



PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 26-05-2025

Time: 01:00 pm – 04:00 pm

School: SOE	Program: B.Tech-EEE			
Course Code: EEE3008	Course Name: Materials in Electrical Systems			
Semester: IV	Max Marks: 100		Weightage: 50%	
CO - Levels	C01	C02	C03	C04
Marks	24	28	24	24

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	Show the variation of resistance (R) on a figure with respect to temperature (K) for mercury when it is in the superconducting state.	2 Marks	L1	C01
2.	What is "Meissner effect"?	2 Marks	L1	C01
3.	A solar cell has a maximum power point of 0.3 W. The cell voltage at maximum power point at STC is 0.65 V. What is the current at maximum power point of the solar cell?	2 Marks	L1	C02
4.	Outline the <i>I-V</i> curve of a solar cell and label the parameters in the curve.	2 Marks	L1	C02
5.	What are the advantages of LEDs over incandescent power lamps?	2 Marks	L1	C02
6.	What are the two primary materials used in LEDs?	2 Marks	L1	C02
7.	The capacity of a battery is 100 Ah, then find the C-rating of the battery for 5 hours of charging.	2 Marks	L1	C03
8.	Define the cut-off voltage of a battery.	2 Marks	L1	C03
9.	State the benefits of Wide Bandgap (WBG) devices.	2 Marks	L1	C04
10.	Identify three-terminal devices from the following: Schottky diode, Thyristor, Photocell, IGBT, Photo coupler	2 Marks	L1	C04

Part B

Answer the Questions.

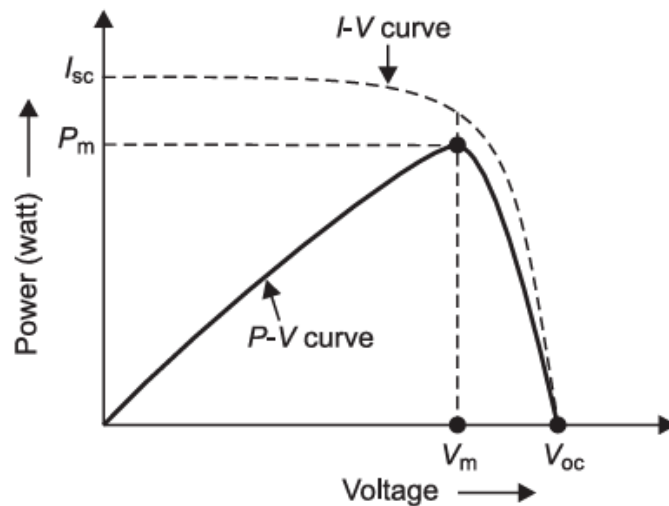
Total Marks 80M

11.	Explain ionic conductivity and summarize the factors affecting it.	20 Marks	L2	C01
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Or				
12.	Describe the economic relevance of the materials sector for electrical applications in the world.	20 Marks	L2	CO1

13.	Illustrate the working principle of a solar cell with a neat sketch.	20 Marks	L2	CO2
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Or				
14.	<p>Explain the following parameters using the schematic of solar PV module I-V and P-V curves shown below.</p> <ul style="list-style-type: none"> i) Short circuit current (I_{sc}) ii) Open circuit voltage (V_{oc}) iii) Maximum power point (P_m) iv) Current at maximum power point (I_m) v) Voltage at maximum power point (V_m) vi) Fill factor (FF) vii) Efficiency (η) 	20 Marks	L2	CO2



15.	a.	If we have a 12 V battery with a capacity of 500 Ah, then compute the power of the battery and the amount of energy stored in the battery. Assume the battery discharge duration is 10 hours.	10 Marks	L3	CO3
	b.	Describe the alternatives to battery energy storage systems (BESS) on energy storage.	10 Marks	L3	CO3

Or					
16.		Describe any three of the following types of fuel cells with neat sketches.	20 Marks	L3	CO3
		<ul style="list-style-type: none"> i) Alkali fuel cell ii) Molten Carbonate fuel cells (MCFC) iii) Phosphoric Acid fuel cells (PAFC) iv) Proton Exchange Membrane (PEM) v) Solid Oxide fuel cells (SOFC) 			

17.	a.	Summarize the applications of power electronics.	10 Marks	L2	CO4
	b.	Distinguish between a power diode and a signal diode.	10 Marks	L2	CO4

Or					
18.		Describe the key features and types of wide bandgap (WBG) devices	20 Marks	L2	CO4