

This question paper contains 4 printed pages.

3276

Your Roll No.

B. Tech. (M) / IV

J

Paper EME-403

PRODUCTION TECHNOLOGY – II

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt five full questions, selecting at least two
full questions each from Part A and Part B.*

Assume missing data, if any.

Draw neat sketches, wherever necessary.

PART A

1. (a) In an orthogonal cutting operation following cutting conditions were recorded:

Mild steel tube outside diameter = 50 mm

Cutting speed = 20 mts/minute

Rake angle = 20°

Feed = 0.1 mm/rev

Cutting force = 2500 N

Feed force = 1000 N

Length of continuous chip in one revolution
= 80 mm

P. T. O.

Determine:

- (i) Shear plane angle
 - (ii) Chip thickness
 - (iii) Chip flow velocity along the tool face
 - (iv) Co-efficient of friction. 8
- (b) Explain the mechanism of chip formation in metal cutting. What factors are responsible for formation of different types of chips? 6
2. (a) Derive expressions for finding out mean shear stress, mean normal stress, and shear strain experienced by a chip during metal cutting. 9
- (b) What do you understand by the term machinability? Which factors affect machinability? Discuss briefly. 5
3. (a) What are the common mechanisms causing wear on cutting tools? Explain in brief. 7
- (b) With the help of a suitable diagram explain the working of turret indexing and stop drum mechanism used on Turrent lathes. 7
4. (a) A machine tool spindle is required to have eight speeds in geometric progression. It is to operate on ferrous metals at 25 mts/min. If the spindle accommodates high speed steel cutters ranging from 10 mm to 55 mm diameters, determine the spindle speeds. Also plot a graph of cutting speed against cutter diameters for each spindle speed. 8

(b) With neat sketches describe how you would perform following alignment tests:

(i) Parallelism of lathe machine spindle to saddle movement

(ii) Central T-slots on milling machine table, parallel with longitudinal movement. 6

PART B

5. Determine the actual dimensions to be provided for a shaft and hole of 90 mm size for H₈e₈ type fit. Size 90 mm falls in diameter steps of 80 and 100.

Value of tolerance unit $i = 0.45 \sqrt[3]{D} + 0.001D$. Value of tolerances for IT8 and IT9 grade are $25i$ and $4i$. Value of fundamental deviation for e type shaft is $11D^{0.41}$.

Also design the GO and NO GO gauges as per the present British system. 14

6. (a) Explain the aspect "Degrees of freedom" of movement of a free body with special reference to jigs and fixtures. Also discuss the principle of six-point location. 7

(b) With the help of neat sketches explain the following:

(i) Swinging leaf type jig

(ii) Spring type Jack pin. 7

7. (a) A slip gauge set M88, consists of the following:

<i>Range</i>	<i>Steps</i>	<i>Pieces</i>
1.001–1.009	0.001	09
1.01–1.49	0.01	49
0.5	–	01
1–9.5	0.5	18
10–90	10	09

Two, 2 mm wear block Total 88

Choose the suitable gauge blocks to give following dimensions:

27.781 mm 89.694 mm. 6

(b) Select the sizes of angle gauges required to build the following angles:

(i) $22^{\circ} 11' 21''$

(ii) $31^{\circ} 49' 24''$ 4

(c) Explain the principle of measurement by light wave interference method. 4

8. Write short notes on any four:

(i) Optical flats

(ii) Preferred numbers

(iii) Various types of errors on spur gear

(iv) Screw thread terminology

(v) Line standards and end standards. 14