

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), May 2019

B. Tech. First Year Second Semester

Roll No.....

EE 101: Electrical & Electronics Engineering

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

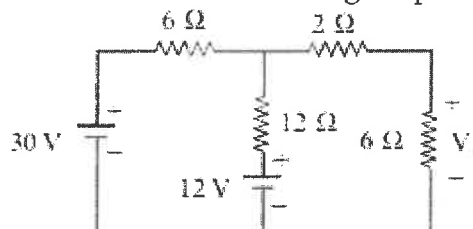
- i. Kirchhoff's law is applicable to (a) Electric circuits (b) Electronic circuits (c) Junctions in a network (d) Closed loop in a network.
- ii. If the effective value of the sinusoidal voltage is 111 V. its average value will be (a) 100 V (b) 123.21 V (c) 156.51 V (d) none of above
- iii. The power dissipated in the pure capacitance of an R-C series circuit will be (a) zero (b) small (c) higher than dissipated in resistance (d) equal to dissipated in resistance
- iv. The power factor at resonance in R-L-C series circuit is (a) zero (b) Unity (c) 0.5 lagging (d) 0.5 leading
- v. While drawing phasor diagram for series circuit, the reference phasor is (a) Voltage (b) Current (c) Power (d) Resistance.
- vi. What is the form factor of pure sine wave? (a) 1.11 (b) 1.414 (c) 1.57 (d) 0.909
- vii. Transformer core is laminated to: (a) Reduce the copper losses (b) Reduce the core losses (c) Reduce the eddy current losses (d) None of these.
- viii. A step-up transformer increases (a) voltage (b) current (c) power (d) frequency.
- ix. When forward bias is applied to a junction diode, it (a) increases the potential barrier (b) decreases the potential barrier (c) reduces the majority-carrier current to zero (d) reduces the minority-carrier current to zero.
- x. Zener diode is used as the main component in dc power supply for: (a) Rectification (b) voltage regulation (c) filter action (d) both (a) and (b).

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- i. State the basis for selecting the node voltage and mesh current techniques for circuit analysis.
- ii. Define form factor and peak factor.
- iii. Distinguish between active and reactive power.
- iv. Explain why a junction between p-type and n-type materials creates a contact potential.

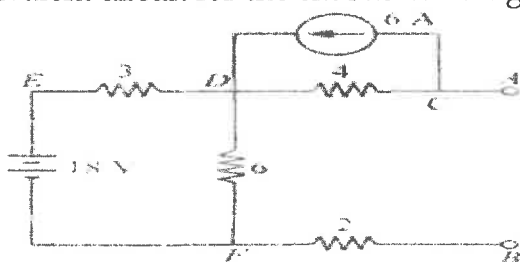
Q.3A Derive the necessary equations for converting a star network into an equivalent delta network. 05

Q.3B Find the voltage V_1 across 6 ohm resistance using loop analysis method. 05



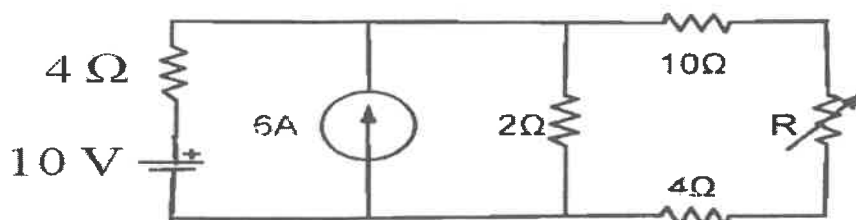
Q.4A State and explain superposition theorem. How is it applied for solving a network? 05

Q.4B Find Thevenin's equivalent circuit for the ckt shown in figure. 05

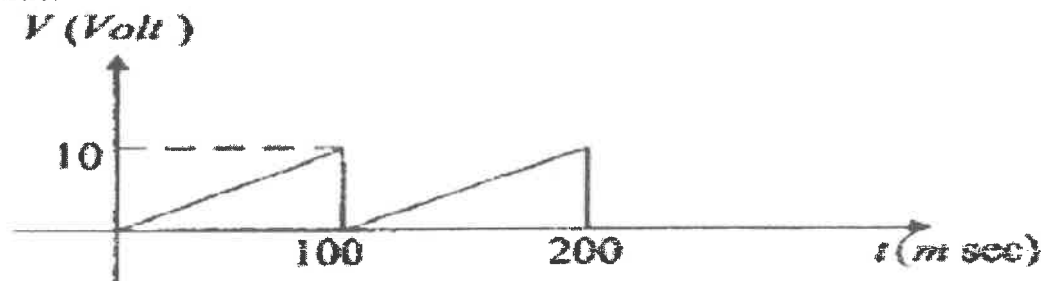


Q.5A State maximum power transfer theorem. 05

Find the magnitude of R for maximum power transfer in the given circuit. Also find out the maximum power transferred.



Q.5B A periodic voltage wave form has been shown in fig. determine: (i) frequency of wave form (ii) wave equation for $0 < t < 100$ m sec. (iii) RMS value (iv) Average value. 05



- Q.6A Explain the construction and working principle of a single phase transformer. 05
- Q.6B A single phase transformer has 500 primary and 1000 secondary turns. The net cross sectional area of the core is 50 cm^2 . If the primary winding is connected to a 50 Hz supply at 400 V, calculate (a) the peak value of the flux density in the core and (b) the voltage induced in the secondary winding. 05

OR

- Q.6B A series RLC circuit consisting of a resistance of 20Ω , inductance 0.2 H and capacitance of $150 \mu\text{f}$ is connected across a 230 V, 50 Hz source. Calculate: (i) the impedance (ii) the current (iii) Power factor (iv) the frequency of supply to be adjusted to make power factor unity. 05

- Q.7A Distinguish between conductors, semiconductors and insulators. 05

- Q.7B Explain the working of a P-N junction diode when it is connected in (i) Forward bias and (ii) Reverse Bias. 05

OR

- Q.7B Describe in detail the working of an NPN bipolar junction transistor. 05

- Q.8 Prove that in a 3-phase delta connected system $I_L = \sqrt{3} I_{ph}$. 10
- A 3-phase, 400 V supply is connected to a 3-phase star balanced load. The line current is 20 A and the power consumed by the load is 12 kW. Calculate the impedance of the load, phase current and power factor.

- Q.9A With the help of V-I characteristics, describe the working principle of Zener diode. Mention also the properties of zener diode when compared to ordinary diode. 10

- Q.9B Define the following for ac waveform terms: (i) Instantaneous value (ii) Root mean square (rms) value (iii) phase angle (iv) Average value. 10
- Also find the resultant voltage $V(t)$ in form $V(t) = V_m \sin(314 t + \Phi)$ of two ac voltages are represented by $V_1(t) = 30 \sin(314 t + 45^\circ)$, $V_2(t) = 60 \sin(314 t + 60^\circ)$.

OR

- Q.9B With the help of block diagram describe the working of (i) a typical TV transmitter (ii) a typical TV receiver. 10