



Answer any FIVE Questions
(5 X 20 = 100 Marks)

1. (a) Find the nodal equations and nodal voltages V_1 , V_2 and V_3 in the circuit shown in Fig. 1

[5+5]

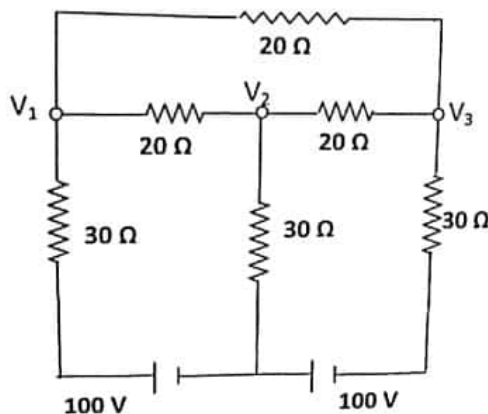


Fig. 1



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- (b) State Maximum power transfer theorem and find the maximum power consumed by the load for the circuit shown in Fig.2. [2+8]

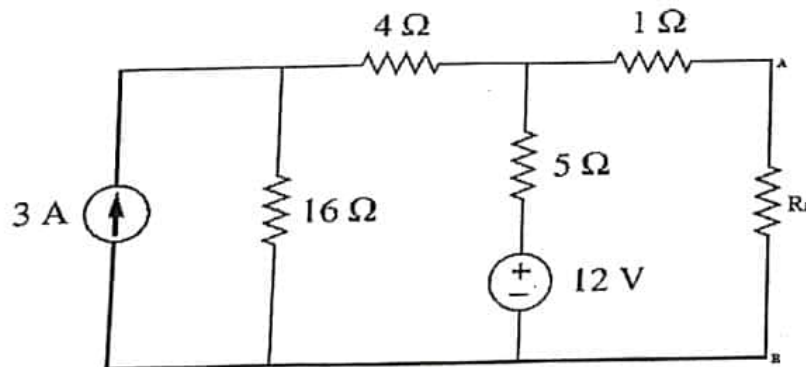


Fig. 2

2. (a) A coil of resistance 20 ohms and inductance 0.2 H is connected in series with a 300 micro farad capacitor across 400 V, 50 Hz supply. Calculate, the impedance, current, power factor, voltage across the coil and voltage across the capacitor. [5x2=10]
- (b) A balanced *abc*-sequence star (Y) connected source with $V_{an} = 120\angle 30^\circ (V)_{rms}$ is connected to a delta(Δ) connected balanced load consists of 10-Ohm resistance in series with 20-mH inductance per phase. Calculate the phase and line currents. [5+5]



3. (a) Explain in detail the working principle of DC generator with necessary diagrams and waveforms. [10]
 (b) Define stepper motor and explain the principle of operation of variable reluctance stepper motor? [2+8]
4. (a) Convert the following numbers to its equivalent binary number in step by step procedure (without using calculator) [5X2 = 10]
 (i) $(25.625)_{10}$
 (ii) $(47.321)_8$
 (iii) $(3B.6)_{16}$
 (iv) $(BEEE)_{16}$
 (v) $(BCD)_{16}$
- (b) Simplify the given Boolean function using K-map and implement using logic gates. [5+5]
 $F(A,B,C,D) = \Sigma (1,2,3,4,7,9,10,12)$
5. (a) Describe in detail with neat sketch the operation of the PN junction diode in forward bias and reverse bias and draw its V-I characteristics. [5+5]
 (b) Define Amplitude Modulation, Frequency Modulation and Phase Modulation and compare each other. [6+4]
6. (a) Derive the expression for the e.m.f. and voltage transformation ratio of an ideal transformer winding. [5+5]
 (b) Explain the operation of single phase half wave and Full wave uncontrolled Bridge rectifier. Draw the necessary circuit diagrams and input and output voltage waveforms. [5+5]

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BJT
 IGBT
 Zener
 EMF derivation
 defines in communication
 Graphs
 All formulas