
i. 500 W

ii. 1000 W

iii. 2000 W

iv. 4000 W

i) Equivalent resistance between terminals XY: [2]



i. 8

ii. 24

iii. 16

iv. 4

j) Phase angle of current in single phase series R-C circuit is [2]

i. -ve

ii. +ve

iii. 0^0

iv. none of the above