B.E. PRODUCTION ENGINEERING THIRD YEAR SECOND SEMESTER - 2023 (Supple)
SUBJECT – MACHINE TOOL SYSTEMS

Time: Three hours   Full Marks: 100

Use Separate Answer scripts for each PART
PART-I
Marks: 60

No of Questions		Marks
	Answer any *three* questions	
1.	(a) Differentiate between "Machine" and "Mechanism". Define "Machine Tool" with reference to metal cutting.	6
	(b) Describe principal objectives of metal cutting machine tools.	4
	(c) Define "Generatrix" and "Directrix". Describe "Turning" and "Shaping" operations with respect to generatrix and directrix.	6
	(d) Classify machine tools in three broad categories giving some examples in each.	4
2.	(a) Classify and explain surfaces produced by machine tools.	6
	(b) Identify types of machine tool's basic motions.	5
	(c) Explain following mechanisms utilized in machine tools:	
	(i) Crank-Rocker mechanism,	
	(ii) Slider-Crank mechanism,	
	(iii) Cam mechanism.	9
3.	(a) Draw a kinematic structure of any standard machine tool having a K-25 type of structure.	6
	(b) Describe four bevel differential mechanism utilized for metal cutting machine tools.	6
	(c) A thread having a pitch of 2.15 mm is to be cut with a single point cutting tool having a pitch error differential unit. The pitch of the lead screw is 6 mm. Calculate the inclination of the correction bar, considering the module and teeth number of the pinion utilized for the purpose are 2 and 18 respectively. Draw the sketch of the setup.	8
4	(a) State reasons which necessitate the variation of spindle speed in machine tools.	4
	(b) Identify and describe the main constraints on which objectives of high Metal Removal Rate (MRR) in machine tools depends.	6
	(c) Explain kinematic structure of "Hobbing machine". Answer should include basic scheme, a neat sketch and also different kinematic balance equations.	10
5.	(a) Explain three constraints that influence the design process of the ray diagrams of gear box.	6
	(b) Draw the Connection and Flow Diagrams for a 2 X 2 structure.	6
	(c) In a four speed gear box, it is possible to have either 2x2(open) or 2x2 (cross) ray diagram. The drive is required to be designed from 200 rpm with common ratio as 2 and transmit 10 H.P. Consider the best ray diagram from two types each. Calculate all the design considerations. Select the best ray diagram considering various strategies utilized for the gear box design.	8

B.E. PRODUCTION ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023

Subject: MACHINE TOOL SYSTEMS
Part: II (40 Marks)

Time: 3 hours   Fullmarks:100

(Use Separate Answer Scripts for Each Group)

Answers any two questions

1. (a) While machining a cast iron block of 180 mm length with a goose-necked H.S.S. shaping tool, it is desirable to select a 200 mm stroke with a permissible cutting speed of 25 m/min. If the specification of the shaping machine (Oscillating lever type) provides for a Q_{max} of 3:2 at the design value of the stroke of 400 mm, calculate the required r.p.m. of the crank.

   (b) Explain and draw the detail design of eccentric drive for shaping machine feed.

   (c) write down the feed arrangements for specific machines:
   - (i) Screw cutting machine
   - (ii) Drilling machine
   - (iii) Boring machine.   **(6+10+4=20)**

2. (a) Draw the schematic feed drives for a milling machine and explain how different clutch is used for feed.

   (b) Why back lash eliminator is used in down milling process? What is the effect of screw-nut back lash during down milling process?

   (c) If number of cutter teeth, Z_c= 10, Diameter of cutter, D=50 mm and S_o= 0.1 mm/tooth, then find out the maximum feed rate (F_{max})? From the given problem justify that what type of cutter is suitable and what is the effect of diameter over feed?

   (8+6+6=20)

3. (a) Why 3 pulley drive is considering over 4 pulley drive for quick return effect draw and explain elaborately.

   (b) Draw the velocity profile of slotted arm analysis for maximum forward and return velocity? From the respective diagram prove that $R_n = [R_v][R_s]f[R_s]$.

   (10+10=20)

Ex/CE/5/T/306/2023 (S)

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) THIRD YEAR
SECOND SEMESTER SUPPLEMENTARY EXAM 2023**
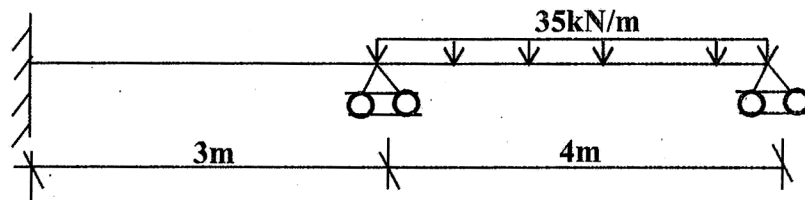
Subject: THEORY OF STRUCTURES-III

Full Marks:100   **Time: 3hours**

(Use Separate Answer scripts for each Part)

Part- II (Marks 50)

1. Analyze the beam given below. **Use Flexibility method (Member approach).**   **25**

1. Analyse the truss shown below. All members have same " *A* " and " *E* ". **Use Stiffness method.**   **25**