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ME 131605

Roll No. of candidate

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2016

B. Tech 6th Semester End-Term Examination

MACHINE TOOLS AND MACHINING

Full Marks-100 Pass Marks-35 Time-Three hours

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

1. Answer the following : (any *eight*) $8 \times 3 = 24$

(a) What is purpose of providing 'rake' and 'clearance' angle in single point turning tool ?

(b) What are the three common ways of expressing tool life ?

(c) Highlight the important points of difference between three jaw and four jaw chuck.

(d) What are the primary motions of Capstan and Turret lathe ?

[Turn over]

- (e) How does the 'clapper box' in a shaper function ?
- (f) How can you estimate the maximum size of a job in a planer ?
- (g) State how can you theoretically determine the cutting velocity and depth of cut in drilling.
- (h) What do you understand by the term 'drilling', 'reaming' and 'boring' ?
- (i) Establish a relation between 'feed per minute' and 'feed per tooth' in milling operation.
- (j) What are the factors upon which the selection of grinding wheel depends ?
- (k) What do you mean by 'loading' and 'glazing' of grinding wheel ?

2. Answer the following : (any six) $6 \times 6 = 36$

- (a) Differentiate between 'orthogonal' and 'oblique' cutting.
- (b) With a neat sketch, discuss the forces acting on a single point tool in turning operation.

- (e) Calculate the time required to machine a work-piece of 200 mm length and 60 mm in diameter. The work-piece is to be plain turned to 50 mm diameter. The rpm of the work is 440, feed = 0.3 mm/rev and permissible depth of cut = 2 mm. Assume over-travel and approach as 5 mm each for the turning operation. The job requires facing operation also.
- (d) Draw the important points of difference between Capstan and Turret lathe.
- (e) How does a 'planer' differ from 'shaper' ?
- (f) A cast iron surface 300 mm long and 180 mm wide is to be machined on a shaper with cutting to return ratio 3 : 2. Cutting speed, feed and clearance are 24.6m/min, 2 mm per double stroke and 30 mm respectively. The available ram strokes on the shaper are : 28, 40, 60 and 90 strokes/min. If the depth of cut is 3.5 mm, determine :
- (i) Time required to machine the surface
- (ii) Material removal rate.
- (g) With neat sketches distinguish between 'up-milling' and 'down-milling.'

(h) Explain the principle of minimum locating points with the help of six point location principle.

3. Answer the following : (any four) $4 \times 10 = 40$

(a) What is the mechanism behind the formation of continuous chip in ductile material? State its favourable conditions. What do you understand by the term 'chip breaker'?

$5+3+2=10$

(b) State the assumptions made in construction of Merchant Circle diagram and thereby develop mathematical expressions for the shear force, normal force, frictional force and back up force in metal cutting in terms of cutting force, thrust force, rake angle and shear plane angle.

$2+8=10$

(c) With a neat schematic diagram, discuss the turret indexing and stop drum mechanism used in semi-automatics.

10

(d) With a neat sketch, explain the working of crank and slotted link mechanism in shaper

10

(e) Draw the sketch of a simple twist drill with taper shank and show its various elements.

10

(f) With a neat sketch, discuss the internal mechanism on which the Universal Dividing Head functions.

10

(g) With necessary steps and calculations, explain differential indexing of 241 divisions.

10