NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
THEORY EXAMINATION
Question Paper

Month and Year of the Examination:		*May/June, 2025 (15.05.2025)*	
Programme	B.Tech (Mechanical)	*Semester*	*Fourth*
Subject	**Production Technology-I**	*Maximum Marks*	*50*
Course No.	**MEPC211**	*Time Allowed*	*03 hours*

Note: Attempt ALL questions. Assume any suitable data if not given and highlight it. This will carry weightage.

1. (a) Differentiate between orthogonal and oblique cutting. (05)

(b) Discuss the characteristics of continuous and discontinuous chips. Can a ductile material ever give discontinuous chips? (05)

2 (a) Describe adhesion, abrasion and diffusion tool wear mechanisms with neat sketches. (06)

(b) A 25 mm diameter steel bar was turned at 300 rpm using HSS tool. Tool failure occurred after 10 min. When the speed was decreased to 250 rpm, the tool failed in 52.5 min. Assuming Taylor's tool life equation applies, find the expected tool life at 275 rpm. (04)

3. (a) Obtain the expression of optimum cutting speed for a given feed in turning for minimum total production cost criterion from first principles. State clearly all the assumptions. (06)

3(b) A seamless tubing 35 mm outside diameter is turned orthogonally on a lathe. The following observations were made: Rake angle = 35°, cutting speed = 15 m/min, feed = 0.10 mm/rev, length of continuous chip in one revolution = 50.72 mm, cutting force = 1960 N, feed force = 784 N. Find the coefficient of friction, shear angle, velocity of chip along tool face and chip thickness. (04)

4 (a) Differentiate between up and down milling. (04)

(b) Explain honing process along with its applications. (06)

5 (a) List different factors influencing surface finish (02)

(b) Determine tolerances on hole and shaft designated by 50H8/c8 and also identify the type of fit.
You may use the following aid for solving the problem as per BIS:
50mm lies between 50-80mm
$i = 0.45 (D)^{1/3} + 0.001 D$ (microns). For IT 8, tolerance is 25i.
Fundamental deviation for c shaft for D > 40mm = -(95+0.8D) microns (05)

(c) Find the machining time and material removal rate for cylindrical turning operation of a 25 mm diameter brass bar at a spindle speed of 900 rpm. Depth of cut = 3mm, longitudinal feed rate = 20cm/min, length of workpiece=50 mm and stock to be removed is 6mm. The side cutting edge angle of the turning tool is 30°. (03)