

Registration No.:

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Total Number of Pages: 02

Integrated Dual Degree (B.Tech and M.Tech)
Sub_Code: 23ES1001

2nd Semester Regular Examination: 2023-24

SUBJECT: Basic Electrical Engineering

BRANCH(S):

AE, AERO, AME, BIOMED, BIOTECH, C&EE, CHEM, CIVIL, CSE, CSEAI, CSEAIME, CSEDS, CSIT, CST, ECE, EEE, ELECTRICAL, ELECTRICAL & C.E, ETC, IT, MECH, METTA, MINING, PT

Time: 3 Hour

Max Marks: 100

Q.Code: P371

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions:

(2 x 10)

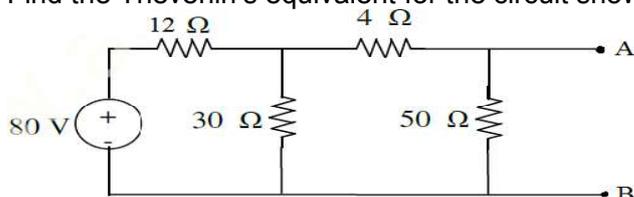
- What is a unilateral circuit? Explain.
- Total current leaving a junction is equal to the total current entering that junction is supported by which law? Justify your answer with reason.
- Write down the formula for a star connected network is converted into a delta network.
- An AC current is given by $i = 10\sqrt{2}\sin 314t$, calculate RMS and Average Values.
- For AC power, draw the Power triangle with proper labeling.
- State maximum power transfer theorem and give one example where this theorem is used.
- Write down the emf equation for DC generator and mention each term in the equation.
- Mention the limitations of the Thevenin's theorem.
- Mention the purpose of laminating the core of a transformer.
- A series R-L-C circuit has $R = 5\Omega$, $L = 0.15\text{mH}$, and $C = 100\mu\text{F}$ and is supplied with 230V, 50Hz single phase. Find impedance and current in the circuit.

Part-II

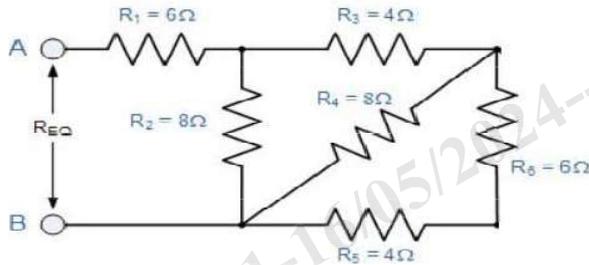
Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6 x 8)

- A resistance R is connected in series with a parallel circuit comprising two resistances of 12Ω and 8Ω respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 20V. Calculate R.
- A three single phase balanced load connected in three phase three wires star form, with the help of phasor diagram, obtain the relationship between line and phase quantities of voltage and current.
- For the single-phase transformer, obtain an expression for EMF induced in either primary side or secondary side.
- Find the Thevenin's equivalent for the circuit shown below



- e) Find the equivalent resistance for the circuit shown below.

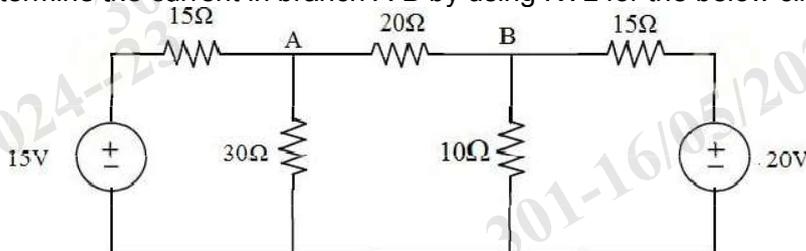


- f) How to control the speed of a D.C. Shunt motor. Explain it with one example.
- g) With neat sketch explain power system structure starting from generation to distribution.
- h) A single-phase transformer has 600 turns on primary winding 1200 turns on secondary winding. If it is operating at 50Hz supply with a maximum flux of 0.055Wb. Find: (I) Primary & Secondary induced EMF (II) EMF induced per turn.
- i) With the help of neat diagram, explain the constructional details of three phase induction motor.
- j) Explain the significance of slip in induction motor. What do you mean by slip speed?
- k) If a coil of 150 turns is linked with a flux of 0.01 Wb when carrying current of 10A, calculate the inductance of the coil. If this current is uniformly reversed in 0.01 second, calculate the induced electromotive force.
- l) Establish the relation between B and H. (B- Flux density, H- Magnetic field strength)

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3 A three phase 400 V, 50 Hz supply is given to three phase induction motor with 4 pole and runs at 1440 rpm. Determine the speed of the rotor flux, frequency of the rotor current and slip. (16)
- Q4 a) Derive the expression for line voltage, phase voltage, line current, and phase current in both 3-phase star and delta connections. (8+8)
- b) Three phase power consumed by the balanced load is given by $P = \sqrt{3}V_L I_L \cos(\phi)$ watts, then show that two wattmeter are sufficient to measure three phase power P.
- Q5 a) Determine the current in branch A-B by using KVL for the below circuit. (8+8)



- b) Explain about Ideal and Practical Current and Voltage sources in detail.
- Q6 a) Calculate the r.m.s. value, the form factor, and peak factor of a periodic voltage having the following values for equal time intervals changing suddenly from one value to the next: 0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, -5, -10 V etc. What would be the r.m.s. value of sine wave having the same peak value? (8+8)
- b) With neat sketch give different types of DC motors.