



Answer all the following questions (with the help of net sketches):

Question: 1

(18 Marks)

- a) What are the advantages of gear generation by shaping? (2 Marks)
- b) Why a heat treatment process is not recommended after gear burnishing? (2 Marks)
- c) Draw a sketch to illustrate the principle of gear lapping operation. (2 Marks)
- d) Explain the main advantages and limitations when using a gear shaping head. Is it a forming or a generating gear production method? (2 Marks)

- e) It is required to manufacturing a helical gear having pitch diameter 60 mm., normal module 2.77164 mm., module 3 mm. and the lead screw pitch of the milling machine table is 8 mm.
where: circle of holes in standard index plates:-
I:15,16,17,18,19,20 & II:21,23,27,29,31,33 & III:37,39,41,43,47,49
changing gears:- 17,18,19,20,22,24,26,28,32,36,40,44,48,56,64,72,86, 100,127, and (80,84,96). (10 Marks)

Question: 2

(27 Marks)

1. a) What are the conditions for which are used self-piloting tools? (3 Marks)
- b) Explain with the drawing the self-piloting drill classification. (6 Marks)
2. a) What are the variables affecting of the performance of the cutting honing process? (5 Marks)
- b) Compare between the processes of honing and superfinishing. (6 Marks)
3. a) Explain what is the lapping process? What are the objectives achieved by this process? (3 Marks)
- b) Draw with explaining of the lapping machines of flat surfaces? (4 Marks)

Question: 3

(15 Marks)

1. What is the necessity of NTM processes? (3 Marks)
2. Give the broad classification of nontraditional machining processes. (5 Marks)
3. With neat sketches, explain the working parameters of the EDM and USM processes (applications, advantages and limitations.) (7 Marks)

Question: 4

(30 Marks)

1. What are the main components of ECM and Laser machining? (5 Marks)
2. Make a comparison between Gas and solid state laser. (5 Marks)
3. Estimate the theoretical metal removal rate in ECM of Zinc workpiece at 1000 A, if the density is 7.13 g/cm³ and its chemical equivalent is 32.7 g. (8 Marks)

4. Consider He Ne laser with an output of 3 m W and Beam divergence of 0.003 degrees and Spot radius of 0.3 mm. Find beam brightness. (7 Marks)

5. Explain self-adjusting features in ECM processes. (5 Marks)

With our best wishes

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This exam measures the following ILOs

Question Number	Q1-a Q3-1	Q2-1-b	Q2-2-b Q4-2	Q1-c Q3-2	Q1-e Q4-3	Q2-1-a	Q2-2-a Q4-1	Q1-b Q4-4	Q1-d Q4-5	Q2-3-a	Q2-3-b Q3-3
Skills	a1-2	a1-1	a19-1	b13-1	b2-1	b18-1	b12-1	c19-1	c13-1	c18-1	c16-1
Knowledge & Understanding Skills			Intellectual skills				Professional Skills				