(A) (1)

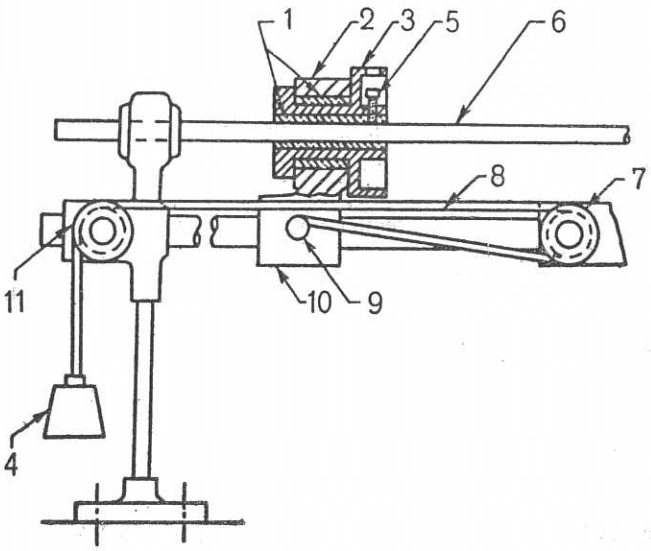
SCHEME OF VALUATION

(Scoring Indicators)

(11)

Revision: 2015 Course code: 6021

COURSE TITLE: ADVANCED PRODUCTION PROCESSES

Qst.	Scoring Indicator	Split up score	Sub Total	Total
I 1)	straight cutter holder, Multiple cutter holder, Knee tool holder, adjustable angle cutter holder, knurling tool holder, Tap holder	½ x 4		2
2)	Three arms, Four arms, Five arms and Machining centers with pallet changer.	½ x 4		2
3)	Broaching is applied in mass production for machining various internal and external surfaces for round or irregular shaped holes, for external flat and contoured surfaces.			2
4)	Dressing removes loading and breaks away the glazed surface so that sharp abrassive Particles are again presented to the work.			2
5)	Manipulator, controller, End effectors, Sensors, Energy source.			2
	PART - B			
II. 1)	 **Figure 4.6 Bar feeding mechanism** 1. Chuck bush, 2. Sliding bracket body, 3. Bar chuck, 4. Weight, 5. Bar chuck set screw, 6. Bar, 7, 11, Pylley, 8. Chain, 9. Pin on the sliding bracket, 10. Sliding bracket			

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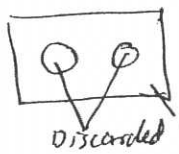
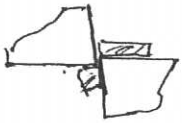
	~~mechanism~~ The bar *6* is passed through the bar chuck *3*, spindle of the machine and then through the collet chuck. The bar chuck *3* rotates in the sliding bracket body *2* which is mounted on a long slide bar. The bar chuck *3* grips the bar centrally by two set screws *5* and rotates with the bar in the sliding bracket body *2*. One end of the chain *8* is connected to the pin *9* fitted on the sliding bracket *10* and the other end supports a weight *4*, the chain running over two fixed pulleys *7* and *11* mounted on the slide bar. The weight *4* constantly exerts endthrust on the bar chuck while it revolves on the sliding bracket and forces the bar through the spindle, the moment the collet chuck is released. Thus bar feeding may be accomplished without stopping the machine.)	Fig 4 note 2		6
2	A reconfigurable manufacturing system is one designed at the outset for rapid change in its structure. ideal RMS possess six core RMS characteristics - modularity, integrability, customized flexibility, scalability, convertibility & diagnosability. The components of RMS are CNC machines, Reconfigurable machine tools ~~Reconfigurable~~ inspection machines and material transport systems, that connect the machines to form the system.	6		6
3)	Piercing  The hole is the desired product.  notching - metal pieces are cut from the edge of a sheet or strip.  shearing - The parts obtained by removing a thin strip of metal along the edge.	2 2 2		6
4)	1) Reduces the operation time ② It increases the machining accuracy ③ Facilitates uniform quality ④ Reduces overall cost of product. ⑤ Unskilled operators can do the job ⑥ Ensures inter changeability of components ⑦ It reduces the operators labour.	6 x 1		6

