BITS, Pilani –Dubai

Dubai International Academic City, Dubai, U.A.E

I Year I Semester 2009-2010

Comprehensive Exam

Course No. TA C112

Date: 28. 12. 2009

Max. Marks: 75

Course Title: Workshop Practice

Weightage: 25%

Duration: 3 hrs.

Notes:

- Answer all the questions sequentially
- Draw neat sketches wherever necessary
- Make suitable assumptions if required and clearly state them
- Dimensions of all the drawings are given in millimeters

Q1. A. What are the 5 M's of manufacturing? Briefly explain with sketch. [2.5M]

B. Define the following
(i) Unit Cell   (ii) Space lattice   [3M]

C. A wooden tip is 40mm wide, 80 mm deep and 1.5m long. It is subjected to an axial pull of 60 kN. The stretch of the member is found to be 0.75mm. Find the Young's modulus of the material.   [4M]

Q2. A. Determine the type of fit that can be obtained if the size of the hole and shaft are:

Hole: $35 {}^{-0.026}_{-0.065}$ mm and shaft: $35 {}^{+0.01}_{-0.011}$ mm   [5M]

B. With a neat sketch explain the geometry of twist drill.   [4M]

C. With neat sketch describe climb milling process   [3M]

D. Define the various types of load with a simple sketch   [4.5M]

Q3. A. With neat sketch explain Lever rule   [3M]

B. Differentiate between hot working and cold working.   [3M]

C. Explain the method of collapsible tube production with neat sketch   [4M]

D. Explain the following with a simple sketch

(a) Piercing   (b) Lancing   (c) Blanking   [6M]

Q4. A. Explain the importance of permeability in moulding sand. [2M]

B. Estimate the time required to machine a cast iron surface 200mm long and 180mm wide on a shaper with cutting – to – return ratio of 3:2. Use a cutting speed of 25 m/min, a feed of 1.5mm/stroke and clearance of 20 mm. The available ram strokes on the shaper are: 50, 60 & 70 strokes/min. Also, determine MRR assuming depth of cut as 5 mm on all sides. [5M]

C. The following component is to be made from cast iron by the casting process. The mould for the job is made using a wooden pattern. Determine the dimensions of the wooden pattern and suggest pattern type. Assume machining allowance is 3 mm on each side, shaking allowance of 1.5 mm on length and width, shrinkage allowance of 2.6% [5M]
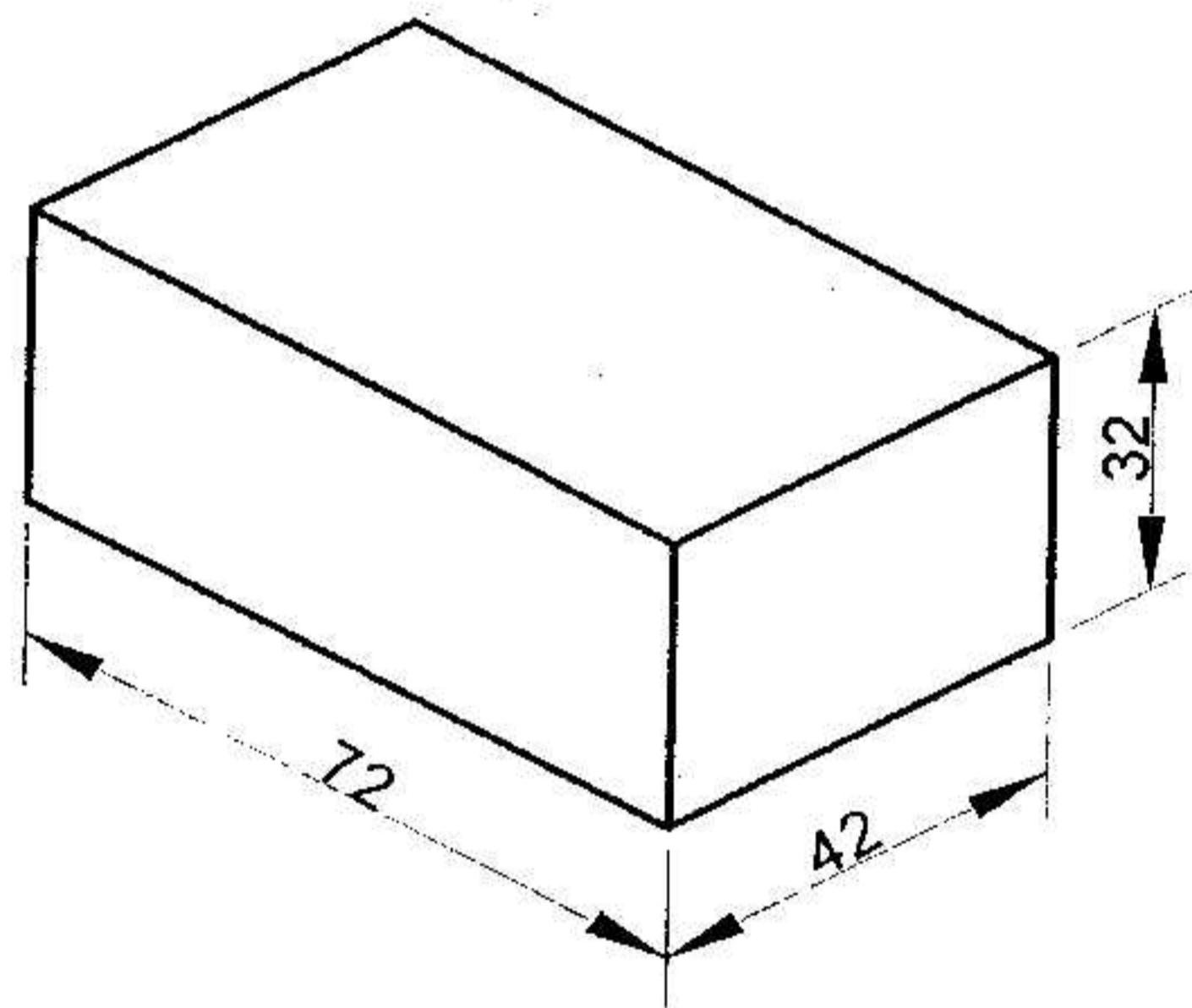
Q5. A. Describe electron theory of arc column [3M]

