LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

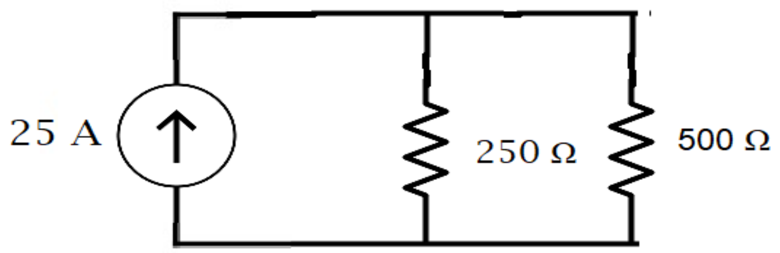
M.Sc. DEGREE EXAMINATION – **PHYSICS**

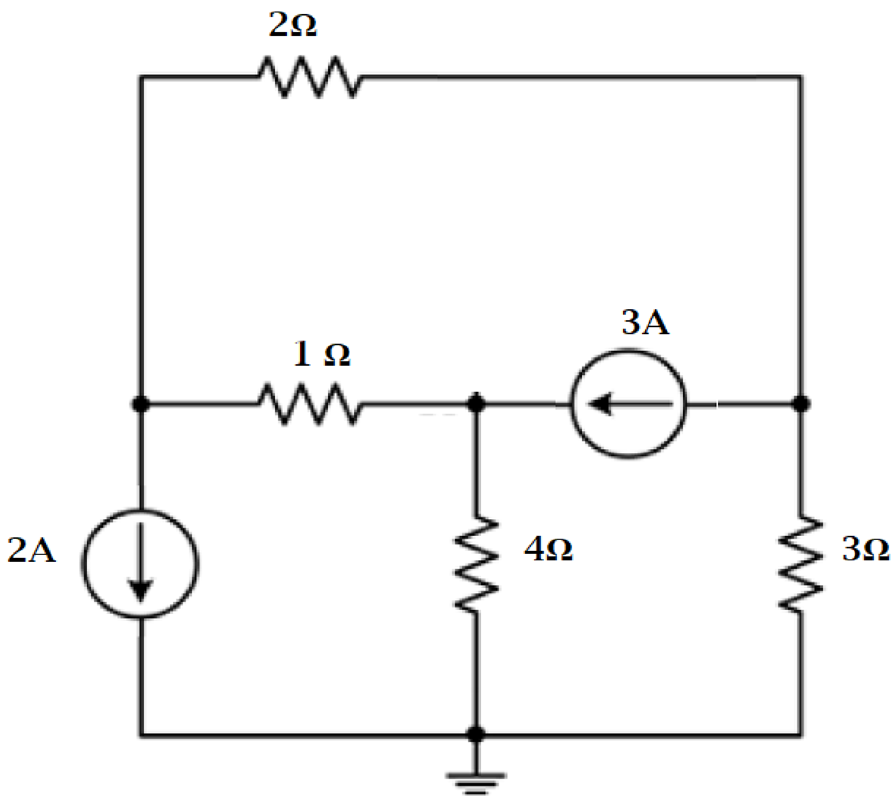
FIRST SEMESTER – **NOVEMBER 2022**

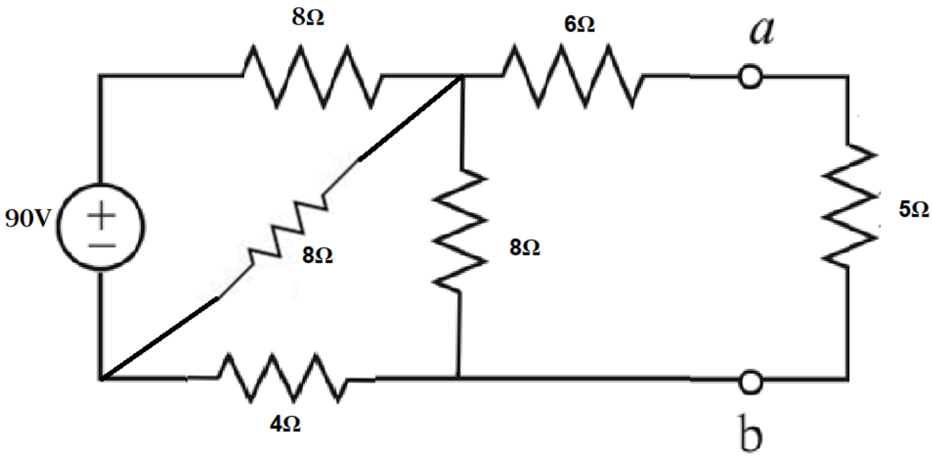
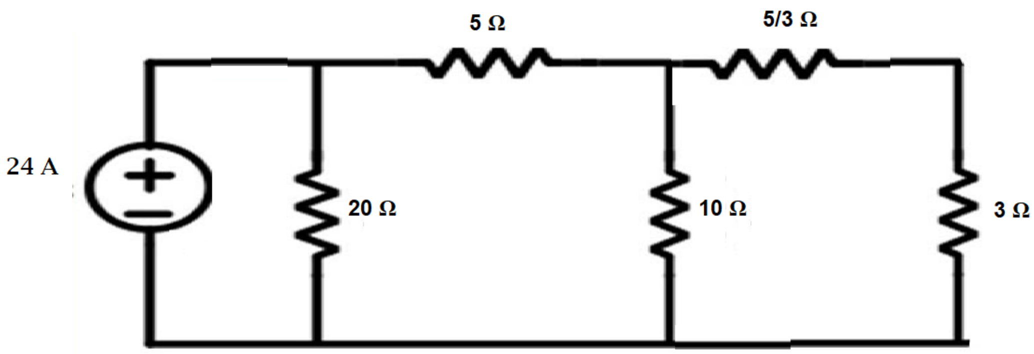
PPH1MC04 – ELECTRONICS I

