(II)

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

G.R. No.	

Paper Code :- U117-104B (FF&F)

DECEMBER 2017 / ~~ENDSEM~~ RE-EXAM

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

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) An 8-pole, lap wound armature rotating at 450 rpm is required to generate 260 V. If the useful flux per pole is 0.02751 Wb and the armature has 140 slots, calculate the number of conductors per slot. **[6]**

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

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

OR

Q.2) a) Draw torque-armature current, speed-armature current and speed-torque characteristics of a dc shunt motor. **[6]**

b) A 4 pole, wave wound dc shunt motor with 65 slots with 6 conductors per slot has a useful flux per pole of 0.02 Wb. The armature resistance is 0.15 Ω. Calculate the motor speed when the motor is operating from 250 V dc supply and armature is taking a current of 60 A. **[6]**

c) A 4 pole, lap connected dc generator has 600 armature conductors and runs at 1200 rpm. This generator has a total flux of 24 mWb in it. Calculate the emf induced in the dc generator. What will be the emf generated if the generator has wave winding? **[4]**

Q.3) a) Differentiate between slip ring and squirrel cage induction motors (any 6 significant points). **[6]**

b) Draw and explain torque-slip characteristics of a three phase induction motor. **[4]**

c) A 4 pole, three phase induction motor operates from a 440 V, 50 Hz, three phase ac supply. Calculate:-

i. Speed at which the magnetic field of the stator is rotating.

ii. Speed of the rotor when tile slip is 0.04

iii. Frequency of the rotor currents when the slip is 0.03.

iv. Frequency of the rotor currents at standstill **[4]**

OR

Q4) a) 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]**

b) State any two advantages of squirrel cage and slip ring type of rotor used in three phase induction motor. **[4]**

c) A three phase slip ring induction motor is wound for 6 poles and is supplied from 440 V, 50 Hz, three phase ac supply. Calculate:

i. Synchronous speed

ii. Rotor speed, when slip is 4%

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

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

a) If two resistances, each of 30 Ω are connected in parallel across a voltage source of 15 V, then the current in each resistance will be **[2]**

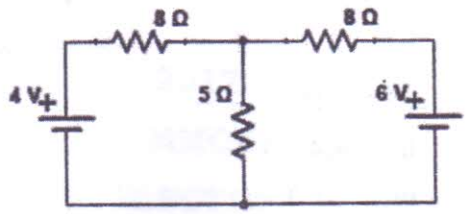
i. 2 A

ii. 0.5 A

iii. 1.5 A

iv. 1 A

b) For a given network as shown below, considering 5 Ω as a load resistance, the value of R_{eq} using Thevenin's theorem is [2]



i. 2Ω
ii. 4.5Ω
iii. 1.5Ω
iv. 4Ω

c) For a series R-L circuit if R is 10 Ω, L is 0.1 H and supply frequency is 50 Hz, total impedance Z in Ω will be: [2]

i. 10 + j 0.1
ii. 10 - j 31.42
iii. 10 - j 0.1
iv. 10 + j 31.42

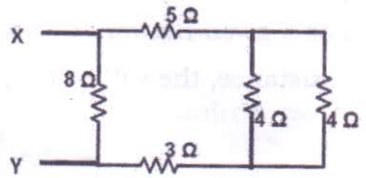
d) The peak value of an ac sinusoidal current is 14.14 A. Its rms value is: [2]

i. 1.414 A
ii. 14.14 A
iii. 10 A
iv. $10\sqrt{2}$ A

e) For series R-L circuit if total applied voltage is 230 V, current is 3.88 A and phase angle $\Phi = 32.48^0$, the active power will be: [2]

i. 780.26 W
ii. 752.8 W
iii. Zero
iv. 75.28 W

f) The equivalent resistance between terminals X and Y for the network shown in fig. below is [2]



i. 2 Ω

ii. 4.44 Ω

iii. 18 Ω

iv. 4.55 Ω

g) The power in a three phase star connected balanced load is _____ times the power in the same load connected in delta. **[2]**

i. two

ii. three

iii. one third

iv. one half

h) In the phasor diagram drawn in case of a three phase delta connected balanced load, the angle between V_L and V_{ph} is **[2]**

i. 0^0

ii. 60^0

iii. 30^0

iv. 120^0

i) The reading of wattmeters connected on supply side and load side are 100 W and 90 W respectively during a direct loading test of a 110 V/220 V transformers having a capacity of 1 KVA. The efficiency will be **[2]**

i. 90 %

ii. 97.56 %

iii. 86.6 %

iv. Data insufficient

j) If a transformer working on 60 Hz with 70 turns on secondary has maximum flux in core as 0.06 Wb, secondary induced emf i: **[2]**

i. 932.4 V

ii. 1118.88 V

iii. 1776 V

iv. 1276 V