(Please write your Exam Roll No.) Exam Roll No. .....

# 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.**

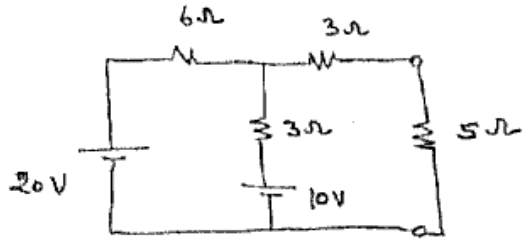
Q1 Attempt all parts:- **(6x2=12)**

(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 SynchronousMotor.
(f) Find condition for maximum efficiency of Transformer.

## UNIT-I

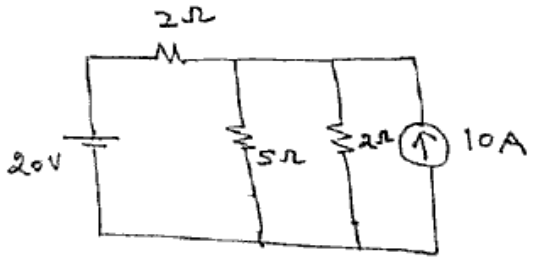
Q2 (a) State and Prove Super Position Theorem. **(6)**

(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$^0$). **(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 powerofcircuit. **(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 loadat which maximum efficiency occurs.  **(6)**

Q9 Explain constructional features, working principal and applications of the following:- **(2x6=12)**

(a) Moving iron volte meter.

(b) PMMC instruments.

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