B. Discuss the principle of *EDM* process. Draw a sketch of the arrangement [5M]

C. What do you mean by line layout briefly explain with neat sketch? [3M]

Q6. A Final product has to be made by assembling part A1 in to the threaded part B1 shown in figure. Calculate the total machining time for manufacturing and assembling time for the components using the given data.
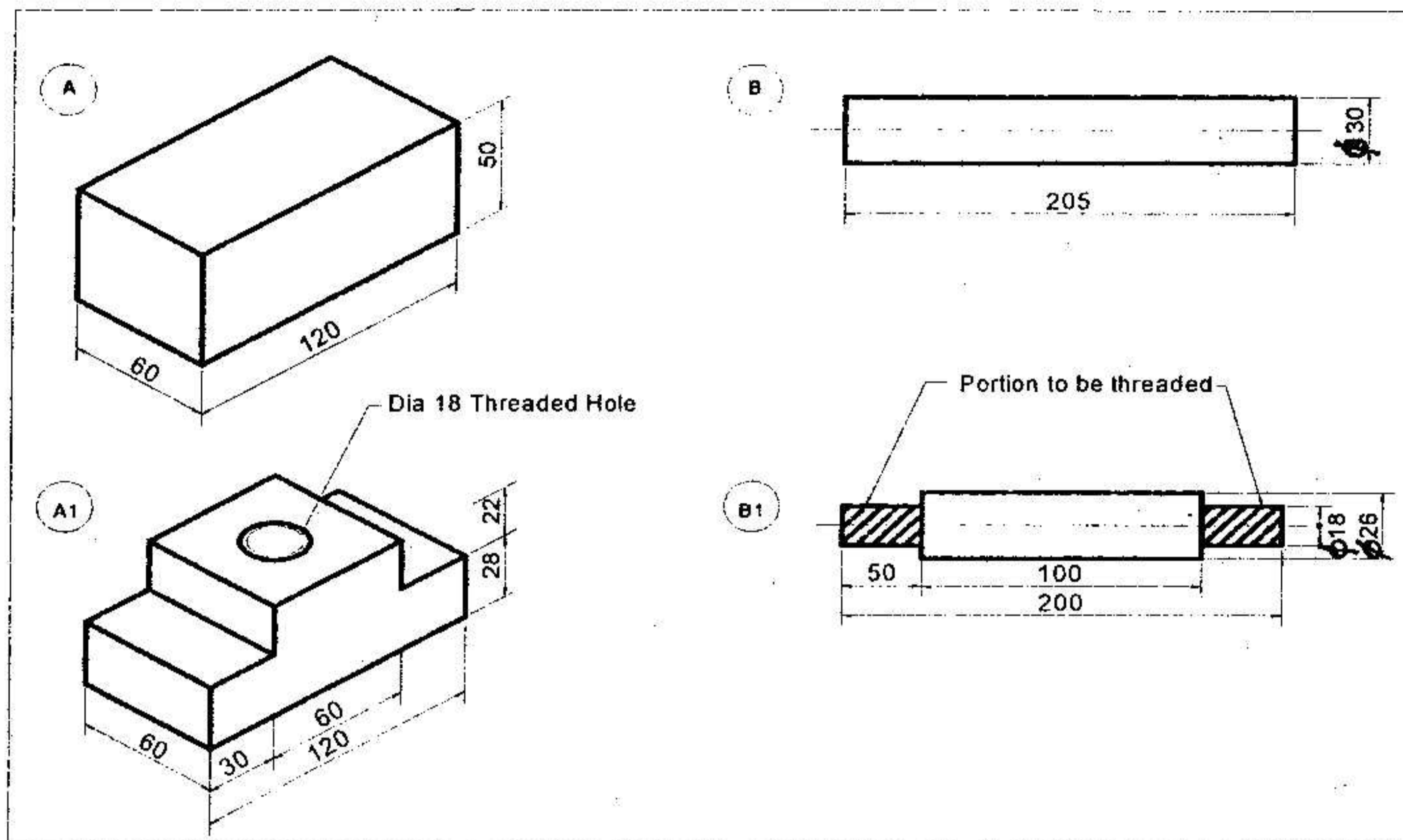
	Lathe	Milling	Drilling
Tool	HSS Turning Tool	HSS End Mill Cutter	HSS Twist Drill
Feed	0.3 mm/rev for facing 0.4 mm/rev for Straight & Step Turning	0.2 mm/tooth	0.1 mm/rev
Cutting Speed	50 m/min for facing 45 m/min for straight & step turning	25 m/min	35 m/min
Depth of cut	1.5 mm for facing 2 mm for turning	4.5 mm	Not applicable
Cutter diameter	Not applicable	32 mm	Not applicable
No. of teeth	Not applicable	10	Not applicable
Approach & Overtravel	Not applicable	16 mm	22 mm

