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

CLASS: BE **SEMESTER : VI/ADD**
BRANCH: CHEMICAL ENGG-PLASTICS & POLYMER **SESSION : SP/19**

SUBJECT: PC6005 POLYMER PROCESSING

TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
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.

Q.1(a) What is thixotropy? Give some examples of thixotropic materials. [2]
Q.1(b) Discuss the effect of MW and MWD in polymer viscosity. [4]
Q.1(c) In a particular type of cone and plate rheometer the torque is applied by means of a weight suspended on a piece of cord. The cord passes over a pulley and is wound around a drum which is on the same axis as the cone. There is a direct drive between the two. During a test on polythene at 190°C the following results were obtained by applying a weight and, when the steady state has been achieved, noting the angle of rotation of the cone in 40 seconds. If the diameter of the cone is 50 mm and its included angle is 170°. Estimate the viscosity of the melt at a shear stress of 10^4 N/m^2. [6]

Weight (g)	50	100	200	500	1000	2000
Angle	0.57	1.25	2.56	7.36	17.0	42.0

Q.2(a) Discuss the method of heating a polymer in an extruder. [2]
Q.2(b) Draw typical extruder screws for PE processing, Nylon processing and PVC processing. [4]
Q.2(c) Derive the pressure flow equation for extrusion operation in metering zone with proper drawing. [6]

Q.3(a) Draw a typical die design used in cable extrusion. [2]
Q.3(b) Discuss the spinning manifold design in melt fibre spinning with suitable diagram. [4]
Q.3(c) Draw and discuss the various parameters of a blown film unit. [6]

Q.4(a) Discuss the different types of gates used in injection moulding. [2]
Q.4(b) Write short Notes - reaction injection moulding. [4]
Q.4(c) Draw a typical mould design indicating all the components and write down their functions. [6]

Q.5(a) Discuss the technology behind rotational moulding. [2]
Q.5(b) A blow moulding die which has an outside diameter of 40 mm and a die gap of 2 mm is used to produce a plastic bottle with a diameter of 70 mm. If the swelling ratio of the melt in the thickness direction is 1.8. Estimate (a) the parison dimensions, (b) the thickness of the bottle. [4]
Q.5(c) Breifly explain different types of vacuum thermoforming with suitable drawing. [6]

Q.6(a) Differentiate between extrusion blow moulding and injection blow moulding. [2]
Q.6(b) Discuss the different types of calender roll configuration and features. [4]
Q.6(c) Derive the expression of compaction force required in compression moulding. [6]

Q.7(a) What are the advantages of adhesive bonding over mechanical fastening? [2]
Q.7(b) How is polystyrene rigid foam manufactured? [4]
Q.7(c) Write short notes on casting process. [6]

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