



Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Programme Name: M. Tech-Advanced Vehicles

Semester : II

Course Name : Advanced Automotive Materials

Time : 03 hrs.

Course Code : MEAV7015P

Max. Marks : 100

Nos. of page(s) : 2

Instructions:

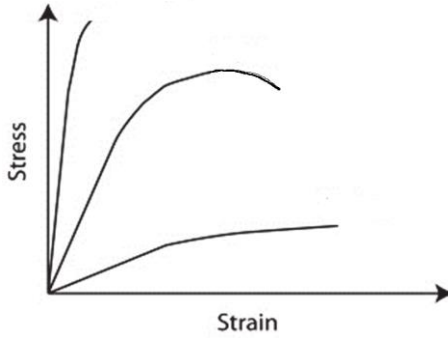

- i. Read the instructions carefully before attempting.
- ii. No submission of the Answer Sheet shall be entertained after due time.
- iii. Attempt All Questions. One question from section B and C have an internal Choice.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	List out the desired properties of matrix materials in composites.	4	CO1
Q 2	List out a minimum of 8 components made of polymers in the automotive environment.	4	CO1
Q 3	Discuss the major advantages of polymer pyrolysis techniques to process the ceramic matrix in CMCs.	4	CO1
Q 4	Identify the major application of hydroforming techniques in an automotive environment.	4	CO2
Q 5	Explain why prepregs are so important in the making of FRPs	4	CO2

SECTION B
(4Qx10M= 40 Marks)

Q 6	(a) List out the major differences in the processing of composites having a thermoset matrix and those having a thermoplastic matrix. (b) Name a few popular thermoset resins used to fabricate FRPs.	8+2	CO1
Q 7	(a) Identify the major advantages and limitations of the Hand Layup process in making a car bonnet. (c) Classify composite material based on reinforcements.	6+4	CO2
Q 8	Write a short note on Dispersion-strengthened Composites with suitable examples.	10	CO2

Q 9	Illustrate Spray forming process with suitable schematic diagram. or Illustrate Hot pressing process to make CMC using suitable schematic diagram.	10 10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q 10	<p>(a) Illustrate a process which is used to fabricate industrial grade glass fibers.</p> <p>(b) Analyze the stress strain curve (Fig. 1) and mark the respective curve for metals, ceramics, and polymers.</p> <div data-bbox="240 575 1162 999" style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Fig. (1)</p>  </div> <div style="width: 45%;"> <p>(2)</p>  </div> </div> <p>(c) Analyze the above component and explain how you will manufacture this component?</p> </div>	10+3+7	CO4
Q 11	<p>(a) Identify the major application area of water jet machining in auto sector and explain its working principle with a suitable scheme.</p> <p>(b) List out the advantages and limitations of EDM process in view of automotive applications.</p> <p>(b) Differentiate between malleability and ductility.</p> <p style="text-align: center;">Or</p> <p>(a) Mention how a weak interphase affects the usages of MMCs in auto sector.</p> <p>(b) Write a short note on surface treatment of fibers and explain how it improves the application area of FRPs.</p> <p>(c) Mention key advantages of using ceramic matrix composites over conventional ceramics.</p>	12 +6+2 5+10+5	CO3