

Code No: 07A60308

R07**Set No. 2**

III B.Tech II Semester Examinations, APRIL 2011
MACHINE TOOLS AND METROLOGY
Automobile Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain with neat sketch the following operation in drilling.
 - (a) Spot facing
 - (b) Counter boring
 - (c) Counter sinking
 - (d) Tapping
 - (e) Trepanning
 - (f) Reaming
 - (g) Boring. [16]
2.
 - (a) What is a deviation? Explain its importance in the system of limits.
 - (b) Explain the disadvantages associated with trial and error method of assembly. [8+8]
3.
 - (a) Explain the conventional methods of representation of surface texture symbols?
 - (b) Explain the construction and working of Profilometer? [8+8]
4.
 - (a) Write brief notes, using sketches, on the classification, care and use of slip gauges.
 - (b) Write a short notes on profile gauges. [8+8]
5.
 - (a) Write short notes on:
 - i. Ray diagram
 - ii. Saw diagram
 - iii. flow diagram
 - iv. speed diagram
 - (b) What is kinematics drive? How it is obtained? [12+4]
6.
 - (a) What are multi check comparators? Explain.
 - (b) Explain how thread angle can be measured? [8+8]
7.
 - (a) What are the differences between compounding indexing and differential indexing? Explain the relative merits and demerits.
 - (b) Sketch plain milling machine and discuss uses of various parts in it. [8+8]

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8. (a) What are the advantages of surface finishing processes and their limitations?
(b) Give the specifications for the wheel to be employed for external cylindrical grinding of a shaft of 50mm diameter of steel SAE 1020. [8+8]

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1. Describe the principal features of International standard system of limits and fits for screwed work. [16]
2. (a) What are the advantages, limitations and applications of shaper?
 (b) What are the advantages, limitations and applications of slotter?
 (c) What are the advantages, limitations and applications of planner? [5+5+6]
3. (a) Sketch and explain the working principle of optical comparator?
 (b) Explain the pitch errors and angle errors in connection with screw thread measurement? [8+8]
4. (a) What are the various types of surface grinding methods that are possible?
 (b) What would be their individual advantages and applications? Give explanation for your reasoning. [8+8]
5. (a) Explain the construction and working of a clinometer.
 (b) Explain the steps involved in the determination of work piece angle using Sine bar. [8+8]
6. (a) Define tool signature.
 (b) Explain briefly with neat sketch
 - i. ASA system
 - ii. ORS system
 - iii. MRS system
 - iv. NRS system of tool signature. [4+12]
7. (a) Draw the block diagram of horizontal milling machine and explain briefly its various parts.
 (b) Calculate the time required to mill a slot of 300mm×25mm in a work piece of 300mm length with side and face milling cutter of 100mm diameter and 25mm wide and having 18 teeth. The depth of cut is 5mm, the feed per tooth is 0.1mm and cutting speed is 30m/min. Assume over travel distance of 5mm. [10+6]
8. (a) Describe the method of finding the profile error in a slip gauge interferometer?

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- (b) Calculate the R_a value of a surface for which sampling length is 8 mm, the graph was drawn to a vertical magnification of 1000 and the areas above and below the datum line were: [8+8]

Above:	180	90	155	55	mm ²
Below:	70	90	170	150	mm ²

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1. (a) What factors contribute to increased production rates in broaching?
 (b) Explain with sketch different elements of a broach and describe them brief. [8+8]
2. (a) Define speed, feed, depth of cut and machining time in shaper with sketches.
 (b) Define speed, feed, depth of cut and machining time in planner with sketches. [8+8]
3. (a) Draw the engine lathe neatly and show the parts. Explain the function of each part in details.
 (b) Describe the working principle of lathe. [8+8]
4. (a) Explain interchangeable assembly.
 (b) In an assembly of two parts of 50 mm nominal diameter the lower deviation of the hole is zero and upper deviation is 5 microns. While that of the shaft is - 8 and - 4 microns respectively. Estimate the allowance and type of fit. [8+8]
5. (a) Explain the following alignment tests on lathe.
 - i. True running of locating cylinder of main spindle.
 - ii. True running of taper socket in main spindle.
 (b) What are the advantages and disadvantages of mechanical comparators? [8+8]
6. (a) What is the difficulty in using the optical flat alone? How do you overcome this difficulty in the interferometer?
 (b) What do you understand by flatness of the surface? What is its symbolic representation? [8+8]
7. (a) Explain briefly with neat sketch primary and secondary motions of the horizontal turret, capstan and vertical lathe.
 (b) Discuss the limitations of automatic lathe and semi automatic lathe. [8+8]
8. (a) The slip gauge set M 38 consists of the following:

Range (mm)	Steps(mm)	Pieces
1.005	–	1
1.01 - 1.09	0.01	9
1.1 - 1.9	0.1	9
1.0 - 9.0	1.0	9
10.0 - 100.0	10.0	10

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Chose the suitable slips to give the following dimensions:

- i. 29.875 mm
- ii. 15.09 mm
- iii. 101.005 mm.

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1. (a) Explain the construction and working of sigma comparator?
 (b) List out various characteristics of a comparator? [8+8]
2. (a) What is principle of working of a shaper? Explain with neat sketch.
 (b) Mention the classification of jig boring machine? and explain salient features of each one. [8+8]
3. Write short notes on:
 - (a) Selection of cutting fluids
 - (b) Application of cutting fluids
 - (c) Maintenance of cutting fluids. [5+5+6]
4. (a) Define cross feed, longitudinal feed and vertical feed of a table in horizontal milling machine.
 (b) Sketch any four types of milling cutters and show the various angles. [8+8]
5. (a) Explain how the taper of a plug gauge can be checked using micrometer and slip gauges.
 (b) What are the requirements and advantages of dial indicator? [8+8]
6. (a) What do you understand by the term interchangeability? State its significance with regard to the mass production.
 (b) How tolerances are specified and indicated? [8+8]
7. Briefly discuss the following:
 - (a) Cam shaft grinders
 - (b) Piston grinders
 - (c) Thread grinders. [5+5+6]
8. (a) How surface texture is related to tolerances on a surface dimensions?
 (b) State the possible causes of each of the various types of irregularities found in surface texture. Show how surfaces having the same numerical assessment may have different properties and texture. [8+8]