Assume time for thread cutting is 1.4 min, time for tapping is 1.8 min and time for assembly is 0.5 min. neglect setup and idle time for operations. [10M]

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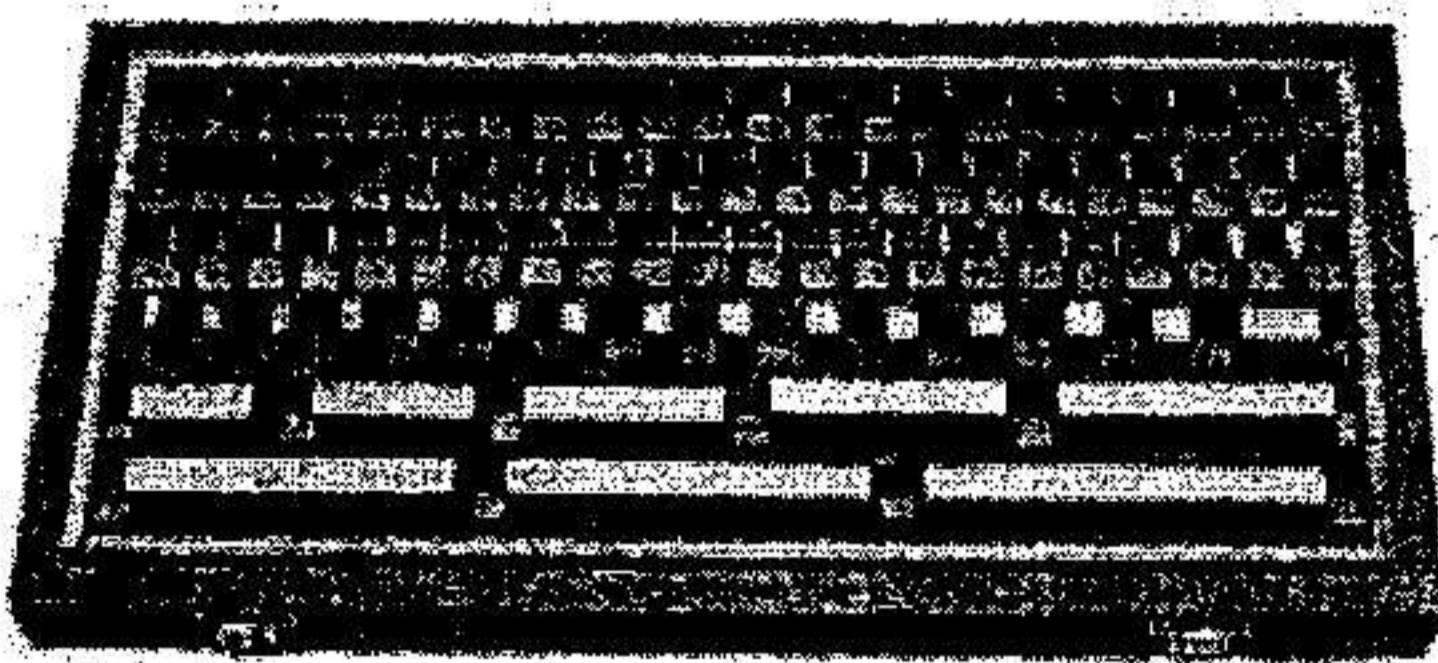**Date:** 13. 12. 2009   **Max. Marks:** 30   **Duration:** 50 min.   **Weightage:** 10%
