6E7012

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B. Tech. VI-Sem. (Main/Back) Exam., April/May-2016
Mechanical Engineering
6ME2A Newer Machining Methods

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks (Main & Back): 26

Instructions to Candidates:-

*Attempt any **five questions,** selecting **one question** from **each unit.** All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Explain the reasons why unconventional machining methods are used. [6]

(b) Explain the Abrasive Flow Machining (AFM) with a neat sketch. [10]

OR

Q.1 (a) Give a comparison of the unconventional processes in terms of process, material removal rate and applications. [6]

(b) Explain the principle of operation of a Magnetic Abrasive Finishing (MAF) with neat sketch. Also highlight its applications and limitations. [10]

UNIT-II

Q.2 (a) Briefly explain the construction and working of an ultrasonic machining unit a neat sketch. [8]

(b) State the advantages, limitations and applications of ultrasonic machining (USM). [8]

OR

Q.2 (a) What is the principal of operation of Water Jet Machining (WJM) ? Explain briefly with a neat sketch. [6]

(b) Discuss graphically the variation of Metal Removal Rate (MRR) in Abrasive Jet Machining (AJM) process with respect of following process parameters: [6]

(i) Nozzle tip distance (NTD)

(ii) Mixing Ratio

(iii) Abrasive Mass Flow Rate.

(c) Give typical engineering applications of AJM. [4]

UNIT-III

Q.3 (a) Explain in detail the working and constructional features of an electric discharge machining (EDM) unit with a neat sketch. [8]

(b) During an electric discharge drilling of a 10mm square hole in a low carbon steel plate of 5mm thickness brass tool and Kerosene are used. The resistance and the Capacitance and the capacitance in the relaxation circuit are 50Ω and 10μ F, respectively. The supply voltage is 200volts and the gap is maintained at such a value that the discharge (sparing) takes place at 150 volts. Estimate the time required to complete the drilling operation. [8]

OR

Q.3 (a) Compare Laser Beam Machining (LBM) and Electron Beam Machining (EBM) in terms of process parameters, equipment and applications. [8]

(b) Explain with a neat sketch the construction and working of a Plasma Arc Machining (PAM). [8]

UNIT-IV

Q.4 (a) Differentiate between Electro – Chemical Machining (ECM) and chemical machining (CHM). [8]

(b) Composition of a Nickel super alloy is as follows:
Ni = 70.0%, Cr = 20.0%, Fe = 5.0% and rest Ti calculate rate of dissolution (mm^3/min) if the area tool is 1200mm^2 and a current of 1500A is being passed through the cell. Assume dissolution to take place at lowest valiancy of the elements. Atomic weight (A), density (P), and valiancy (v) of different constituents of super alloy are as mentioned below: [8]

A_{Ni} =	58.71	P_{Ni} =	8.9	V_{Ni} =	2
A_{Cr} =	51.99	P_{Cr} =	7.19	V_{Cr} =	2
A_{Fe} =	55.85	P_{Fe} =	7.86	V_{Fe} =	2
A_{Ti} =	47.9	P_{Ti} =	4.51	V_{Ti} =	3

OR

Q.4 (a) Explain briefly the process parameters that affect the metal removal rate (MRR) and surface Quality in ECM. [8]

(b) What factors should be considered is selecting the tool materials in ECM? [4]

(c) State the advantages, limitations and applications of ECM. [4]

UNIT-V

Q.5 Explain in detail the nanoscale cutting process. Also highlight the typical advantages, applications and limitations of the process. [16]

OR

Q.5 Write brief notes on: [4×4=16]

(a) Micro turning

(b) Micro drilling

(c) Micro milling

(d) Micro grinding
