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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2021 - 2022)

Subject: Manufacturing Technology-II

Time: 3 Hours Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 marker & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1-a. In how many groups, cutting tools can be divided? (CO1) 1

(a) 4

(b) none of the mentioned

(c) 3

(d) 2

1-b. In a single point turning tool, the side rake angle and orthogonal rake angle are equal. ϕ is the principal cutting edge angle and its range is $0^o<\phi<90^o$. The chip flows in the orthogonal plane. The value of ϕ is closest to. (CO1) 1

(a) 0

(b) 45

(c) 60

(d) 90

1-c. Belt driven lathe is the type of____. (CO2) 1

(a) engine lathe

(b) centre lathe

(c) room lathe

(d) special purpose lathe

1-d. Grinding wheel is specified as “A 46 K 5 B 17”. Grain size of a wheel will be (CO2) 1

(a) Coarse

(b) Medium

(c) Fine

(d) Very Fine

1-e. Which of the following is the correct grain size range of abrasive grains for honing stones? (CO3) 1

(a) 800 grit to 1000 grit

(b) 5 grit to 10 grit

(c) 50 grit to 60 grit

(d) 80 grit to 600 grit

1-f. Speed and Position in CNC can be controlled using _____ (CO3) 1

(a) slide table and spindle

(b) machine code unit

(c) feedback system
(d) graphic user interface

1-g. Vacuum is the machining medium for _____ (CO4) 1
(a) USM
(b) EDM
(c) LBM
(d) PAM

1-h. What is the pressure of gas that is to be supplied, for carrying the abrasives? (CO4) 1
(a) 0.1 to 1.0 kg/cm2
(b) 2.0 to 8.0 kg /cm2
(c) 10.0 to 18.0 kg/cm2
(d) 25.0 to 35.5 kg/cm2

1-i. Chemical equivalent is the ratio of which of the following factors? (CO5) 1
(a) Work piece valence to the atomic weight
(b) Atomic weight to work piece valence
(c) Tool valence to molecular weight
(d) Molecular weight to tool valence

1-j. In ECM, gap increase proportional to which relation of time below? (CO5) 1
(a) Square of time
(b) Square root of time
(c) Cube of time
(d) Cube root of time

2. Attempt all parts:-

2.a. What is rake angle? What is the effect of nose radius in tools? (CO1) 2

2.b. What is climb milling and mention its advantages? (CO2) 2

2.c. What is the need of truing and dressing operations in a grinding wheel? (CO3) 2

2.d. Write the typical applications of ultrasonic machining. (CO4) 2

2.e. Define W/T (Tool Wear) ratio? (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. Derive the Merchant metal cutting theory with suitable diagram? (CO1) 6

3-b. What are the possibilities for tool failure? (CO1) 6

3-c. Explain parallel action and progressive action multi-spindle automatics? (CO2) 6

3-d. What is the principle of taper turning & explain briefly various taper turning methods? (CO2) 6

3.e. Explain: 1.Honing, 2.Super finishing, 3.Lapping, 4.Polishing, 5.Buffing. (CO3) 6

3.f. Compare the mechanical and electrical energy processes in terms of physical parameters. Shape capabilities, Process capability, and Process economy. (CO4) 6

3.g. Compare the Chemical Machining (CHM) with Electro-Chemical Machining (ECM) with respect to their process parameters. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. Calculate the specific energy and unit power in a turning process. The machining data are:Diameter of workpiece = 50 mm Cutting speed = 40 m/min Feed = 0.24 mm/sec Depth of cut = 1.8 mm Tangential component of force = 800 N Axial component of force = 290 N. (CO1) 10

4-b.	In an orthogonal cutting operation the following data have been observed: Uncut chip thickness(t) 10.127 mm, Width of cut (b) 6.35 mm, Cutting speed 2 m/s, Rake angle 10°, Cutting force 567 N, Thrust force 227 N, Chip thickness, 40.228 mm. Determine Shear angle, the friction angle, shear stress along the shear plane and the power for the cutting operation. Also find the chip velocity: shear strain in chip and shear strain rate. (CO1)	10

5. Answer any one of the following:-

5-a.	What are the different between compound indexing and differential indexing and explain its relative merits? (CO2)	10
5-b.	Explain the hydraulic drive of a horizontal shaper with neat sketch? (CO2)	10

6. Answer any one of the following:-

6-a.	Explain the various steps to be followed while developing the CNC part programs? (CO3)	10
6-b.	Sketch a broaching tool and explain the different nomenclature? (CO3)	10

7. Answer any one of the following:-

7-a.	State the working principle and construction detail of Abrasive Jet Machining. (CO4)	10
7-b.	What do you understand by the word “unconventional” in unconventional machining processes? Is it justified to use this word in the context of the utilization of these processes on the shop floor? (CO4)	10

8. Answer any one of the following:-

8-a.	Discuss about Electrochemical Honing and Electrochemical Grinding with suitable sketches. a. List out the advantages of ECG over conventional grinding. b. Mention the product application of ECG. (CO5)	10
8-b.	Briefly explain the following with respect to chemical machining: i) Characteristics of cut peel maskants ii) Selection of maskants iii) Advantages of photoresist maskant iv) Limitations of chemical machining. (CO5)	10