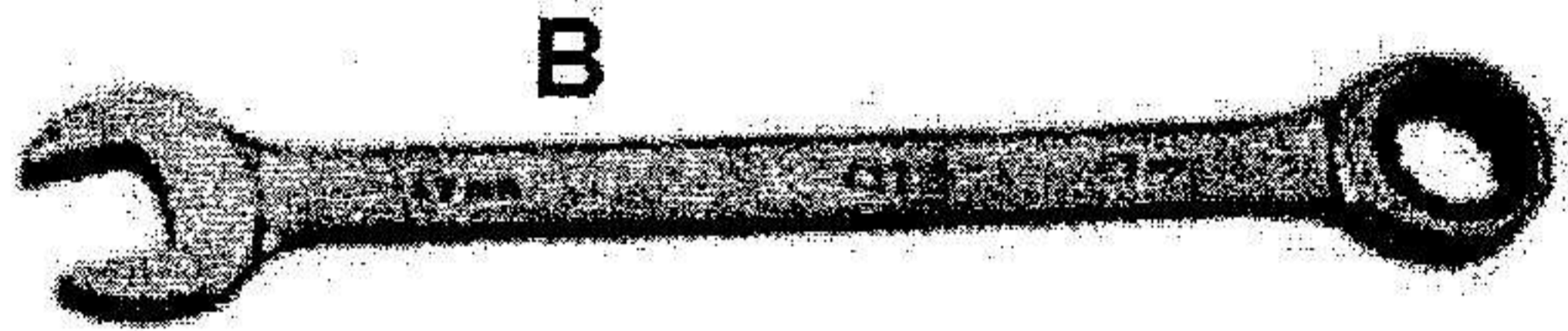
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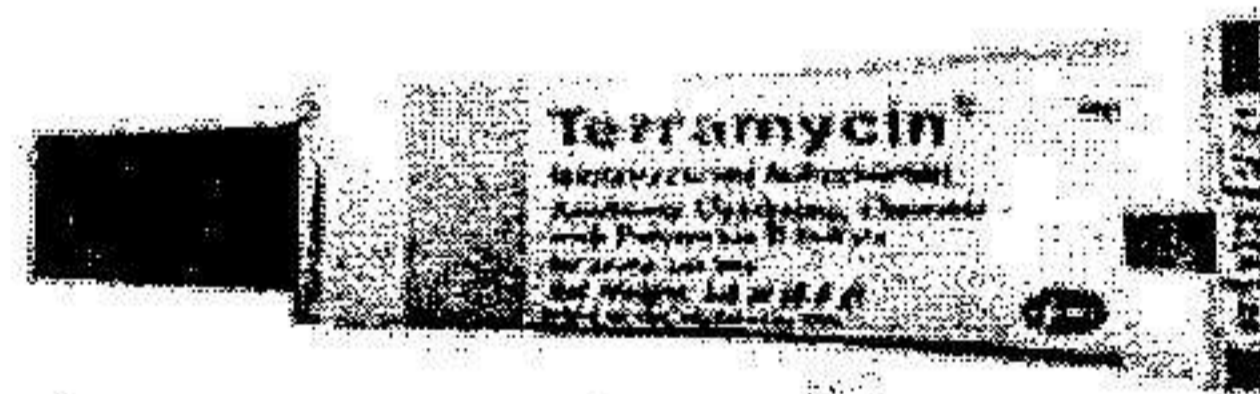- Dimensions of all the drawings are given in millimeters

Q.1. Suggest a suitable process for manufacturing the following components.

