BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(ME)-2021
Course Name – Advanced Manufacturing Technology
Course Code - PCC-ME701
(Semester VII)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the importance of non-traditional machining processes.
a) To improve tool life
b) To machine materials that are difficult or impossible to machine using traditional methods
c) To increase the hardness of the tool material
d) To reduce cutting speeds and feeds

(ii) Select the primary characteristic of mechanical non-traditional machining processes.
a) High-energy heat sources
b) Use of cutting fluids
c) No direct contact between the tool and workpiece
d) Use of high-velocity abrasives or fluid jets

(iii) Identify the following is NOT a traditional machining process.
a) Turning
b) Milling
c) Drilling
d) Electrical Discharge Machining (EDM)

(iv) Identify the primary energy source used in Laser Beam Machining (LBM).
a) Mechanical
b) Thermal
c) Chemical
d) Electrical

(v) Identify the following uses a high-pressure jet of water for machining.
a) Ultrasonic Machining
b) Laser Beam Machining
c) Water Jet Machining
d) Chemical Machining

(vi) Electrochemical machining (ECM) removes material by the process is recognize as
a) Erosion
b) Melting
c) Chemical Dissolution
d) Mechanical Impact

(vii) Select the factor distinguishes non-traditional machining from traditional machining processes.

a) Type of tool used
b) The reliance on non-mechanical energy sources
c) The speed of operation
d) Use of cutting fluids

(viii) Select non-traditional machining process would be best suited to machine a complex part made of hard-to-machine materials like tungsten.

a) Electrical Discharge Machining (EDM)
b) Turning
c) Grinding
d) Planing

(ix) If a part has intricate and fine details made of brittle materials, Select the process is most appropriate for machining it.

a) Ultrasonic Machining (USM)
b) Chemical Machining
c) Water Jet Machining
d) Laser Beam Machining

(x) If you need to machine a small, precise hole in a very hard material, identify the process you consider as machining.

a) Water Jet Machining
b) Electrical Discharge Machining (EDM)
c) Turning
d) Broaching

(xi) Identify the main principle of Ultrasonic Machining.

a) Material removal by electrical discharge
b) Material removal by chemical etching
c) Material removal by high-frequency vibrations and abrasives
d) Material removal by laser ablation

(xii) Identify the following is a key factor affecting material removal rate (MRR) in USM.

a) Amplitude of ultrasonic vibration
b) Magnetic field strength
c) Workpiece color
d) Temperature of the tool

(xiii) In Water Jet Machining (WJM), material removed from the workpiece observed as

a) Erosion due to high-pressure water jet
b) Melting due to laser heating
c) Electrochemical reaction
d) Abrasion by high-speed air

(xiv) Identify the following materials cannot be easily machined using Abrasive Water Jet machining.

a) Soft materials like rubber
b) Hard materials like ceramics
c) Brittle materials like glass
d) Very soft materials like foam

(xv) Identify the following is used as an electrolyte in ECM.

a) Deionized water
b) NaCl solution
c) Pure sulfuric acid
d) Organic solvents

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the purpose of the lead screw in a lathe. (3)
3. Explain the purpose of the crank mechanism in a shaping machine. (3)
4. Summarize the different function of the table feed mechanism in a planning machine. (3)
5. Compare the ultrasonic machining process to a traditional grinding process. (3)
6. Compare the effectiveness of AJM for machining metals versus non-metals. (3)

OR

Analyze how nozzle wear can affect the precision of the AJM process. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Describe in detail the constructional differences between a Vertical Machining Center (VMC) and a Horizontal Machining Center (HMC). (5)
8. Describe the tool geometry in ORS system with proper diagram. (5)
9. Analyze the effect of varying discharge current on the rate of material removal and tool wear. (5)
10. Differentiate between the EDM process and Electrochemical Machining (ECM) in terms of working principles. (5)
11. Analyze the effect of beam intensity on the quality of the cut. (5)
12. Analyze the effect of increasing the frequency of the ultrasonic vibrations on the machining rate. (5)

OR

Evaluate the advantages and limitations of Ultrasonic Machining compared to other nontraditional machining processes. (5)

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