

**Subject : BASIC ELECTRICAL AND ELECTRONICS (01EE0103)****Date : 07-Feb-2022****Time : 3 Hours****Total Marks : 100****Instructions :**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Que.1 Answer the following objectives**[10]****(A)**

- (1) The power rating of a BJT is determined by which of the following
 - a) Collector base area
 - b) Base width
 - c) Heat sink
 - d) Emitter base junction area
- (2) The process of connecting metallic body part of all electrical apparatus to earth is known as _____
 - a) Piping
 - b) wiring
 - c) earthing
 - d) insulating
- (3) Full name of MCB is
 - a) Miniature circuit breaker
 - b) Minimum circuit breaker
 - c) Maximum circuit breaker
 - d) None of the above
- (4) The depletion region consists of
 - a) minority carriers only
 - b) majority carriers only
 - c) positive and negative ions
 - d) both majority and minority carriers
- (5) Find the input voltage of an ideal op-amp. It's one of the inputs and output voltages are 2V and 12V. (Consider gain = 3).
 - a) 8V
 - b) 4V
 - c) (-) 4V
 - d) (-) 2V
- (6) A typical insulator, energy gap between valence band and conduction band is

- a) $E_g < 1 \text{ eV}$
 - b) $E_g < 3 \text{ eV}$
 - c) $1 \text{ eV} < E_g < 3 \text{ eV}$
 - d) $E_g > 5 \text{ eV}$
- (7) Which operating condition is satisfied by the transistor if it is supposed to function in cut-off region ?
- a) $V_{CE} > 0$
 - b) $V_{CE} = 0$
 - c) $V_{CE} < 0$
 - d) $V_{CE} = V_{CC}$
- (8) Two bulbs $B_1 = 100 \text{ W, } 200 \text{ V}$ and $B_2 = 40 \text{ W, } 200 \text{ V}$ are connected in series across 200 V battery, the total circuit resistance will be
- a) 1000Ω
 - b) 1400Ω
 - c) 400Ω
 - d) 600Ω
- (9) In any network of wires carrying currents, the algebraic sum of all currents meeting at a point is equal to
- a) Sum of all the currents
 - b) Sum of outgoing current
 - c) Sum of incoming current
 - d) Zero
- (10) In a pure resistive circuit
- a) Current lag behind the voltage by 90°
 - b) Current leads the voltage by 90°
 - c) Current can lead or lag the voltage by 90°
 - d) Current is in phase with voltage

Que.1 Answer the following questions.

[10]

- (B)**
- (1) Draw the equivalent circuit of electric cell.
 - (2) In an AC inductive circuit, what is the phase relationship between the voltage and current?
 - (3) What is an Operational Amplifier?
 - (4) Define Resistance.
 - (5) Which configuration among CE, CB, CC gives highest input impedance and no voltage gain?
 - (6) Discuss the need for biasing the transistor.
 - (7) What is the distinction between an intrinsic and an extrinsic semiconductor?
 - (8) If the length of a wire of resistance R is uniformly stretched to n times its original value, what will be its new resistance?
 - (9) Draw the B-H curve for a magnetic circuit.

(10) Define Power and Energy.

Que.2

- (A) Explain collector to base bias circuit in detail with necessary circuit diagram. [8]
- (B) Explain the important electrical characteristics of a battery. Define the term efficiency for battery. [8]

OR

- (B) Derive the equation for self inductance and mutual inductance for coils. [8]

Que.3

- (A) Discuss the operation of a summing amplifier. [8]
- (B) Describe the construction of LASER diode. [4]
- (C) What is the Hall effect and what is it used for? [4]

OR

- (A) Draw and explain following curve with reference to parallel resonance in AC circuit. [8]
(i) Impedance-frequency curve
(ii) Current-frequency curve
(iii) Susceptance-frequency curve
- (B) State Bohr's three postulated for the atom. [4]
- (C) Determine the m.m.f. required to generate a total flux of $100\mu\text{Wb}$ in an air gap 0.2 cm long. The cross-sectional area of the air gap is 25 cm^2 . [4]

