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B. E. (Seventh Semester) Examination,Nov.-Dec. 2021

(New Scheme)

(Mech. Engg. Branch)

MACHINE TOOL TECHNOLOGY

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each question is compulsory. Solve any two parts from (b), (c) and (d). Part (a) carries 2 marks and parts (b), (c) and (d) carry 7 marks each. Explain your answer with neat sketches wherever necessary.*

Unit-I

1. (a) What is tool signature? Give an example.   2

(b) Derive an expression realting shear plane angle ϕ with chip thikness ratio and rake angle.   7

(c) What are the types of cutting tool? Explain the complete geometry of a single point cutting tool with the help of neat sketches.   7

(d) In an orthogonal cutting using tungsten carbide cutting tool, the following observations were mad : Rake angle = 10°, Cutting velocity = 100 mpm, Chip thickness = 0·45 mm, Feed = 0·25 / rev, Width of cut = 0·25 mm, Cutting force = 1200 N, Feed force = 300 N. Determine the shear plane angle and coefficient of friction betwen tool and chip.   7

Unit-II

2. (a) What are the soruces of heat in metal cutting?   2

(b) What is machinability index? Explain the factors affecting machinability.   7

(c) Give the name of different temperature measurement techniques in metal cutting. Explain anyone technique.   7

(d) The useful tool life of a HSS tool machining mild steel at 40 m/min. is 3 hours. Calculate the tool life

when the tool operates at 50, m/min. (Assume $n = 0·16$).   7

Unit-III

3. (a) Why Cast Iron is recommended for lathe beds?   2

(b) Explain the analysis of forces and reactions that are acting on the lathe bed under headstock.   7

(c) Explain the functions and requirements of guide ways.   7

(d) Why reinforcing stiffeners are used in lathe beds? Explain with neat sketch.   7

Unit-IV

4. (a) What is stepped drive? Draw a neat sketch.   2

(b) What are the guidelines given for selecting the proper value of geometrical progression ratio?   7

(c) Design a speed gear box for centre lathe having 6 standard speeds of 90, 125, 180, 250, 355, 500 RPM. Draw the best ray diagram and calculate number of teeth on all gears.   7

(d) Explain the kinematic advantages of geometric progression over others.   7

Unit-V

5. (a) Explain the importance of feed gear box in lathe.　2

    (b) List and explain the various measuring instruments for geometrical test.　7

    (c) Design a feed gear box for cutting metric threads of 12 different pitches ranging from 1·5 mm to 9 mm. Assume pitch of load screw as 6 mm. Draw the kinetic arrangement of gears.　7

    (d) Explain the procedure of performing acceptance test on radial drilling machine.　7