A
B
C

[4.5M]

Q2 A. Draw the phase diagram for the given data and calculate the % of phases present in 35 wt% of Cu & 65 wt% of Ni at 1300° C. (Melting Pt of Copper is 1084°C, Melting Pt of Nickel is 1453°C)

CU % wt	20	40	60	80
NI % wt	80	60	40	20
Solidification Start Temp. °C	1430	1390	1300	1210
Solidification End Temp. °C	1280	1200	1120	1080

Q2 B. Draw the equilibrium diagram of pure metal with suitable assumptions.   [5+1.5M]

Q3. A part shown in figure has to be manufactured from cylindrical bar. Suggest the suitable machine tool(s), cutting tool(s) and the sequence of operations (with dimensions) to be performed in a tabular form as shown. Raw material Dimension is Dia 52 mm X 160 mm.

[5M]
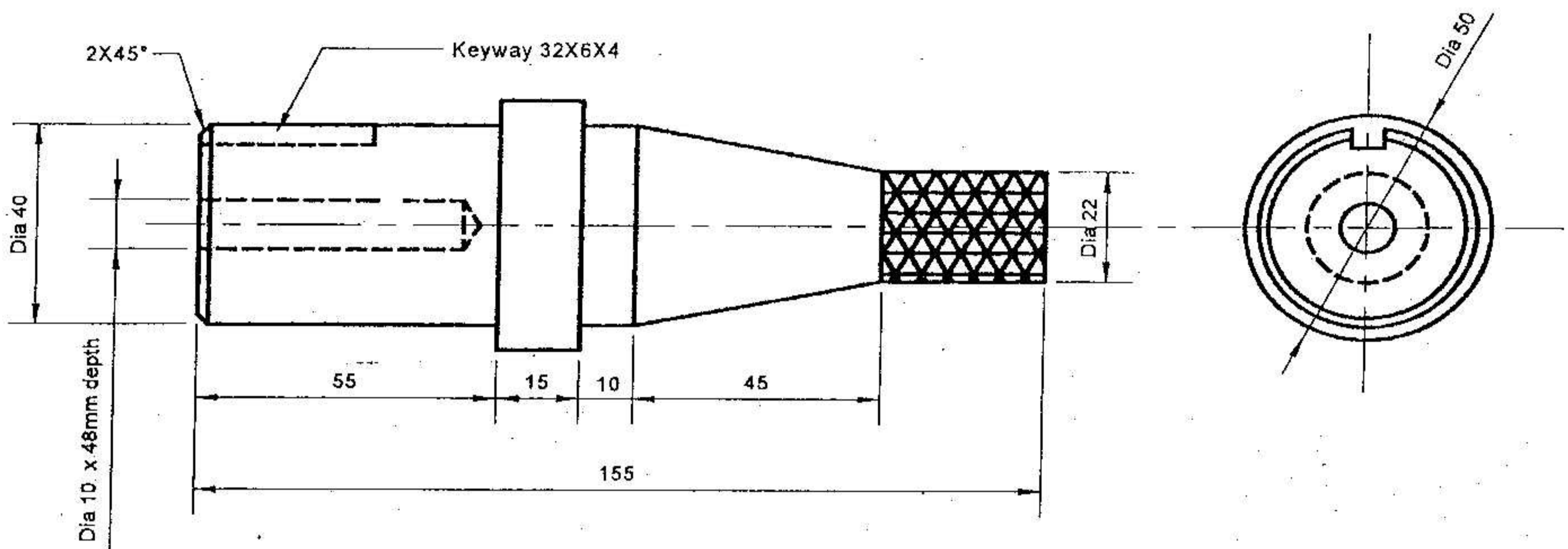
Sl.No	Machine Tool	Cutting Tool	Operation	Dimension
1				