Que.4

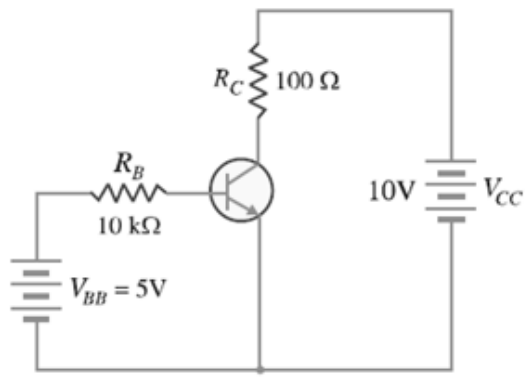
- (A) If a series R-L circuit is supplied from sinusoidal supply given by $v = V_m \sin(\omega t)$, express following [8]
(a) Current through the circuit
(b) Impedance
(c) Waveforms of voltage and current
(d) Phasor Diagram for the circuit
(e) Instantaneous Power
- (B) Draw the block schematic of a typical operational amplifier and briefly explain the function of each block. Also give the equivalent circuit of the Opamp. [8]

OR

- (A) Draw energy band diagram of different materials. Interpret the role of energy gap in various materials as well semiconductor. How does it determine the applicability of material? [8]
- (B) What is tunnelling? Explain the forward bias operation of tunnel diode with necessary diagram. [8]

Que.5

- (A) Explain the working of earth leakage circuit breaker (ELCB) with circuit diagram. [6]
- (B) Determine V_{CB} in the transistor circuit shown below. The transistor is of silicon and has $\beta = 150$. [6]



- (C) Write a short note on intrinsic semiconductor material. [4]

OR

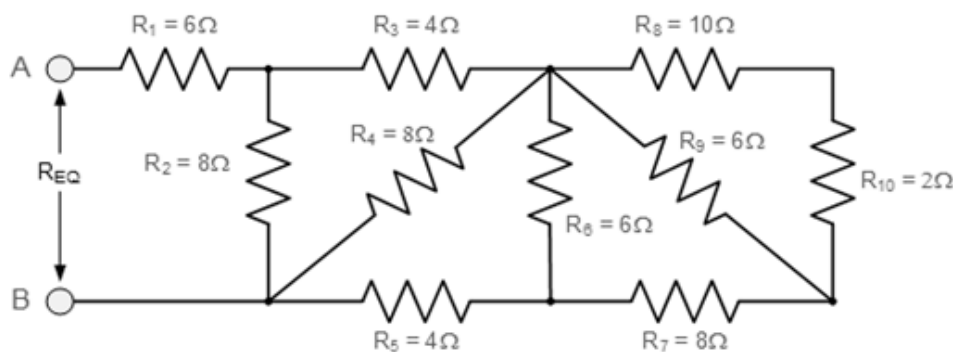
- (A) Explain how sinusoidal waveform is generated and derive $v = V_m \sin \omega t$. [6]
 (B) Explain the formation of depletion region and barrier potential in a PN junction. [6]
 (C) Derive the expression for energy stored in inductor. [4]

Que.6

- (A) Explain following methods to determine the RMS value of an alternating quantity. [8]
 (i) Mid-ordinate method
 (ii) Analytical method
 (B) A 100 watt, 250 V lamp is connected in series with a 100 watt, 200 V lamp across 250 V supply. Calculate [4]
 (i) circuit current and (ii) voltage across each lamp. Assume the lamp resistances to remain unaltered.
 (C) A battery with a terminal voltage of is connected to a circuit consisting of four and one resistors all in series. Assume the battery has negligible internal resistance. (a) Calculate the equivalent resistance of the circuit. (b) Calculate the current through each resistor. (c) Calculate the potential drop across each resistor. [4]