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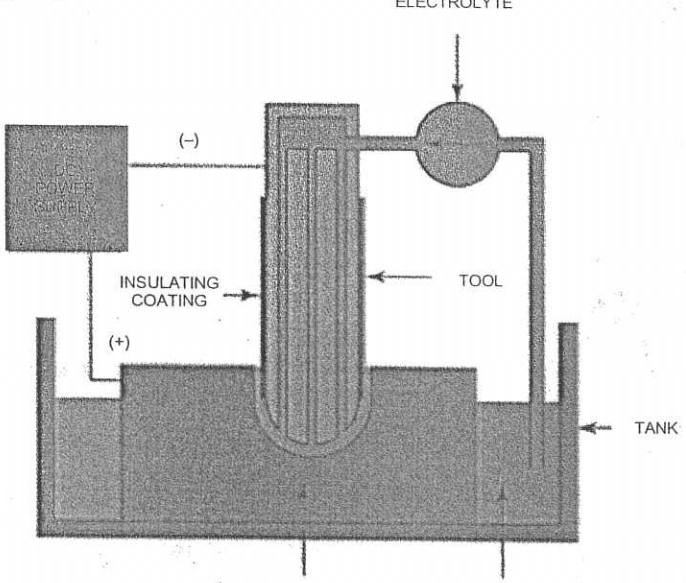
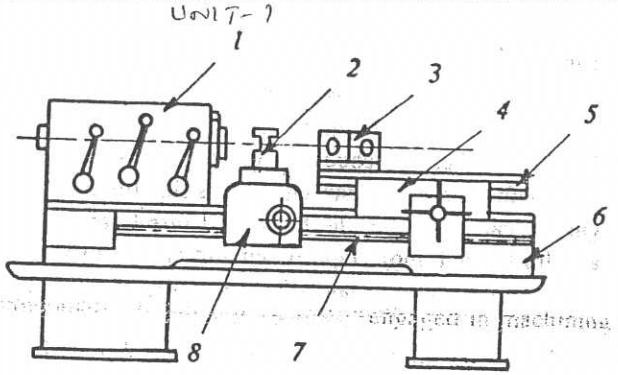
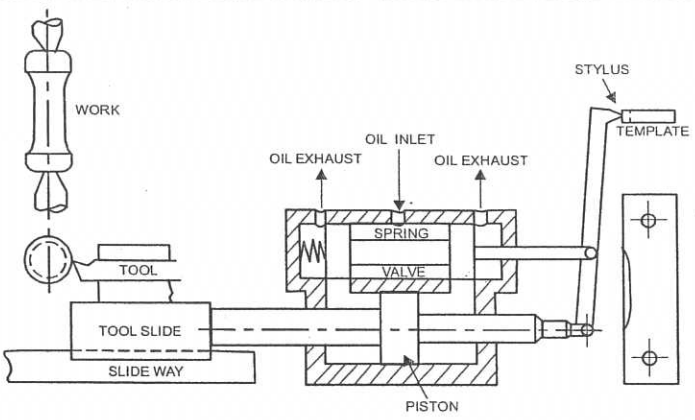
5.	constant factors – material to be removed, Amount of material to be removed wheel contact, Type of grinding machine Variable factors wheel speed, work speed, condition of the machine skill of operator	3 3		6
6	 The workpiece is assembled in fixture and tool is brought close to the work piece. The tool and work piece is immersed in a suitable electrolyte. After that, current is applied across the workpiece (anode) and tool (cathode). The removal of material starts.	Fig (4) 2		6
7)	CAD - computer Aided Design – use of computers for designing products, processes or systems. CAD system offers the opportunity to develop database to manufacture the designed product. CAM - computer Aided manufacture - it implies the use of computers to monitor and control the manufacturing process as a whole.			6

SCHEME OF VALUATION

(Scoring Indicators)

Revision:		Course code:		
Qst.	Scoring Indicator	Split	Sub	Total
5 - a)	UNIT - 1  **Figure 4.3 Capstan lathe parts** 1. Headstock, 2. Cross-slide toolpost, 3. Hexagonal turret, 4. Saddle for auxiliary slide, 5. Auxiliary slide, 6. Lathe bed, 7. Feed rod, 8. Saddle for cross-slide.	Fig. 6		8
b)	**Hydraulic System :** Brief note The hydraulic system for lathe tracer controlled copying unit is shown in Fig. 2.7. It has the advantage of having very little contact pressure between the stylus and template.  Fig. 2.7 Hydraulic Servo Copying System for a Lathe The hydraulic units are basically servomechanism which magnifies a relatively small input force or signal in order to provide a larger output force or signal for operating the mechanism. This output signal from the servo mechanism must	2	Fig 5 not - 2	7