Q4. The following component is to be made from cast iron by the casting process. The mould for the job is made using a wooden pattern. Determine the dimensions of the wooden pattern and suggest pattern type. Assume machining allowance is 2.2% for all the dimensions, shrinkage allowance of 1.4% and a draft allowance of 1.2°. **[6M]**
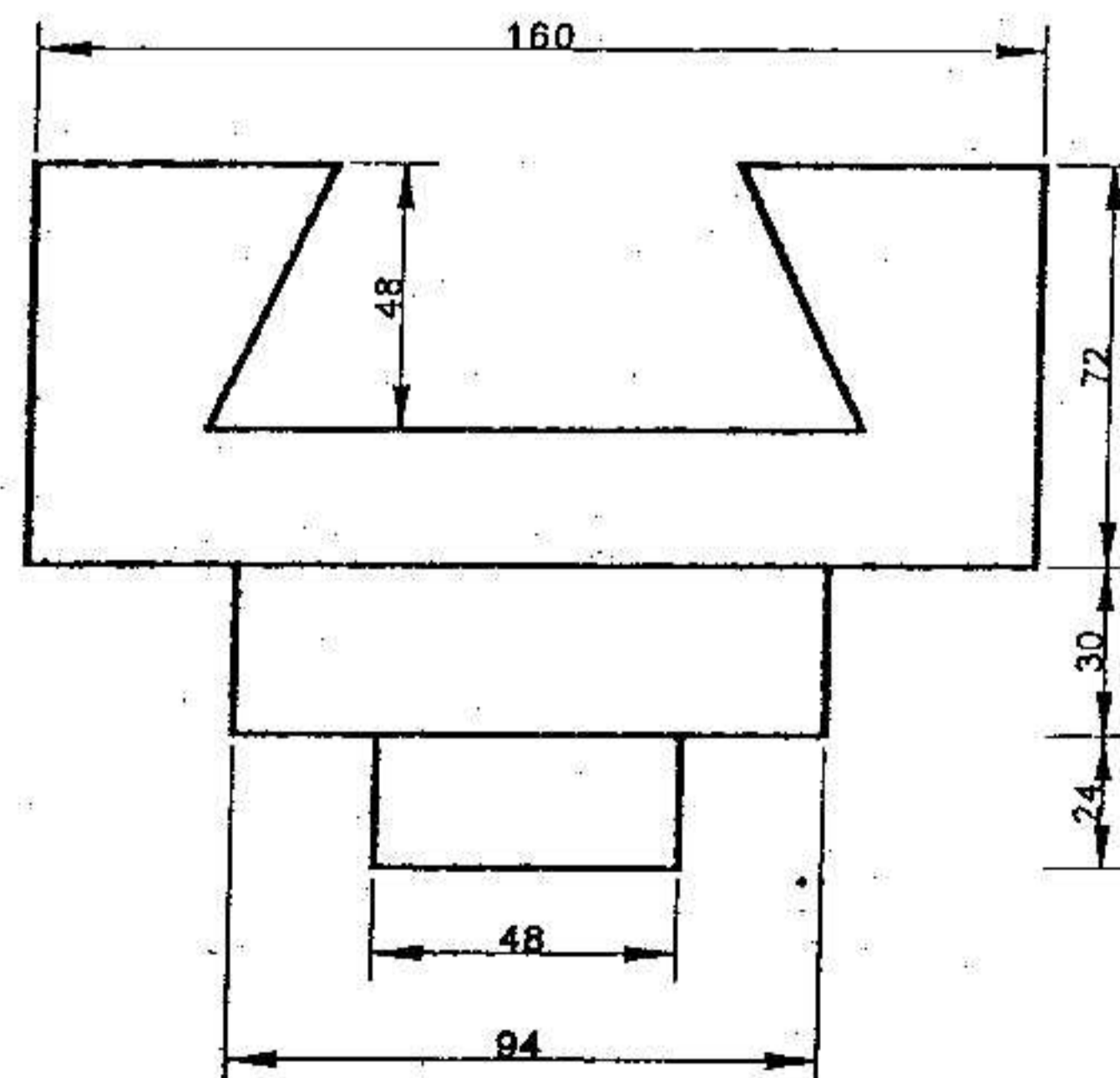
Q5. A Final product has to be made by assembling part A1 in to the threaded hole of part B1 shown in figure. In Part B for machining flat surface shaper is preferred. Calculate the total machining time for manufacturing and assembling time for the components using the given data.
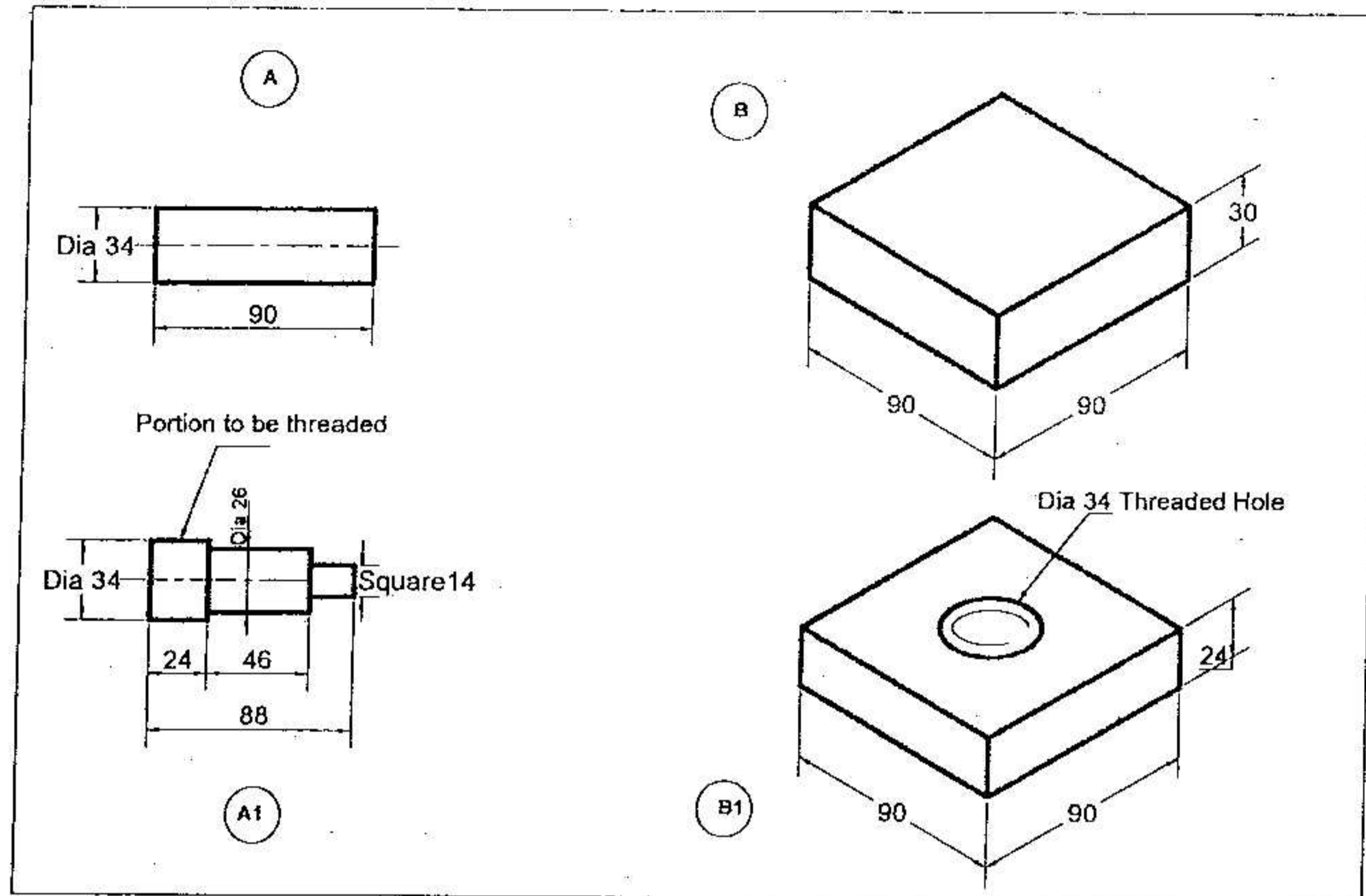
	Lathe	Milling	Drilling	Shaper
Tool	HSS Turning Tool	HSS End Mill Cutter	HSS Twist Drill	HSS Turning Tool
Feed	0.3 mm for facing 0.4 mm/rev for Straight Turning	0.2 mm/tooth	0.1 mm/rev	2.5 mm/stroke
Cutting Speed	60 m/min for facing 75 m/min for straight turning	65 m/min	55 m/min	6m/min
Depth of cut	1.5 mm for facing 2 mm for turning	3mm	Not applicable	1.2 mm
Cutter diameter	Not applicable	20 mm	Not applicable	Not applicable
No. of teeth	Not applicable	12	Not applicable	Not applicable
Approach and Over travel	Not applicable	15 mm (Including L1)	22 mm	Not applicable
Cutting to return ratio	Not applicable	Not applicable	Not applicable	2:3
Clearance	Not applicable	Not applicable	Not applicable	15 mm

