

Total No. of Questions – [5]

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Paper Code - U119-104B (BE-ES)

DEC. 2019/END SEMESTER EXAM (Backlog)

F. Y. B. TECH. (COMMON) (SEMESTER – I/II)

COURSE NAME: BASIC ELECTRICAL ENGINEERING

COURSE CODE: ET10174B

(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 the torque equation of a dc motor with usual notations. [6]
b) Draw a neat diagram of a three-point starter and label its various parts. [6]
c) A 4-pole lap connected dc generator has 600 armature conductors and runs at 1200 rpm. This generator has a flux per pole of 24 mWb. Calculate i) the emf induced in the dc generator and ii) the speed at which it should be driven to produce the same emf when wave connected. [4]

OR

- Q.2) a) Draw and explain torque-armature current, speed-armature current and speed-torque characteristics of a dc shunt motor. [6]
b) An 8 pole, 400V, shunt motor has 900 wave connected armature conductors. The full load armature current is 40A, and flux per pole is 0.02Wb. The armature resistance is 0.1 Ω and the contact drop is 1V per brush. Calculate the full load speed of the motor. [6]
c) State function of commutator and brushes in D.C. Generator along with material used it during its manufacturing. [4]
- Q.3) a) Differentiate between slip ring and squirrel cage type of an induction motor (any 6 significant points). [6]
b) State any two applications of squirrel cage and slip ring type three phase induction motors. [4]
c) 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. Speed of the motor when the slip is 0.04
ii. Frequency of the rotor current when slip is 0.03

OR

- Q.4) a) Write a note on capacitor start single phase induction motor [6]
with respect to following points: -
i. Neat circuit diagram with proper labels
ii. Applications
- b) Draw and explain in brief torque-slip characteristics of a three- [4]
phase induction motor.
- c) A three-phase slip ring induction motor is wound for 4 poles [4]
and is supplied from 415 V, 50 Hz three phase ac supply.
Calculate:
i. Synchronous speed
ii. Rotor speed, when slip is 8%

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

- a) If two resistances each of $30\ \Omega$ are connected in series across a [2]
voltage source of 15 V, then the voltage across each resistance
will be
i. 2 V
ii. 7.5 V
iii. 15 V
iv. 0.5 V
- b) Which among the following is true about Ohm's law? [2]
i. $I \propto V$
ii. $I = V/R$
iii. $V = IR$
iv. All of these
- c) According to Kirchhoff's voltage law in any closed loop of a [2]
network
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 series R-C circuit if R is $8\ \Omega$, C is 0.05 F and supply [2]
frequency is 50 Hz then total impedance Z of this circuit in Ω
will be:
i. $8 + j\ 0.064$
ii. $8 - j\ 0.064$
iii. $8 - j\ 15.70$
iv. $8 + j\ 15.70$
- e) For a series R-L circuit if R is $20\ \Omega$, X_L is $15\ \Omega$ then power factor [2]
of this circuit will be:
i. 0.8 leading
ii. zero lagging
iii. 0.8 lagging
iv. zero leading

- f) In a series resonating circuit, resonance occurs when? [2]
- i. $X_L = 1$
 - ii. $X_C = 1$
 - iii. $X_L = X_C$
 - iv. $X_L = -X_C$
- g) In the phasor diagram drawn in case of a three-phase star connected balanced load, the angle between V_L and V_{ph} is [2]
- i. 0°
 - ii. 60°
 - iii. 30°
 - iv. 120°
- h) 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.
- 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) A transformer has 70 turns on secondary and maximum flux in core is 0.06 Wb. If it is working on a 50 Hz frequency, induced emf in secondary will be [2]
- i. 932.4 V
 - ii. 1118.88 V
 - iii. 1776 V
 - iv. 1276 V