BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B. TECH **SEMESTER: V**
BRANCH: MECHANICAL **SESSION: MO/2022**

SUBJECT: ME333 COMPOSITE MATERIALS

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Classify various composite materials	[2]	1	L
Q1	(b)	Explain the difference between thermosetting and thermoplastic matrix materials with relevant examples.	[3]	1	L
Q2	(a)	Discuss the role of a matrix material with the help of suitable examples.	[2]	1	L
Q2	(b)	Differentiate composite from metal. Discuss its application to different industries.	[3]	1	L
Q3		For a sheet molding compound composite designated as SMC-R65 E-Glass Fibre in thermosetting polyester matrix has the following data: Glass Fibre E = 68.9 GPa; Density =2.54 Kg/mm^2; Length of Fibre = 25 mm; Diameter = 2.5 mm; Polyester (matrix material) E = 3.45 GPa; Density = 1.1 Kg/mm^2. Determine the tensile modulus, shear modulus and Possion's ratio.	[5]	2	M
Q4	(a)	Discuss the, failure mechanism of composite materials in the Following conditions; brittle fibre in ductile matrix and ductile fibre in brittle matrix.	[2]	2	M
Q4	(b)	Discuss the, failure mechanism of composite materials in the Following conditions; 1) Fatigue loading; 2) Tensile loading.	[3]	2	L
Q5	(a)	Determine the elements in the stiffness matrix for an angle ply lamina containing 60% of carbon fibre in an epoxy matrix. Consider both +45 deg and -45 deg. For the Fibre E = 220 GPa, vr = 0.2 and matrix: E =3.6 GPa and vm = 0.35.	[3]	2	M
Q5	(b)	Derive the following equation where the nomenclature used have their usual meaning	[2]	2	M

$$\frac{\nu_{21}}{E_2} = \frac{\nu_{12}}{E_1}$$

:::::: 01/10/2022 ::::::M