BACHELOR OF ENGINEERING IN PRINTING ENGINEERING
SECOND YEAR 2ND SEMESTER EXAMINATION 2022
PACKAGING TECHNIQUE-II

Full Marks: 100　　　　　　　　　　　　　　　　　　**Time: 03 Hrs.**

Answer any five questions

1. (a) Discuss about the possible hazards during distribution of packaged items. Why assessment of journey hazards is necessary?
   (b) How the best packaging material for fragility protection be selected?
   (c) Draw the force deformation characteristics curves for crushing, elastic and bi-linear type cushions.

   10+5+5=20

2. (a) How can you find the thickness of a particular cushion being used more efficiently for good cushioning design in a package? Is it at all necessary and why?
   (b) How can you prevent the package with a content from mechanical shock and strength?
   (c) Distinguish between impact load factor and cushion factor.

   10+5+5=20

3. (a) Describe the effect of dampening and transmissibility on the shipping container for the effective isolation of vibratory forces emanating from a freight car to which the container is rigidly attached.
   (b) What is the relation between the packaging cost and loss through damage during transport and handling system? Describe the effect of technological development in an improved packaging material on it.

   10+10=20

4. (a) What deformation of an elastic type cushioning material will be required to limit the load factor of a packaged item to 30 if a boxcar is stopped from a speed of 20 miles per hour in a distance of 2.0 inch?
   (b) An item to be packaged weighs 30 pounds, and the supporting suspension system has a spring constant of 100 pounds per inch.. The package is to be shipped by rail freight in train that will be a forcing frequency of 4.0 cycles per second at near about 60 miles per hour. Find the transmissibility of the suspension system used in the package if (i) no damping is provided, (ii) the system has a damping ratio of 0.375, and (iii) if the spring constant is increased to 320 pounds per inch. (no damping). Comment on your answers from the design point of view.

   8+12=20

5. (a) How the nature of the packaged products changes by the influence of moisture?
   (b) How can a packaged article be subjected to forced vibration? Illustrate with examples.
   (c) How can you compare the efficiencies of two or more packages of the same product?

   6+6+8=20

6. How can you determine the half-value period of a moisture sensitive package? Is it the shelf life of the package at service conditions? If not, how can you determine this life?

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7. Five packets of cigarettes overwrapped in moisture proof cellulose film are initially weighed in grams and given 33.145, 32.796, 32.771, 32.175 and 32.203 respectively. They are exposed to a storage atmosphere of 25^0C and 75% R.H. and re-weighed at intervals upto 16 days. Due to moisture gain the following gains in weights of the packets are given below.

Packet No.	Gains after x days' storage (in grams)		
	x=2	x=7	x=16
1	0.079	0.0198	0.412
2	0.088	0.233	0.480
3	0.079	0.197	0.420
4	0.074	0.190	0.406
5	0.046	0.227	0.489

The packets are then completely opened to expose the whole of the contents to the storage atmosphere and allowed to come to equilibrium. The final weights are 36.409, 35.950, 35.887, 35.188 and 35.216 grams respectively.
Determine the half-value period of the cigarette packet.

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