B   B7040

PART A
Answer any three full questions, each carries 10 marks.   Marks

1 a) Define tool signature. How is it related to tool geometry?   (4)

   b) Sketch the top view, front view and end view of a 25-mm square bit having tool signature of 15-15-10-10-15-10-3 and label all parts.   (6)

2 a) Clearly explain the utility of Merchant's Circle Diagram. How it can be plotted?   (4)

   b) A lathe while running consumes 2000W when cutting a steel specimen at 30m/min. Determine the cutting force and torque at the spindle running at 120 rpm. Also determine the specific power consumption if the depth of cut is 4 mm and feed is 0.25 mm/rev.   (6)

3 a) Discuss the relative merits and demerits of the different methods for machining external taper on lathe.   (4)

   b) State any six advantages of using cutting fluids during machining.   (6)

4 a) Sketch a fully labelled schematic diagram of a Radial Drilling Machine. List any four key design features that make it popular.   (6)

   b) Identify the possible causes for the following problems in drilling: (4)
   i) Drill breakage   ii) Oversized hole
   iii) Rough hole   iv) Breakage of outer corners of cutting edges.

PART B
Answer any three full questions, each carries 10 marks.

5 a) With the help of a fully labelled schematic diagram, explain the kinematic system provided in shaping machine for transmitting power and motion from the motor to the tool and job at desired speeds and feeds.   (6)

   b) With the help of neat sketches explain any two operations (other than machining of flat surfaces) that can be carried out using a shaping machine.   (4)

6 a) Compare and contrast (differentiate) shaping machine, slotting machine and planing machine.   (10)

7 a) Differentiate between up-milling and down milling operations.   (5)

   b) Show that the mean cross-sectional area of chip in plain milling is given by   (5)

$A_m = \frac{fW}{Nm}\sqrt{\frac{d}{D}}$; Where f = feed in mm/m; N = cutter rpm; D = milling cutter diameter; d = depth of cut; m = No of tooth in cutter; W = Width of work piece.

8   a)   With the help of simple sketches, explain any three common attachments used in Milling Machines.   (6)

     b)   Estimate the machining time that will be required to finish a vertical flatsurface of length 120 mm and depth 15 mm by an 8 teeth HSS end millcutter of 32 mm diameter and 60 mm length in a milling machine. Assume, cutting velocity = 30 m/min, feed = 0.12 mm/tooth.   (4)

PART C

Answer any four full questions, each carries 10 marks.

9   a)   With suitable sketches, clearly explain the similarities and differences between cylindrical grinding and centreless grinding.   (6)

     b)   The base of a brass bracket has to be rough ground to remove the unevenness. Suggest the most suitable grinding wheel for this purpose. Justify the choice of the wheel also.   (4)

10   a)   Differentiate between truing and dressing of a grinding wheel   (5)

     b)   Write a short note on the self-sharpening characteristic of a grinding wheel.   (5)

11   a)   Explain the basic principle of broaching.   (4)

     b)   Explain the kinematic system and operating principle of a swiss type automatic lathe with the help of a line diagram.   (6)

12   a)   With the help of a suitable illustration explain the concept of Digital Manufacturing.   (5)

     b)   With the help of a block diagram explain the Architecture of Digital Manufacturing System.   (5)

13   a)   Briefly outline the system modelling principle, modelling methods and modelling steps followed to create an abstract model of the digital manufacturing system.   (6)

     b)   Formulate the general mathematical model of the digital manufacturing system.   (4)

14   a)   Write short notes on the following models of digital manufacturing system: (8)
        i) Organization Model   ii) Function model
          iii) Information model   iv) Operation & Control Model

     b)   Explain the role of Bionic Mechanics and Manufacturing Intelligence in Digital Manufacturing.   (2)

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