

VII SEMESTER B.TECH. (PRINT AND MEDIA TECHNOLOGY)

END SEMESTER EXAMINATIONS, NOVEMBER 2018

SUBJECT: PACKAGE DESIGN AND TESTING [PMT 4101]

REVISED CREDIT SYSTEM

(20/11/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- **1A.** Derive an equation for cushion factor and energy absorbed by expanded polystyrene as a cushioning material.
- **1B.** Which property of the paper board is significant for cartons primarily meant for carrying weight? Explain the test procedure with the help of neat diagram.
- **1C.** List three categories of product that requires special glass bottle design features? Explain its special design considerations.

[04 + (0.5+2.5) + (0.5+2.5)]

- **2A.** With a neat diagram explain the process of making two-piece cans using drawn and wall ironed (DWI) process.
- **2B.** Explain various factors influencing the selection of a package with a block diagram.
- 2C. It is desirable to test the paperboard box for increasing its stacking strength. Which mechanical package test would you suggest? Explain the test procedure with a neat sketch.

[04 + 03 + (0.5+2.5)]

- **3A.** Which type of pressure forming technique would you prefer for the product containing intricate parts? Explain with neat diagram.
- **3B.** With a neat sketch explain the manufacturing of Aluminum collapsible tubes by Impact extrusion process.

ΡΤΟ

3C. It is desirable to print and die cut a multicolor duplex board for carton production. The production is required to be carried out on a large scale. The customer is mainly interested in high degree of production accuracy and uniformity in carton dimension. This being the scenario, which kind of die would you prefer? Explain the steps involved in making such dies with a sketch.

[(0.5+3.5) + 03 + (0.5+2.5)]

- 4A. A glass bottle manufactured for the use of storing certain chemical is required to be tested in the laboratory. The bottle measures 0.625 m long. The area of circular base of the bottle and its wall thickness are 22,096 mm² and 12 mm respectively. The temperature of the product while filling varies between 58 ° C and 88 °C. Expected pressure inside the bottle will be upto 98 kg/m² during the storage. Material constant and atmospheric temperature are 0.45 & 34 ° C respectively. Calculate the thermal stress interval and limiting hoop stress in the glass bottle for safe usage.
- **4B.** Explain the working of vertical form fill seal machine with a neat sketch.
- **4C.** Explain the process of making two-piece Drawn and Redrawn (DRD) cans with neat sketches.

[04+03+03]

- 5A. A retailer needs corrugated boxes of width 250 mm to carry 24 Kg of detergent powder. The load exerted on fourth box from the bottom of a full stack is 450 Kg. The length, width and height of the corrugated boxes are respectively in the ratio 2:1:1. The fluting medium is of 150 GSM with RCT of 2.5 KN/m and all the liners are made from same board with equal GSM. Which of the following corrugated box is cheaper for the above specifications?
 - **a.** Three ply box with C flute.
 - **b.** Five ply box with B & C combination flutes.

(Note: Use two decimal place correction for ECT & RCT, Factor of safety = 3 and Take up factor for B and C flute are 1.32 and 1.42 respectively)

- **5B.** Discuss the working of screw type injection molding machine with a neat sketch.
- **5C.** Explain the common formats in metal cans.

[05+03+02]

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