*Total number of printed pages–3*

**53 (FPT 503) FPEN**

**2021**

# FOOD PROCESS ENGINEERING

Paper : FPT 503

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

1. *(a)* What is meant by Dehydration ? 5

   *(b)* Compare and contrast dehydration and drying. 5

   *(c)* Describe briefly the principles of drying. 5

   *(d)* How do you evaluate the rate of drying from drying data ? 5

2. *(a)* What do you mean by Equilibrium Moisture Content (EMC) ? 5

*Contd.*

(b) Discuss the importance of EMC for agriculture food materials. 5

(c) What is the significance of EMC-RH data? 5

(d) What is Henderson's equation? 5

3. Define the following terms: 5×4=20

(a) Moisture content on wet basis

(b) Free Moisture

(c) Unbound Moisture

(d) Bound Moisture.



4. The result of EMC determination is given below. 20

| | Temp. | RH | EMC |
|---|---|---|---|
| Experiment No.1 | 60°C | 40% | 8.65% *db* |
| Experiment No. 2 | 30°C | 50% | 10.51% *db* |

For the above data, compute the constant $C$ and $n$ for Henderson's equation.

5. *(a)* Describe a relationship between relative humidity and percentage humidity. 5

*(b)* How a humidification of air is done? 5

*(c)* Describe typical humidification equipment. 5

*(d)* What are the various applications of humidification operation in food processing? 5

6. *(a)* How do you classify the drying equipment? 10

*(b)* Describe with a neat diagram, a freeze dryer and its application in Food processing. 10

7. Write short notes on : 5×4=20

*(a)* Hysteresis effect

*(b)* Degree of Saturation

*(c)* Spray dryer

*(d)* Cabinet Dryer.

*Total number of printed pages–5*

**53 (CE 503) STA–II**

**2021**

# STRUCTURAL ANALYSIS–II

Paper : CE 503

*Full Marks : 100*

Time : Three hours

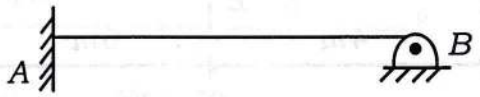
***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

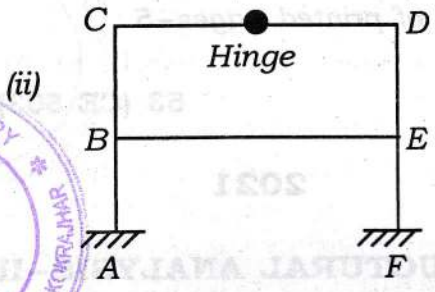
1. *(a)* Define statically indeterminate structures. And give the classification of indeterminate structures. 3

   *(b)* Determine the degree of static indeterminacy for the following : 6

   *(i)*

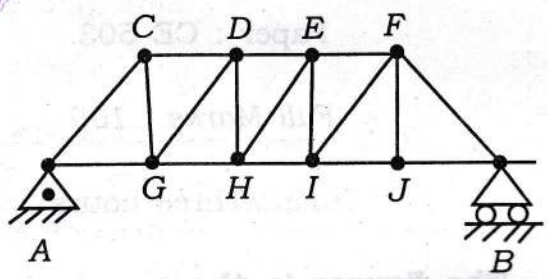



*Contd.*




(ii)






(iii)

(c) State Clapeyron's theorem. 2

(d) Determine the moments over the beam in *figure*–1 and draw the bending moment diagram by three moment theorem. Also calculate the reactions at the supports and draw the shear force diagram. 9

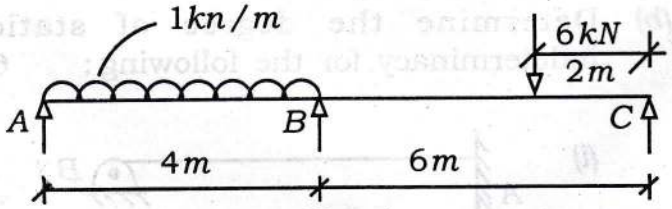
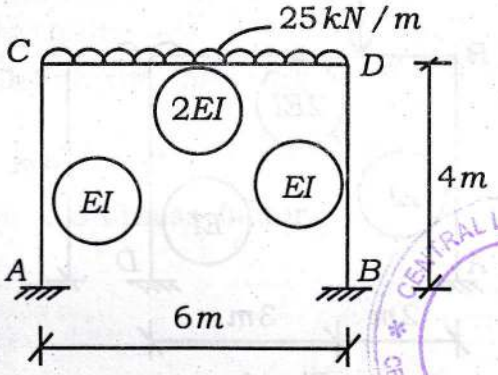



*Fig* – 1

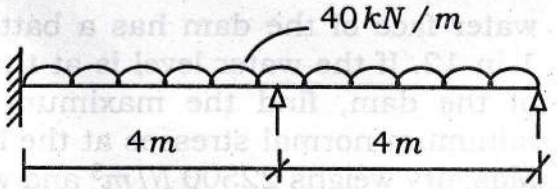
2. Analyse the frame shown in *figure*–2 by slope deflection method. Draw BMD and SFD. 20




*Fig*–2

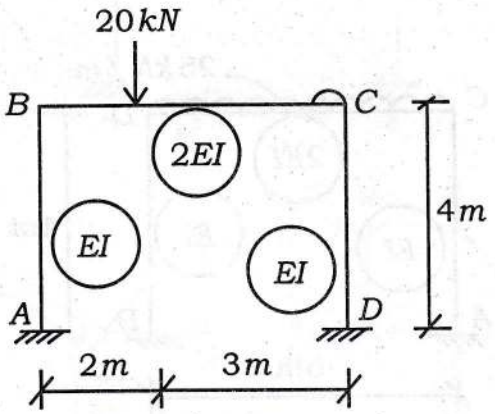


3. Using moment distribution method, analyse the beam shown is *figure*–3. Support *B* sinks by 5 *mm* below *A* and *C*. Take $E = 200\ GPa$ and $I = 400 \times 10^6\ mm^4$. 20




*Fig*–3

4. Analyse the frame shown is *figure*–4 by Kani's method and draw BMD. 20




*Fig*–4

5. *(a)* Define the following: 5

*(i)* Fatigue and *(ii)* Creep.

*(b)* A masonry dam of trapezoidal section is 12 *m* high. It has a top width of 1·75 *m* and bottom width of 6·75 *m*. The water face of the dam has a batter of 1 in 12. If the water level is at the top of the dam, find the maximum and minimum normal stresses at the base. Masonry weighs 22500 $N/m^3$ and water weighs 9810 $N/m^3$. 15

6. *(a)* A fixed beam of span '*l*' carries a point load '*W*' eccentrically on the span at a distance '*a*' from the left end and '*b*' from the right end. Find the fixing moments at the ends of the beam. 16

*(b)* Define the following: 4

*(i)* Orthogonal frame and

*(ii)* Stiffness factor.