

C25J

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SARDAR PATEL UNIVERSITY
F.Y.B.Sc. (Semester – II) (CBCS) Examination.
Monday, 30th April, 2011.
Instrumentation (Vocational)
US02CINS01
Basic Electronics Instrumentation.

Time: - 3:00 To 5:00 PM

Marks: - 70

Answer of all the questions (Including multiple choice questions) should be written in the answer book only.

Q.1 Select the correct option. (Attempt all)

(10)

- 1 Inductive reactance is a function of _____
(a) Inductance of coil. (c) Wave shape of AC signal.
(b) Current passing from coil. (d) All of above.
- 2 The frequency of AC signal depends on
(a) Amplitude of signal. (c) Phase angle of signal.
(b) Periodic time of signal. (d) All of above.
- 3 Algebraic sum of the current entering and leaving the junction is always....
(a) Positive. (c) Negative.
(b) Zero. (d) None of above.
- 4 The Resonance frequency of the series resonance circuit do not depends on _____
(a) Capacitance of capacitor. (c) Inductance of the coil.
(b) Quality factor. (d) None of above.
- 5 The phase difference between the voltage and current in an ideal capacitive circuit is...
(a) $+90^\circ$ (c) -90°
(b) 0° (d) None of above.
- 6 The quality factor of the series resonance circuit is lowered due to....
(a) Coil resistance. (c) Leakage through capacitor.
(b) Loading on resonance circuit. (d) All of above.
- 7 The average value of the sinusoidal signal is.....
(a) $0.5 V_m$. (c) $0.707 V_m$.
(b) $1.1 V_m$. (d) $0.636 V_m$.
- 8 For maximum power transfer the resistance of load circuit should be....
(a) Equal to source resistance. (c) Less than source resistance.
(b) More than source resistance. (d) All of above.
- 9 An ideal inductor has _____ coil resistance.
(a) High. (c) Low.
(b) Zero. (d) None of above.
- 10 If the two signals are in phase opposition then what is the phase difference between them?
(a) 360° (c) 180°
(b) 90° (d) 0°

Q2 Answer the following questions (Any ten) (20)

- (1) What is a network?
- (2) State Norton theorem and draw Norton equivalent circuit.
- (3) Differentiate between Resistance and Reactance.
- (4) Define form factor.
- (5) Which factors determines the energy stored by the capacitors?
- (6) State Kirchhoff's Voltage and Current laws.
- (7) Explain the meaning of phase lagging and phase leading in AC circuits.
- (8) Define and explain the Resonance in electric circuits.
- (9) What is Quality factor?
- (10) An inductive reactance of 140Ω and capacitive reactance of 250Ω are connected in series with 170Ω resistor. Find the impedance offered by the series circuit.
- (11) What is Admittance?
- (12) What is half power bandwidth?

Q3 (a) Do as directed. (6)

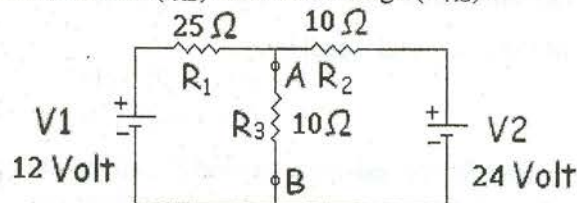
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|-----------------------------|-------------------------------|
| (i) $(1 + i2) + (3 + i4)$ | (ii) $(9 + i2) - (9)$ |
| (iii) $(5 + i2) + (2 + i2)$ | (iv) $(5 - i4) - (3 + i6)$ |
| (v) $(i6 - 8) - (12 + i3)$ | (vi) $(9 - i19) + (i15 + 12)$ |

- (b) Convert following polar coordinates to Cartesian coordinates and vice versa. (4)
- | | |
|---|----------------------------|
| (i) $r = 282$ & $\theta = 45^\circ$. | (ii) $x = 10$ & $y = 10$. |
| (iii) $r = 100$ & $\theta = 25^\circ$. | (iv) $x = 0$ & $y = 50$. |

OR

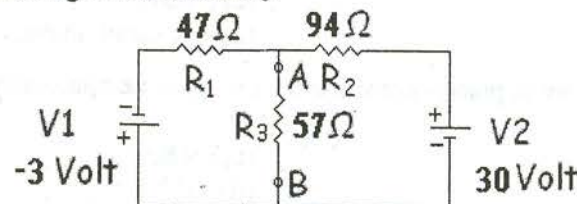
- Q3 (a) Derive an expression for the average and effective values of the ac sinusoidal signals and derive an expression for the form factor. (5)**
- (b) Define the terms Phase, Frequency and Periodic time of an ac sinusoidal signal. Find the periodic time of the signal produced by the Inverter with 49 Hz frequency. (5)

Q4 State Thevenin's theorem and Thevenize a given network circuit of and calculate the load current (I_{AB}) and load voltage (V_{AB}). (10)



OR

Q4 State super position theorem and For the given circuit calculate the voltage and current passing from resistor R_3 . (10)



- Q5 (a) Discuss the response of parallel RL circuit for sinusoidal signals. Derive expressions for the total impedance and phase angle of the circuit. (6)
- (b) Calculate the impedance and phase angle offered by the parallel RL circuit made up of 100Ω resistor and 100Ω inductive reactance. (4)

OR

- Q5 (a) Discuss the capacitors response to sinusoidal signals and write an expression for the energy stored in capacitors. (6)
- (b) The high voltage circuit of mosquito repellent unit produces 2000 Volts across $1 \mu\text{F}$ capacitor. Calculate the energy stored in output capacitor. (4)

- Q6 (a) Draw the circuit of the Series resonance and explain it with necessary diagrams. Also derive an expression for the resonance frequency. (6)
- (b) Calculate the resonance frequency and bandwidth of a series resonance circuit made up of 1mH inductor and 100 nF capacitor. The quality factor of the circuit is 5. (4)

OR

- Q6 (a) Draw the circuit of the Parallel resonance and explain it with necessary diagrams. Also derive an expression for the resonance frequency. (6)
- (b) List and explain the applications of the electronic resonance circuit. (4)

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