Total No. of Questions – [10] Total No. of Printed Pages: 3

G.R. No.	

U118-102(ESE)

DECEMBER 2018 / END-SEM

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

COURSE NAME: BASIC ELECTRICAL ENGINEERING

COURSE CODE: ET 10182A

(PATTERN 2018)

Time: [2 Hours] [Max. Marks: 50]

(*) Instructions to candidates:

1) **Attempt Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9 and Q.10**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data where ever required.**

Q 1) a) Find current in 5 Ω resistance for circuit shown in figure 1 using Superposition Theorem. **[4]**

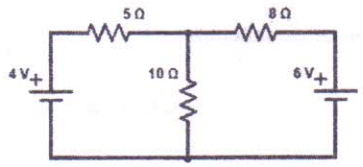

Fig. 1

OR

b) Find current in 5 Ω resistance for circuit shown in figure 1 using Thevenin's Theorem. **[4]**

Q 2) a) Draw impedance triangle and write formula for impedance and phase angle and nature of p.f. for series R-L circuit. **[4]**

OR

b) A series R-C circuit of resistance 8Ω, of capacitance 50μF is connected across 230V, 50Hz single phase ac supply. Calculate: i) impedance and ii) power factor of circuit **[4]**

Q 3) a) State any two advantages, disadvantages and relevant applications of single phase autotransformers. **[6]**

OR

b) Derive e.m.f. equation of single phase transformer. State expressions for e.m.f. induced in primary and secondary winding **[6]**

Q 4) a) State in brief the functions of following parts of an underground cable:
i. Core ii. Insulation iii. Metallic sheath iv. Bedding v. Armouring vi. Serving **[6]**

b) An electric pump lifts 1.2 m^3 of water per minute to a height of 15 m. If its overall efficiency is 60 %, find the input power. If the pump is used for 4 hours a day, find the daily cost of energy at the rate of Rs. 2.25 per unit. **[4]**

OR

Q 5) a) In a residential flat, following is the usage of various electrical appliances during a day.

i. 4 fluorescent tubes each of 40 W for 5 hours
ii. 2 kW electric geyser for 1 hour
iii. 800 W electric iron for 45 minutes
iv. Other miscellaneous load of 500 W for 3 hours

Estimate the electricity bill for this residential flat for a month of 30 days at the rate of Rs. 3.5 per unit. **[6]**

b) State any four essential features of a switchgear. **[4]**

Q 6) a) An 8-pole, lap wound armature of a generator is rotated at 450 rpm 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) Draw speed- armature current and torque-armature current characteristics of a dc shunt moto. **[4]**

OR

Q 7) a) A 4-pole DC shunt motor takes 22 A from 220 V supply. The armature and field resistances are 0.5 Ω and 100 Ω respectively. The armature is lap connected with 300 conductors. If the flux per pole is 20 mWb, calculate the speed and gross torque. **[6]**

b) Explain in brief classification of dc machines **[4]**

Q 8) a) Differentiate between slip ring and squirrel cage induction motor with respect to following points

i. Rotor construction
ii. Starting torque
iii. Maintenance requirement
iv. Cost
v. Losses
vi. Efficiency **[6]**

b) Draw power flow diagram in case of a three phase induction motor. **[4]**

OR

Q 9) a) Write a note on capacitor start 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) A 4 pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate;

i. the speed at which the magnetic field of the stator is rotating.
ii. the speed of the rotor when tile slip is 0.04.
iii. the frequency of the rotor current when the slip is 0.03.
iv. the frequency of the rotor current at standstill [4]

Q 10) Answer the following multiple choice questions (1 X 6) [6]

a) The laminated construction is used to reduce
i. copper losses
ii. hysteresis loss
iii. eddy current losses
iv. friction and windage losses

b) The nature of speed-torque characteristics of a DC series motor is _____ .
i. a straight line
ii. parabolic
iii. exponential
iv. rectangular hyperbola

c) Which of the following is the correct expression for gross torque developed by armature in case of a lap wound DC motor.
i. $0.159Z\Phi Ia$
ii. $0.159 (PZ/2) \Phi Ia$
iii. $0.159 (2PZ) \Phi Ia$
iv. $0.159 (PZ/2N) \Phi Ia$

d) Find the number of poles required, when the frequency is 50Hz and synchronous speed of the motor is 500 rpm
i. 10
ii. 12
iii. 24
iv. 6

e) At stand still condition of an induction motor, the value of slip is
i. 1
ii. 0
iii. infinite
iv. between 0 and 1

f) A single-phase induction motor is
i. inherently self-starting with high torque
ii. inherently self-starting with low torque
iii. inherently non-self-starting with low torque
iv. inherently non-self-starting with high torque