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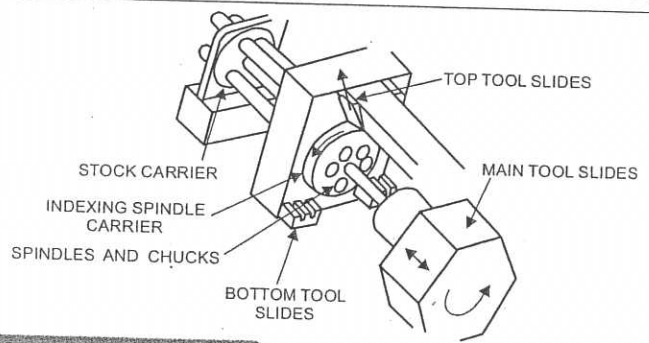
IV a) 1) The head stock of a turret lathe is heavier than the head stock of engine lathe.
2) In turret lathes, the tail stock of an engine lathe is replaced by turret that hold six or more tools
3) In engine lathe one tool is used in one time where as in turret lathe two or more tools can be used
4) Turret lathes are suitable for mass production Engine lathes are not economical for mass production
5) Turret lathe lead screw is not used. Usually die head are used
b) 6) In turret lathes centre rigidity is required for holding the work.
7) Rapid machining of any quantity of identical parts is possible with initial tool setup

8

IV b) **Multi - Spindle Lathes :**

Multi-spindle (semi-automatic or automatic) lathe has from two to eight work-rotating spindles. Multi-spindle automatic lathes are widely used in mass production. More production is possible due to the increased number of operations that can be performed at the same time on one lathe. But their machining accuracy is comparatively lower.

A schematic diagram of multi-spindle automatic is shown in Fig. 2.4.1.



2.4.1 Multi-Spindle Automatic Machine

Fig - 5
note - 2
} 7

Each of the spindle is provided with a spring collet chuck through which bar stock is passed and each rotates as in a single spindle machine. Suitable cutting tools such as drills, taps, reamers etc., are located in front of the each spindle. The cross-slides are provided with other cutting tools of turning, forming and cutting-off operations. At the finish of an operation, each spindle rotates progressively from one position to another until the cycle is completed.

SCHEME OF VALUATION

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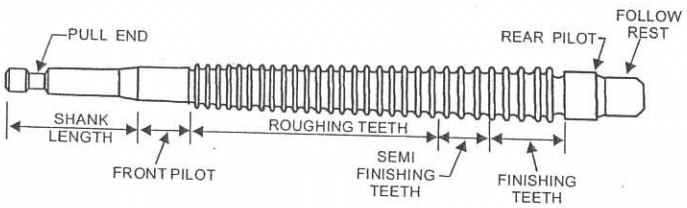
V.a) The first roughning tooth is the smallest tooth on broach. Rough teeth are designed to cut heaviest metal. The next portion has semifinished teth which are progressively increase in size upto and including first finishing tooth. Finishing teeth are desgined for lighter cuts, and last few finishing teeth are made of same size to attain high degree of accuracy and surface finish. In some broaches last few teeth edges are rounded for burnishing action. The various parts of typical internal pull broach is shown in ~~fig 14.2~~.

Fig- 6
note- 2

8



b) casting, Powder metallurgy, Plastic moulding, Stamping, Extruding, coining, Rolling, Machining

7x1

7

VI. a)

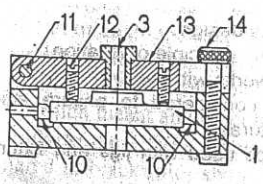


Figure 14.31 Leaf jig
1. Work, 3. Drill bush, 10. Buttons, 11. Hinge pin, 12 Set screw, 13. Leaf,

Fig- 5
note- 3
} 8

Leaf jig : The leaf jig illustrated in Fig.14.31 has a leaf or a plate *13* hinged on the body at *11* and the leaf may be swung open or closed on the work for loading or unloading proposes. The work *1* is located by the button *10* and is clamped by set screws *12*. The drill bush *3* guides the tool.