Date: 30-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

	SECTION A			
	Answer ALL the questions			
1	**MCQ** **(5 x 1 = 5)**			
a)	What is the maximum current that a 1 W, 56 kilo ohm resistor can safely conduct? a) 56 A b) 4.225 mA c) 4.225 A d) 0.017857 A	K1	CO1
b)	In a JFET, drain current is maximum when V_{GS} is a) Zero b) negative c) positive d) equal to Vp	K1	CO1
c)	BCD counter is also known as a) Parallel counter b) binary counter c) decade counter d) asynchronous counter	K1	CO1
d)	An Opamp as a voltage follower has a voltage gain of a) Infinity b) zero c) unity d) none of these	K1	CO1
e)	A 4 bit resistor divider D/A converter uses 80 kΩ resistor for MSB, the resistor value used for LSB is a) 160 kΩ b) 40 kΩ c) 20 kΩ d) 10 kΩ	K1	CO1
2	**Fill in the blanks** **(5 x 1 = 5)**			
a)	The inverse of resistance is -------------------------	K2	CO1
b)	A UJT has only ---------- PN junction.	K2	CO1
c)	In a multiplexer, the selection of a particular input line is controlled by ----------------	K2	CO1
d)	The maximum rate that an ouput of an operational amplifier can change ---------------	K2	CO1
e)	The A/D converter that does not use D/A converter is -------------------------	K2	CO1
	SECTION B			
	Answer any THREE of the following in 500 words **(3 x 10 = 30)**			
3		K3	CO2

	A 500 Ω resistor is connected in parallel with a 250 Ω resistor and the combination is fed by a 25 A current source. Calculate the power absorbed by each resistor. Determine the voltage across the resistors. Verify the power supplied by the source is the same as the total power dissipated in the resistors.		
4	Discuss the construction and operation of JFET.	K3	CO2
5	Construct a 4 bit shift left shift register and explain its working.	K3	CO2
6	a) Explain how an opamp can be used as a summing amplifier. b) If V_1= 0.5 V, V_2=0.7V, V_3= 0.3 V, V_4 = 0.8V and R_f=10 kΩ, R_1=R_2=R_3=R_4 = 20 kΩ, what will be the output voltage? **(8+2)**	K3	CO2
7	With a neat diagram explain the working of a counter type A/D converter.	K3	CO2
	SECTION C		
	Answer any TWO of the following in 500 words		**(2 x 12.5 = 25)**
8	 Determine all node voltages and branch current using nodal analysis.	K4	CO3
9	What is the racing condition in a JK flip flop? How it is eliminated in JK master slave flip flop?	K4	CO3
10	With a neat diagram explain the functioning of an OPAMP as an instrumentation amplifier.	K4	CO3
11	Distinguish between high pass and low pass filters. Explain the working of first order low pass and high pass filters.	K4	CO3

SECTION D			
Answer any ONE of the following in 1000 words **(1 x 15 = 15)**			
12	a) Calculate Thevenin's voltage and resistance at terminals ab of the circuit.  b) Construct a 4 line to 1 line data selector using NAND gates and explain its working. **(10+5)**	K5	CO4
13	a) Design a 5 bit ring counter using D flip flops and explain its operation. b) Explain the operation of OPAMP as a logarithmic amplifier. **(8+7)**	K5	CO4
SECTION E			
Answer any ONE of the following in 1000 words **(1 x 20 = 20)**			
14	a) Solve the given second order differential equation using OPAMP, $$2\frac{d^2y}{dt^2} + 3\frac{dy}{dt} - y = -9$$ b) Using Norton's theorem, find the current through the 3 Ω resistor.  **(10+10)**	K6	CO5
15	a) Construct a 5 bit binary weighted resistor D/A converter using OPAMP and obtain the expression for the output voltage. b) For a 5 bit binary weighted resistor D/A converter, determine the output voltage for i) 10101 ii) 11000 iii) 01010 iv) 00111 v) 11101 vi) full scale voltage, if R_f = 1kΩ, R = 40 kΩ and 0=0V, 1=5V. **(8+12)**	K6	CO5

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