CBCS SCHEME

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21ME42

Fourth Semester B.E. Degree Examination, June/July 2024
Machining Science and Jigs & Fixtures

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. write a neat sketch wherever necessary.
3. Missing data, if any, may be suitably assumed.

Module-1

1 a. With a line at diagram explain the construction and working of an engine lathe. **(08 Marks)**

b. List the various operations that can be performed in a lathe and explain any two methods of taper turning process. **(06 Marks)**

c. Explain the different operations that can be performed on a drilling machine. **(06 Marks)**

OR

2 a. Differentiate between drilling machine and milling machine. **(06 Marks)**

b. Differentiate between up milling and down milling process. **(06 Marks)**

c. With a neat sketch explain construction of CNC milling machine. **(08 Marks)**

Module-2

3 a. Differentiate between orthogonal and oblique cutting process. **(04 Marks)**

b. With usual notations prove that, where Q is shear angle r – chip thickness ratio and α rake angle. **(06 Marks)**

c. In an orthogonal cutting the following observations were made :

Pipe diameter	100mm
Pipe thickness	0.3mm
Cutting speed	200m/min
Feed	0.26mm/rev
Cutting force	1000N
Feed force	600N
Chip thickness	0.3mm
Contact length	1mm
Power consumed	2KW

Back rake angle = 10° (negative) = –10°.
Calculate the shear strain and shear energy. **(10 Marks)**

OR

4 a. With the help of merchant circle diagram desire an expansion for co-effcient of friction and show that $\mu = \left[\frac{F_c \tan\alpha F_T}{F_c - F_r \tan\alpha}\right]$. **(06 Marks)**

b. Explain the different zones of heat generation and the parameters influencing in heat generation in metal cutting. **(06 Marks)**

c. What is cutting fluid? What are requirements of ideal cutting fluid and list–factors for selection of cutting fluid? **(08 Marks)**

Module-3

5 a. What is tool wear and explain different types of tool wear with a neat sketch. **(08 Marks)**

b. What is tool life and explain Taylor's tool life equation. **(04 Marks)**

c. A 50mm dia M S Rod is turned at 300rpm. The tool failure occurs in 10 mins the speed was changed to 200 rpm and the tool failure occurred offer 50 mins. Calculate the cutting speed to obtain the fool life of 30 mins. **(08 Marks)**

OR

6 a. Explain the variables affecting tool life. **(06 Marks)**

b. Explain any two of the following finishing process :
   i) Honing
   ii) Capping
   iii) Power coating **(08 Marks)**

c. What is machinability index?
   i) Explain
   ii) Galvanizing. **(06 Marks)**

Module-4

7 a. Explain the process parameters in abrasive jet machining process that affect surface finish of machined surface and MRR. **(06 Marks)**

b. Explain the later beam machining with a neat sketch. **(07 Marks)**

c. Explain electron bean machining process with its advantage, limitations and applications. **(07 Marks)**

OR

8 a. With a neat sketch explain the electro chemical machining and discuss about tool design in ECM. **(06 Marks)**

b. Explain the principle of EDM electric discharge machining. What are the functions and dielectric fluid in EDM process? Mention advantages and limitations of EDM process. **(08 Marks)**

c. Explain the following process with a neat sketch :
   i) Ultrasonic assisted electric discharge machining (UAEDM)
   ii) Electro discharge grinding. **(06 Marks)**

Module-5

9 a. Differentiate between Jigs and fixtures. **(04 Marks)**

b. Explain the factors to be considered for design of Jibs of fixtures. **(06 Marks)**

c. With a sketch explain leaf drill. **(10 Marks)**

OR

10 With a sketch explain any two of the following fixtures in detail :

a. Turning fixture

b. Milling fixture

c. Welding fixture

d. Fixtures for indexing. **(20 Marks)**

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