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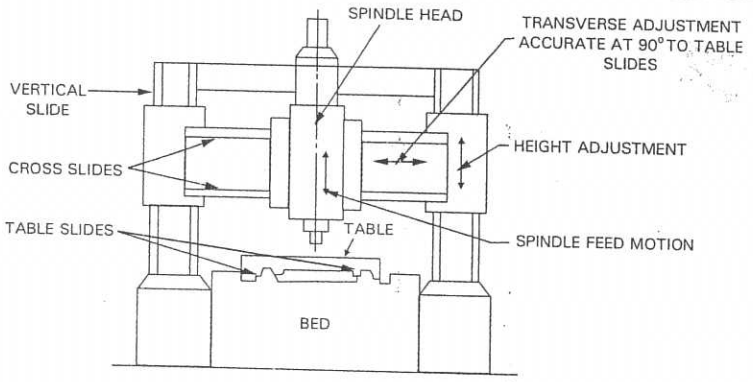
VI-b	***Cross-rail Jig boring machine :*** It is a planer type jig boring machine. It has a cross-rail, which is supported on two vertical columns. The cross-rail carries a vertical spindle on its housing. The table is supported on the base of machine and it has reciprocating movement for adjustment of the work. The hole location is provided by the longitudinal movement of the table and 'traverse' movement of the spindle along the cross-rail. The various parts of planer type jig boring machine are shown in Fig. 8.4.  Fig - 5 note - 2 } 7			
VII-a)	UNIT-III Natural abrasives - sand stone, emery, corundum and diamond. sand stone is relatively soft. Emery and corundum are natural aluminium oxide Artificial abrasives - silicon carbide - 52% silica sand 38½% coke 12% saw dust, 2% sodium chloride in an electric furnace. aluminium oxide - bauxite + ground coke all iron oxide + titanium oxide etc mixed with ground coke and iron borings in a arc type electric furnace.			8

SCHEME OF VALUATION

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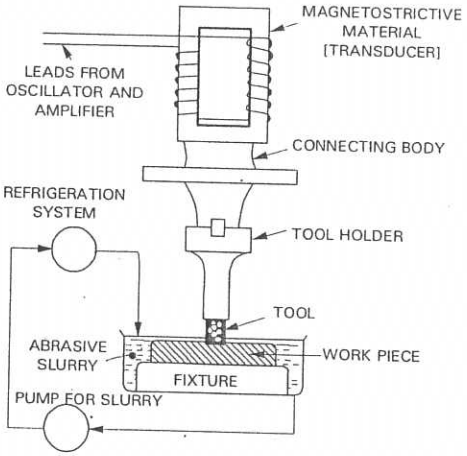
Qst.	Scoring Indicator	Split	Sub	Total
VII-b	 Fig. 11.2 Ultrasonic Machining ***Process Description :*** The ultrasonic machining uses a magneto strictive type transducer which generate linear vibrations at high frequency and minimum amplitude. These vibrations are transmitted to the tool by means of mechanical devices. The mechanical focusing device that provides vibrating motion to tool is called *velocity transformer*. The tool moves in the direction of vibrations and forces the abrasive particles on the work piece. These abrasive particles are mixed with water to form slurry, and the abrasive slurry must be continuously circulated between the tool and workpiece in order to bring fresh grains into the action at the work-tool gap. The circulation of slurry is maintained by the pump. Due to the impact of abrasive grains on workpiece metal is removed. The form of the tool tip is confined to cavity to be produced in the workpiece. The slurry takes away the worn out grains. It also acts as a coolant and dissipate heat from the tool and workpiece.		Fig-4 note-3	7
	OR.			
VIII-a)	Mounting – The method of fixing the grinding wheel on the spindle. Before mounting the wheel should be inspected for cracks. After mounting it should be balanced. Truing – It involves removing any high spots on the wheel, thereby wheel runs concentrically Dressing – The purpose of dressing is to remove dulled abrassive grains and improve the cutting action of a grinding wheel			8

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VIII-b **5.2 Powder Method :**

In powder method, coating metal is in the powder form and is fed from the container through a rubber hose to spray-gun. The powder-spray method uses an oxyacetylene welding torch with modified tip which permits the powdered metals to be sprayed through the flame. A gas or compressed air convey the powder metal to the torch tip. Fuel gas can be acetylene or hydrogen. The principle of powder method is illustrated in Fig. 10.3.

