G.R. No. [   ]   Paper Code – U127-104B(RE-F& FF)

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) A 6-pole DC shunt motor takes 12A from 200V supply. The armature and field resistances are 0.6 Ω and 100 Ω respectively. The armature is wave connected with 300 conductors. If the flux per pole is 15 mWb, calculate the speed and gross torque developed.   [6]

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

c) State types of DC motors.   [4]

OR

Q.2) a) A 4-pole, lap wound armature rotating at speed of 600 rpm is required to generate 200 V. If the useful flux per pole is 0.04 Wb and the armature has 100 slots, calculate the number of conductors per slot.   [6]

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

c) Explain significance of back emf and necessity of starter in a DC motor.   [4]

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

b) 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 800 rpm **[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   iii) Disadvantages

iv) Applications **[6]**

OR

Q4) a) Explain working principle of three phase induction motor. **[4]**

b) A 5 HP, three- phase, 4 pole, 400 V, 50 Hz induction motor runs at 1400 rpm. What will be the frequency of the rotor- induced EMF? **[4]**

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

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

a) Three resistances of 50 Ω each are connected in star and supplied from 400 V, 50 Hz supply. The phase voltage will be: **[2]**

    i.   250.58 V

    ii.   200.37 V

    iii. 230.94 V

    iv. 280.55 V

b)   For a series R-C circuit if R is 10 Ω, X_C is 30 Ω then power factor of **[2]** series R-C circuit will be:

    i.   0.2 lagging

    ii.   0.2 leading

    iii. 0.32 lagging

    iv. 0.32 leading

c) If two resistances each of 6 Ω are connected in parallel across a   **[2]**
voltage source of 18 V, then total current will be

    i. 6 A

    ii. 5 A

    iii. 2 A

    iv. 1 A

d) For a single phase A.C. circuit if the supply voltage is 200 V, current   **[2]**
is 1 A and power factor angle, Φ is 0^0 then the true power will be:

    i. 200 W

    ii. Zero

    iii. 200 VAR

    iv. 200 VA

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

    i. 3 Ω

    ii. 1Ω

    iii. 2Ω

    iv. 6Ω

f) Full load current on primary side of a single phase 100 V/220 V,   **[2]**
10KVA transformer is _____.

    i. 100 A

    ii. 10 A

    iii. 1000 A

    iv. 1 A

g) Match the pairs [2]

Type of transformer   Particular

1. Core type   R. Winding surrounds core

2. Shell type   Y. Core surrounds winding

3. Berry type   B. Yoke radiates out

   i.   1-R, 2-Y, 3-B
   ii.   1-Y, 2-R, 3-B
   iii. 1-B, 2-Y, 3-R
   iv. 1-R, 2-B, 3-Y

h) The reading of wattmeters connected on supply side and load side are [2] 320 W and 280 W respectively during a direct loading test of a 110 V /220 V transformers having a capacity of 1 KVA. The efficiency will be

   i. 50%

   ii. 100%

   iii. 87.5%

   iv. None of the above

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

   i. -ve

   ii. +ve

   iii. 0^0

   iv. none of the above

j) The full load regulation of a transformer is 4.5%. If secondary voltage on nameplate is mentioned as 240 V, the full load voltage is [2]

   i. 240 V

   ii. 120 V

   iii. 229 V

   iv. Data insufficient