PRANVEER SINGH INSTITUTE OF TECHNOLOGY KANPUR

Odd Semester Session 2023-24 CT -I

B. Tech. - I Semester

Fundamentals of Electrical Engineering (BEE-101)

CO Number	Course Outcome
CO1	To define basic laws, terminologies and theories pertaining to DC and AC (1-phase and 3-phase) electrical circuits.
CO2	Explain concepts of electrical circuits, the components of switchgear, transformers and electromechanical energy conversion devices and their applications.
CO3	Apply the concepts of transformers, AC & DC machines and energy consumption in solving real life numerical problems.
CO4	Analyze and examine different types of DC and AC electrical circuits (1-phase and 3-phase).

Time: 1.5 Hrs. M. M. 20

Section A

Q1. Attempt all questions: **(1X5 = 5 Marks)**

a) Define average and rms value of an alternating quantity. CO1

b) Cite the difference between ideal and practical current source. CO1

c) Explain active and passive elements with the help of example? CO2

d) What is the significance of peak factor? CO1

e) What is the form factor of ac current $i = 400\sin(157t + \frac{\pi}{6})$? CO2

Section B

Q2. Attempt all questions: **(2.5X4 = 10 Marks)**

a i) Use nodal analysis to calculate the currents in various resistors of the circuit shown in Fig.1 CO4

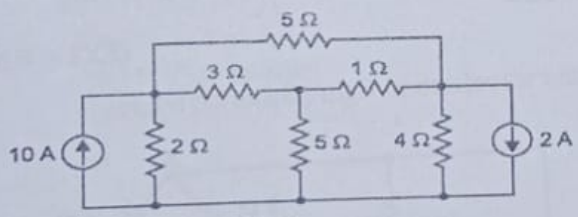

Fig.1

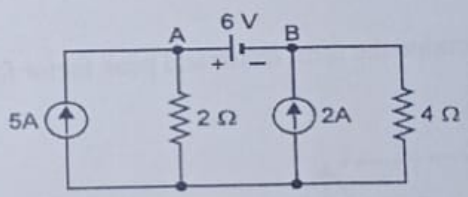

Fig.2

Or

ii) Calculate current in the 4Ω resistor by mesh current method for the circuit shown in Fig.2 CO4

b i) Calculate the value of V_{AB} in Fig.3 as shown below CO3

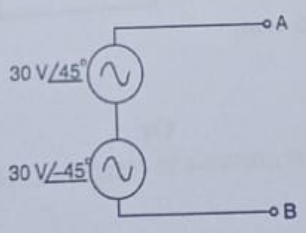

Fig.3

ii) Use mesh current method to determine current I_x in the circuit shown in Fig.4. CO3

Or

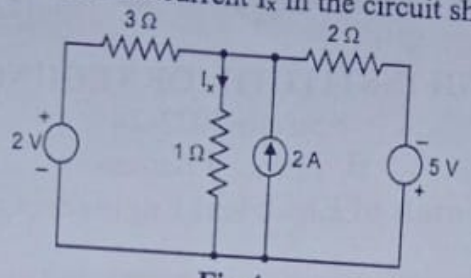

Fig.4

c i) Find the current in 4 Ω resistance of the circuit shown in Fig.5 CO3

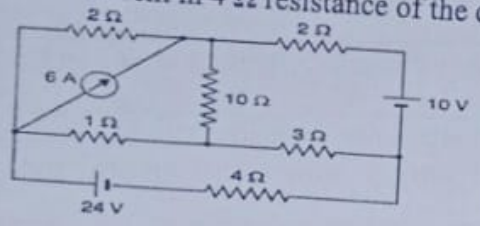

Fig.5

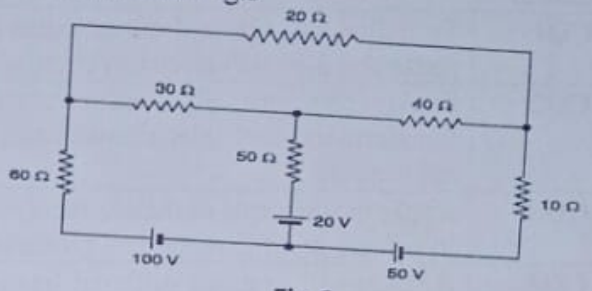

Fig.6

Or

ii) Find the current in 50 Ω resistance using nodal analysis in Fig.6

d i) Find the average and rms value for the waveform shown in Fig.7 CO3 CO3

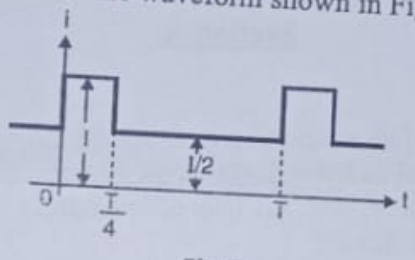

Fig.7

Or

ii) The following four e.m.fs. act together in a circuit: CO3

$e_1=10\sin\omega t$; $e_2=8\sin(\omega t+\pi/3)$; $e_3=4\sin(\omega t-\pi/6)$; $e_4=6\sin(\omega t+3\pi/4)$

Calculate the e.m.f. represented by $e1-e2+e3-e4$.

Section C

Q3 **(5X1 = 5 Marks)**

i) Determine the form factor and peak factor for the waveform in figure 8 shown below. CO4

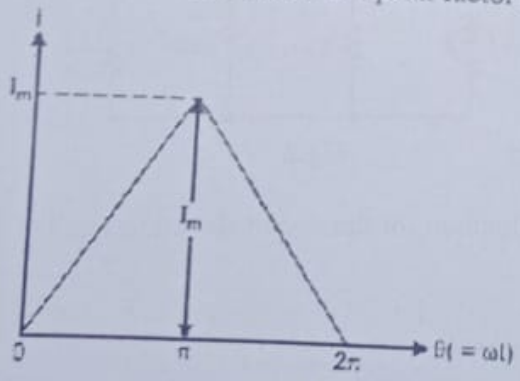

Fig.8

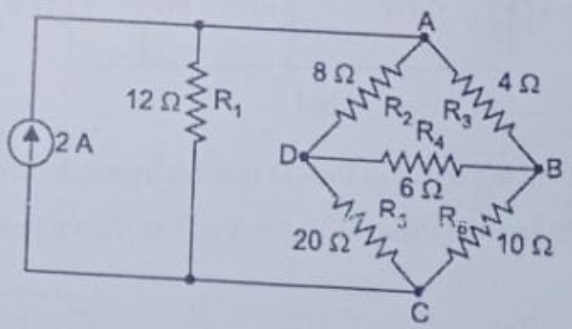

Fig.9

Or

ii) Using mesh current method, calculate the currents in resistances R_3, R_4, R_5 and R_6 of the circuit shown in Fig.9 CO4