

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: ALL**

**SEMESTER : VII
SESSION : MO/2022**

TIME: 3:00 Hours

SUBJECT: CL422 POLYMER COMPOSITE

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Write down Halpin-Tsai Equation applicable to determine the modulus of elasticity of aligned short fibre composites. [2] CO5
- Q.1(b) A graphite /epoxy cuboid specimen with voids has dimensions of 50x20x1.5 cm and its mass is 25g. After it is put into a mixture of sulfuric acid and hydrogen peroxide, the remaining graphite fibres have a mass of 0.5 g. Density of graphite is given as 1.72Kg/m³. Find the volume fraction of voids in the composite. [3] CO5
- Q.1(c) An epoxy/glass composite with 65% filler volume fraction contains fibres of circular cross section (r=0.04mm) of length l= 5mm. Find out the E_c of the composite considering longitudinal load (10 kN) applied in the direction of fibre alignment. E_m=3.42MPa, E_f=85MPa, density of resin and fibre are 1100 and 2.5Kg/m³ respectively. [5] CO5
- Q.2(a) What is the function of styrene during preparation of SMC? If it is not used what will be effect on the composite property? [2] CO4
- Q.2(b) Describe the process of Pultrusion drawing the various units used for manufacturing composite panels. [3] CO4
- Q.2(c) Explain the basic steps of RTM. List out at least five advantages and disadvantages of this process. [5] CO3
- Q.3(a) Cite one example of rubber based composite. Name the Rubber, fibre and crosslinking agent used in this composite. [2] CO3
- Q.3(b) Show the diagram of laminate composites. Write down the salient features of such composite. [3] CO1
- Q.3(c) Classify composites. Write down about the application, materials used and limitations of each type. [5] CO1
- Q.4(a) What are the unique features of Kevlar fiber? [2] CO1
- Q.4(b) Draw schematic flow diagram and label for melt spinning process of fiber. [3] CO1
- Q.4(c) Classify natural fibers with example in each category. [3] CO2
- Q.4(d) How are inorganic fibres manufactured? [2] CO1
- Q.5(a) What are the roles of styrene in unsaturated polyester? [2] CO1
- Q.5(b) Compare between novolac and resol resin. [3] CO2
- Q.5(c) Demonstrate the methodology for the manufacturing of polycarbonate polymer. [3] CO2
- Q.5(d) What are the advantages of using polyamide (Nylon) in composite? [2] CO1

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