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

G.R. No.	

Paper Code - U127 - 10174B (RE - FF FS)

JUNE 2018/ RE-EXAM

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) **Use suitable data wherever required**

Q.1) a) Derive torque equation for obtaining gross torque developed by a D.C. motor. **[6]**

b) A 230 V, 4 pole, D.C. shunt motor has a wave winding with 600 conductors. Under certain load conditions, motor draws a current of 75 A and runs at 1200 rpm. The armature and shunt field resistances are 0.2 Ω and 75 Ω respectively. Calculate flux per pole and armature torque developed. Neglect brush voltage drop in the motor. **[6]**

c) Derive equation for induced EMF in a D.C. generator. **[4]**

OR

Q.2) a) A 250 V, 4 poles, wave wound, D.C. shunt motor has 782 conductors and 25 mWb flux per pole. If armature resistance is 0.75 Ω, calculate armature torque developed when armature current is 40 A. Also calculate speed. **[6]**

b) Draw torque-armature current, speed- armature current and speed-torque characteristics of a dc shunt motor and state it's any 3 applications. **[6]**

c) The lap connected armature of a 4 pole generator has 400 conductors and runs at 300 rpm. If generated EMF is 200 V, Calculate the useful flux per pole. If the armature is now wave connected, with the same flux, calculate generated EMF. **[4]**

Q.3) a) A 4 pole, 3 phase, 50 Hz induction motor runs at 1440 rpm. Calculate its slip in percentage. Also calculate the frequency of the induced EMF in the rotor circuit. **[4]**

b) Write any two advantages and two disadvantages for a capacitor start single phase induction motor. **[4]**

c) A 6 pole, 3 phase induction motor is connected to a 50 Hz supply. Calculate

(i) Synchronous speed

(ii) The rotor speed when slip is 4 per cent

(iii) The rotor frequency when the rotor is running at 1425 rpm. **[6]**

OR

Q4) a) Draw and explain the torque- slip characteristics of a 3 phase induction motor. **[4]**

b) A 3 Phase, 4 pole induction motor is connected to a 50 Hz supply. If frequency of rotor EMF at full load is 3 Hz, find full load slip and full load speed of motor. **[4]**

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

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

a) Three resistances each of equal value R are connected in star formation. The equivalent delta formation will have three resistances of equal value which is **[2]**

i. R/3

ii. 3R

iii. 2R/3

iv. R/2

b) For a series R-L circuit if R is 4 Ω, L is 0.2 H and supply frequency is 50 Hz then total impedance Z in Ω will be: **[2]**

i. 4 + j 62.83

ii. 4 - j 62.83

iii. 4 - j 0.0159

iv. 4 + j 0.0159

c) If two resistances each of 5 Ω are connected in parallel across a voltage source of 10 V, then the current in each resistance will be **[2]**

i. 1.5 A

ii. 4.5 A

iii. 2 A

iv. 1 A

d) For a single phase A.C. series circuit if the supply voltage is 230 V, current is 4 A and phase angle $\Phi = 90^0$ then the active power will be: **[2]**

i. 920 VAr

ii. Zero

iii. 57.5 VAr

iv. 92 VAr

e) If three resistances each of 9 Ω are connected in delta, value of each resistance in equivalent star connection is _____ **[2]**

i. 9 Ω

ii. 3 Ω

iii. 27 Ω

iv. 18 Ω

f) The transformation ratio of a single phase 130 V/260 V, 1KVA transformer is _____. [2]

i. 1
ii. 2
iii. 4
iv. 0.86

g) The peak value of an A.C. sinusoidal current is $20\sqrt{2}$ A. Its RMS value is: [2]

i. $20\sqrt{2}$ A
ii. 10 A
iii. 20A
iv. Data not sufficient

h) The readings of wattmeter connected on supply side and load side are 100 W and 80 W respectively during a direct loading test of a 115 V /230 V transformers having a capacity of 1 KVA. The efficiency will be [2]

i. 85%
ii. 80%
iii. 86.6%
iv. None of the above

i) In _____ type transformer, multiple cores are used. [2]

i. core
ii. shell
iii. berry
iv. none of the above

j) While applying Thevenin's theorem to given circuit, equivalent resistance R_{eq} is found [2]

i. By removing voltage sources along with their internal resistance
ii. By short-circuiting the load terminals
iii. By considering only one source at a time
iv. By observing the circuit from open circuited load terminals and all sources being replaced by their internal resistances