

END TERM EXAMINATION

FIRST SEMESTER [B.TECH] DECEMBER 2024-JANUARY 2025

Paper Code: ES-107

Subject: Electrical Science

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

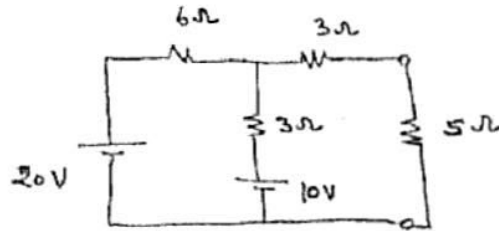
Q1 Attempt all parts:-

(6x2=12)

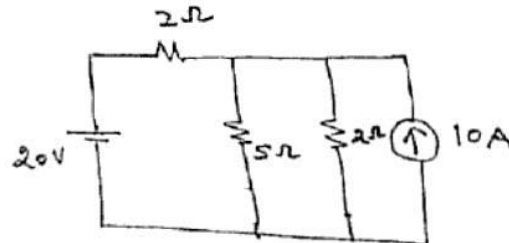
- (a) Write limitation of Maximum Power Transfer Theorem.
- (b) Compare series and Parallel Resonance.
- (c) Write applications of moving iron instruments?
- (d) Write name of four parts of DC machine?
- (e) Write applications of Synchronous Motor.
- (f) Find condition for maximum efficiency of Transformer.

UNIT-I

- Q2 (a) State and Prove Super Position Theorem. (6)
 (b) Calculate current in 6ohm resistance in the circuit shown below using mesh current analysis and verify the answer using Norton's Theorem. (6)



- Q3 (a) State and prove Maximum Power Transfer Theorem. (6)
 (b) Calculate current in 2 ohm resistance in the circuit shown below using node voltage analysis and verify the answer using Thevenin's Theorem. (6)



UNIT-II

- Q4 (a) Calculate impedance, power factor, quality factor of coil, active power, reactive power and apparent power consumed by electric load which is connected with voltage $v = 200 \sin 314t$ and it draw current $i = 20 \sin (314t - 30^\circ)$. (6)
 (b) In RLC series circuit draw curve of reactance, impedance, current and voltages along elements as a function of frequency. (6)

- Q5 (a) Calculate overall current and power factor of the circuit which has two parallel branches and connected with 200V ac supply. The impedance of one branch is $(3+j4)$ ohm and impedance of second branch is $(5-j5)$ ohm. (6)
- (b) A three-phase delta connected circuit has per phase impedance of $Z = (5 + j5)$ ohm and connected with 440V supply. Calculate the line voltage, phase voltage, line current, and phase current and complex power of circuit. (6)

UNIT-III

- Q6 (a) Explain constructional features, working principals and applications of Three Phase Induction motor. (6)
- (b) Draw the circuit diagram and discuss speed control of DC shunt motor. (6)
- Q7 (a) Explain constructional features, working principals and applications of DC shunt motor. (6)
- (b) Draw the circuit diagram and discuss working of star delta starter used for three phase induction motor. (6)

UNIT-IV

- Q8 (a) With the help of circuit diagram explain working of autotransformer, also write its applications. (6)
- (b) A 200 kVA, 1000/200V transformer has 2 kW hysteresis loss and 2 kW eddy current loss. When it is working at fullload, the copper losses are 8 kW. Calculate maximum efficiency of transformer and the load at which maximum efficiency occurs. <https://www.ggsipuonline.com> (6)
- Q9 Explain constructional features, working principal and applications of the following:- (2x6=12)
- (a) Moving iron voltmeter.
- (b) PMMC instruments.
