Exam.Code:1014
Sub. Code: 35208

2124
M.E. (Mechanical Engineering)
First Semester
Elective – I
MME-105(b): Manufacturing Science

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, selecting atleast two questions from each Section. All questions carry equal marks.

x-x-x

SECTION-A

1 (a) Name various tool materials and discuss the advantages of carbide over high speed steel and carbon steel?

b) What is Caine's rule and Write Caine's equation? Show the graphical plot (risering curve) representing Caine's equation.

2 (a) Explain Merchant's force diagram and derive the merchant's shear angle relationships.

(b) What is the importance of economics of metal cutting? Derive an expression for optimum cutting speed for maximum production rate. Assume suitable assumptions.

3 (a) Sketch a milling cutter and show its various elements and angles. Describe all components in details also.

(b) The Workpiece diameter is 100 mm and length of workpiece is 200 mm. The cutting speed of the machining is 120 m/min and feed is 0.2 mm/rev. Assume the over travel length at the beginning and ending of the each pass is 5 mm. Calculate the machining time?

4 (a) In an orthogonal turning of an engineering alloy, it has been observed that the friction force acting at the chip tool interface is 402.5 N and the friction force is also perpendicular to the cutting velocity vector. The feed velocity is negligibly small with respect to the cutting velocity. The ratio of friction force to normal force associated with the chip-tool interface is 1. The uncut chip thickness is 0.2 mm and the chip thickness is 0.4 mm. The cutting velocity is 2m/s. Assume that the energy expended during machining is completely converted to heat. Calculate the rate of heat generation (in W) at the primary shear plane?

(b) Describe tool nomenclature in ASA and ORS with suitable examples?

SECTION-B

5 (a) Differentiate between true centrifugal casting and semi-centrifugal casting. Give applications of both the processes?

(b) Explain the salient features of riser design in respect of its shape, size and placement with the help of suitable diagrams.

6 (a) Calculate the filling times for both top and bottom gating systems to fill up a cylindrical casting of 40 cm diameter and 20 cm height. Static head available for both the cases is 25 cm. The gate diameter is 2 cm.

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b) What are the essential conditions that are to be kept in mind while designing risers? Compare the modulus method with that of Caine's method of fixing riser dimensions.

7 (a) Which process you would select for welding of Aluminum. Why?

(b) Differentiate between welding, brazing and soldering?

8 (a) Describe briefly the factors that influence the quality of cut in Plasma Arc Welding. Discuss the process capabilities of Electron Beam Welding.

(b) Write short notes on:

(i) Heat affected zone

(ii) Chvorinov's rule in the context of solidification of a casting.

(iii) Epitaxial growth in weld metal solidification

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