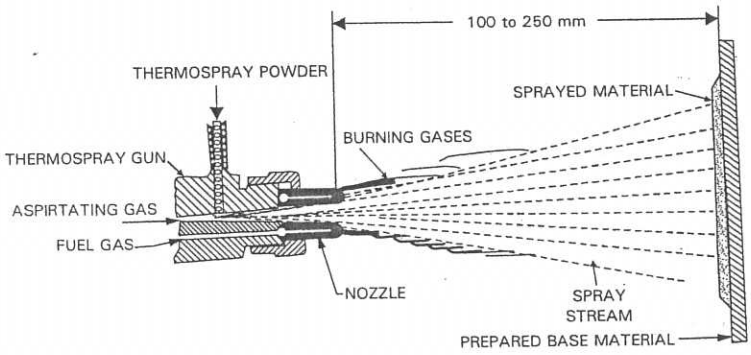


Fig-5 note-2

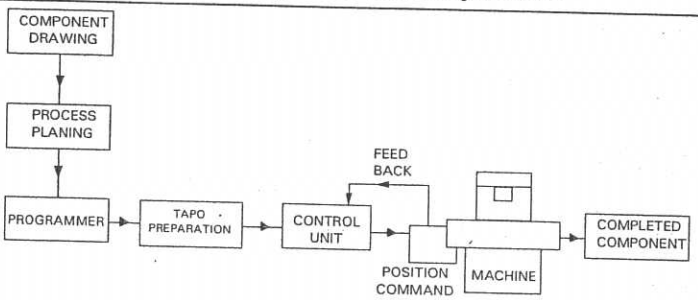
10.3 Powder Method

In this case, coating metal is already in the atomised form and hence air is required to deposit the molten metal on the surface being coated.

UNIT- IV

IX 9) In NC machine tools (Fig. 12.10) the operator functions are under taken by data processing unit of the system and the control unit. In data processing unit, the component drawings are translated into a form acceptable to the control unit. Here, the coordinate information is recorded on a tape, and the tape is fed to control unit. The control unit feeds the position command information to slideway transmission elements of the machine, and the command signal is constantly compared with the actual position achieved. The difference in two signals, if any, is corrected to get the desired product.

Fig-4 note-4 } 8



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1x-6

13.7 TYPES OF JOINTS :

A joint permits relative motion between two links or arms of a robot. Various types of mechanical joints are:

(i) *Linear joint (L-joint)* : Permits linear sliding motion between two links whose arms are parallel.

(ii) *Orthogonal joint (O-joint)* : Permits linear sliding motion between two links which are perpendicular to each other.

(iii) *Rotational joint (R-joint)* : Provides rotational relative motion of the joint, with the axis of rotation being parallel to the axes of the two links.

(iv) *Twisting joint (T-joint)* : Permits rotary motion between two links, the axis of rotation being parallel to the axes of the two links.

(v) *Revolving joint (V-joint)* : Provides rotary motion; the axis of the input link is parallel to the axis of rotation, and the axis of out put link is perpendicular to the axis of rotation.

7

Fig. 13.3 illustrates various types of joints.

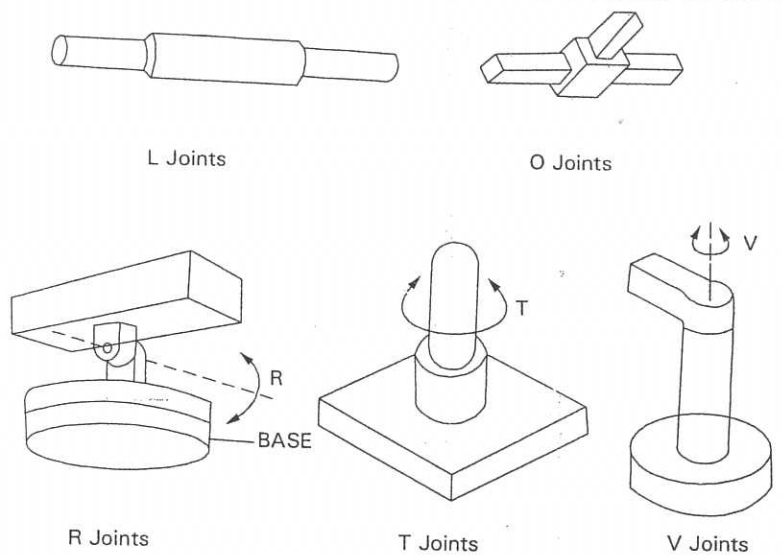

Fig. 13.3 Types of Joints

OR.

Xa) Advantages - All parts with specified size can be manufactured.
set up time to virtually eliminated
High flexibility

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Qst.	Scoring Indicator	Split	Sub	Total
	The system is adopted to CAD/CAM Better predictability Easy control of operation and scheduling Limitations Design is complicated costly to build. ~~Le~~ consistency of raw material becomes important Fixtures can sometimes cost more with FMS.			8
X b)	1) Load carrying capacity 2) Speed movement 3) Reliability 4) Repeatability 5) Arm configuration 6) Degree of freedom 7) control system 8) Program memory 9) Work envelop.			7