OR

- (A) Find the equivalent resistance, R_{eq} for the following resistor combination circuit. [8]



- (B) A coil has a resistance of 18Ω when its mean temperature is 20°C and of 20Ω when its mean temperature is 50°C . Find its mean temperature rise when its resistance is 21Ω and the surrounding temperature is 15°C . [4]
 (C) How we can find the direction of induced emf? [4]

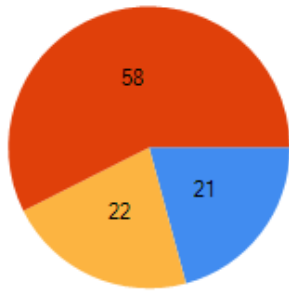
---Best of Luck---

MARWADI UNIVERSITY**MU-FOT****AUTO-FOT1 (MU), CIV-FOT1 (MU), ME-FOT1 (MU)****Semester 2 - Winter****Subject : BASIC ELECTRICAL AND ELECTRONICS (01EE0103)****Date : 07-Feb-2022****Time : 3 Hours****Total Marks : 100**

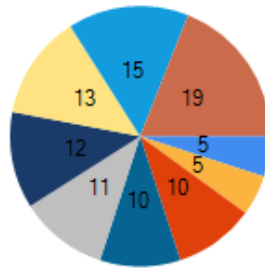
Difficulty Level	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
High	20	20.93	10	36	1(A), 1(B), 3(C), 5(A), 5(B), 5(C), 6(A), 6(C)
Low	20	21.51	14	37	1(A), 1(B), 2(A), 2(B), 3(B), 3(C), 6(C)
Medium	60	57.56	21	99	1(A), 1(B), 2(B), 3(A), 3(B), 4(A), 4(B), 5(A), 5(B), 5(C), 6(A), 6(B)

Module Name	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
Safety and Protection	5	4.65	3	8	1(A), 5(A)
Batteries	5	5.23	2	9	1(B), 2(B)
Bipolar Junction Transistor	10	10.47	6	18	1(A), 1(B), 2(A), 5(B)
Operational-Amplifier	10	10.47	4	18	1(A), 1(B), 3(A), 4(B)
Semiconductor Diodes	11	11.05	4	19	1(A), 3(B), 4(B), 5(B)
Magnetic Circuits and Electromagnetics	12	12.21	5	21	1(B), 2(B), 3(C), 5(C), 6(C)
Fundamentals of Semiconductor Materials	12	12.79	6	22	1(A), 1(B), 3(B), 3(C), 4(A), 5(C)
Fundamental of DC circuits	17	14.53	9	25	1(A), 1(B), 6(A), 6(B), 6(C)
Fundamental of AC Circuit	18	18.60	6	32	1(A), 1(B), 3(A), 4(A), 5(A), 6(A)

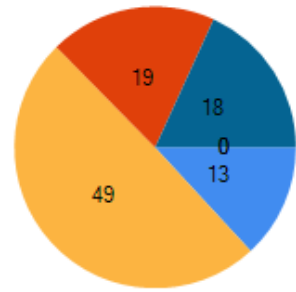
Blooms Taxonomy	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
Remember / Knowledge	20	13.37	11	23	1(A), 1(B), 3(B), 3(C), 5(C), 6(C)
Understand	30	49.42	18	85	1(A), 1(B), 2(A), 2(B), 3(A), 3(B), 4(A), 4(B), 5(A), 5(B), 6(A)
Apply	25	19.19	9	33	1(A), 1(B), 3(C), 5(B), 6(A), 6(B), 6(C)
Analyze	15	18.02	7	31	1(B), 2(B), 3(A), 4(B), 5(C)
Evaluate	10	0.00	0	0	
Higher order Thinking	0	0.00	0	0	



High Low Medium



Safety and Protection Batteries
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Remember / Knowledge Unde...