Assume time for thread cutting is 0.6 min, time for tapping is 1.76 min and time for assembly is 0.5 min. neglect setup and idle time for operations.   [8M]

ALL THE BEST

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Max.Marks: 30   **Weightage:** 10%

Date: 25-10-2009   **Duration:** 50 min.

Notes:
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C   A. List different **manufacturing processes** and give examples of the components made by these processes.   [3M]

       B. List the factors to be considered before selecting the manufacturing process for producing a component   [2M]

Q 2.   A. Write the **crystal structure** for the following materials:

           i). Zinc   ii).Sodium   .iii).Gold.   iv) Iron   [2M]

       B. Data obtained for tensile test of bronze specimen (length x 60mm (b) x 90mm (d)) is given below. Poisson's ratio =0.34, Δb = 0.72mm, Δl = 5.25mm. Calculate original length of the specimen.   [4M]

Q3.   A. Draw the engineering stress-strain curve for the given data and calculate ultimate tensile stress, fracture stress, necking strain and fracture strain.

Engineering Stress (MPa)	120	160	180	205	215	210	207	190	160	125
Strain	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5

                                                                   [3M]

   B. Briefly explain ductile fracture with neat sketches.   [3M]

Q4. A. Explain

i. What is the difference between accuracy and precision? Give an example for each.

ii. Zero quality control [4M]

B. The dimensions of shaft and hole are $50^{-0.020}_{+0.025}$ and $50^{-0.010}_{+0.005}$ respectively. Identify the type of fit that can be obtained. [4M]

5. The following figure shows a Single point cutting tool. Mention what is "A","B","C","D","E" &"F"
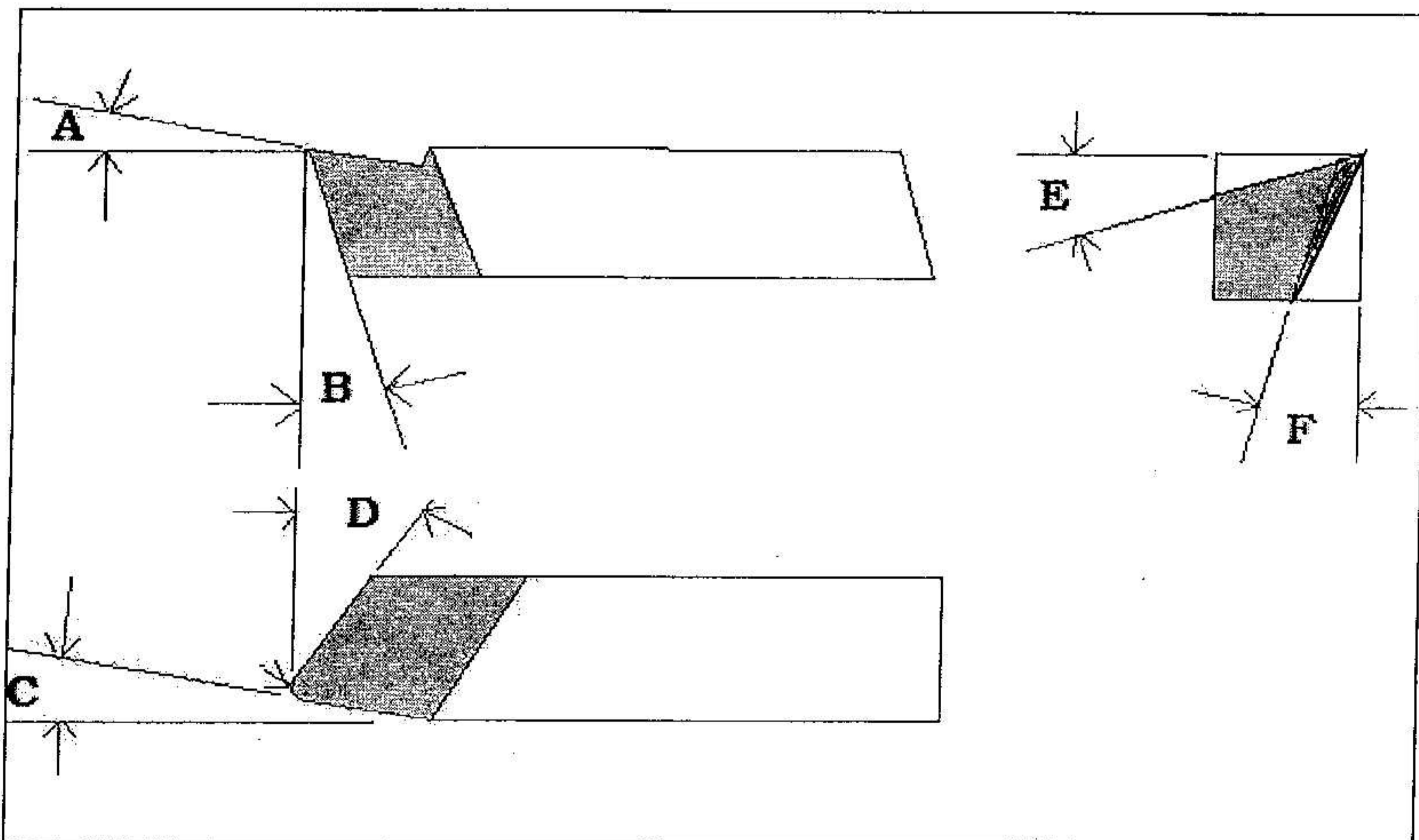
[3M]

(B) Write the composition and properties of the following HSS tool material.

(i) 18-4-1   (ii) Super HSS

[2M]

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