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BME-011

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

00695

June, 2015

BME-011 : COMPUTER AIDED PROCESS PLANNING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***five*** *questions. Use of scientific calculator is allowed.*

1. (a) Discuss the various costs considered in machine selection under process planning economy. 7

(b) Write the advantages and disadvantages of process planning. 7

2. (a) Discuss the steps in automatic process planning. 7

(b) The useful tool life of a HSS tool machining mild steel at 16 m/min is 3 hours. Calculate the tool life, when the tool operates at 50% higher speed. (n = 0·4) 7

3. (a) Explain the various types of milling cutters and their applications. 7

(b) Estimate the actual machining time required for the component of diameter 40 mm and length 150 mm. Use a roughing speed of 30 m/min and finish speed 50 m/min; the feed roughing is 0·2 mm/rev, while that for finishing is 0·1 mm/rev. The maximum depth of cut for roughing is 2 mm. Finish allowance may be taken as 0·75 mm. Blank to be used for machining is 50 mm in diameter. 7

4. (a) With the help of a suitable chart give the general classification of powder metallurgy process. 7

(b) Explain the mechanical properties of engineering materials. 7

5. (a) Explain the tolerable-cost relationship with respect to various production processes to manufacture the components. 5

(b) Differentiate the cumulative tolerancing with over tolerancing. 5

(c) Explain the geometrical tolerances with suitable examples. 4

6. (a) A hollow cylindrical workpiece of 80 mm diameter and 160 mm length is held on a lathe between chuck and tail stock. It is turned all over in 5 passes. If the approach length = 18 mm, over travel = 10 mm, average feed = 0·8 mm/rev; cutting speed = 32 m/min, calculate the machining time. 7

(b) A surface 112 mm wide and 200 mm long is to be rough milled with a depth of cut of 5 mm by a 16-tooth cemented carbide face mill 150 mm in diameter. The work material is alloy steel. Calculate the cutting line. Use cutting speed = 60 m/min, f = 0·18 mm/tooth. 7

7. (a) The specifications for one characteristic of a part call for its width to be 3·000 ± 0·006 cm. The process has been run under controlled conditions, so that no assignable causes of variation have been introduced, and samples have been taken. The standard deviation of the process was estimated to be 0·002 cm.

(i) Calculate C_p for this process.

(ii) What percentage of the units would be out of control ? (Show in terms of Z only) 7

(b) Define standard deviation. Why is it important ? *4*

(c) Describe what is meant by statistical process control. *3*

8. (a) Discuss the advantages of automating the process planning functions. *5*

(b) Briefly give an outline of the variant process planning approach. *5*

(c) Discuss the role of process planning in CAD/CAM integration. *4*