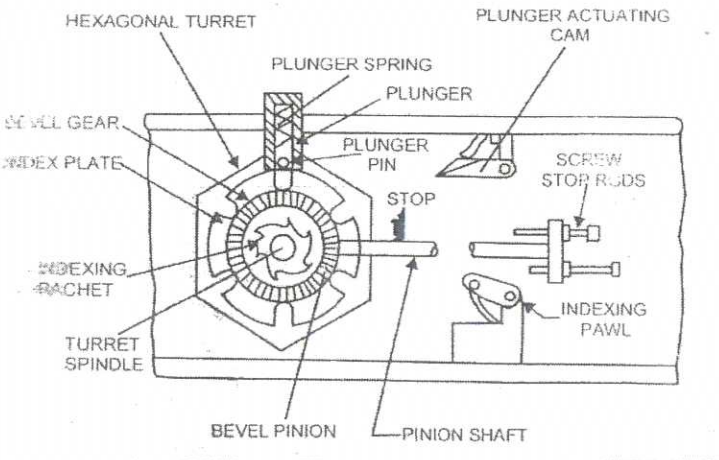
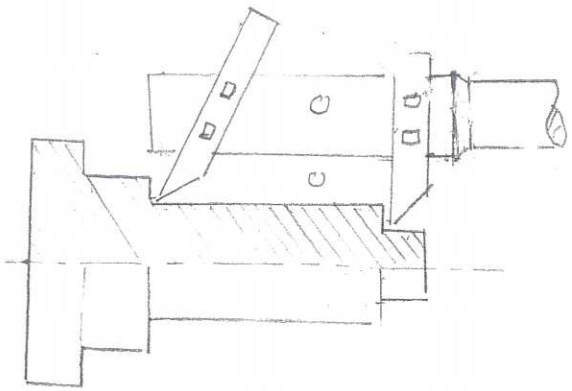
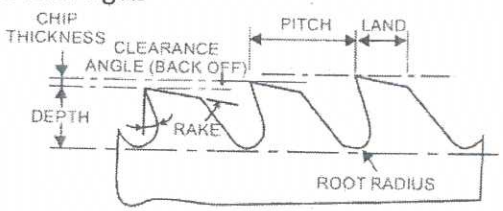
SCHEME OF EVALUATION

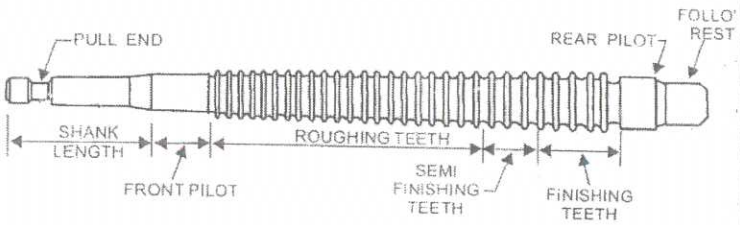
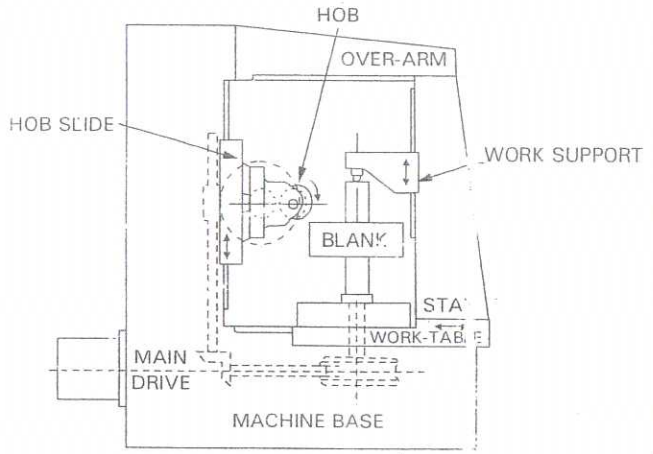
(SCORING INDICATORS)

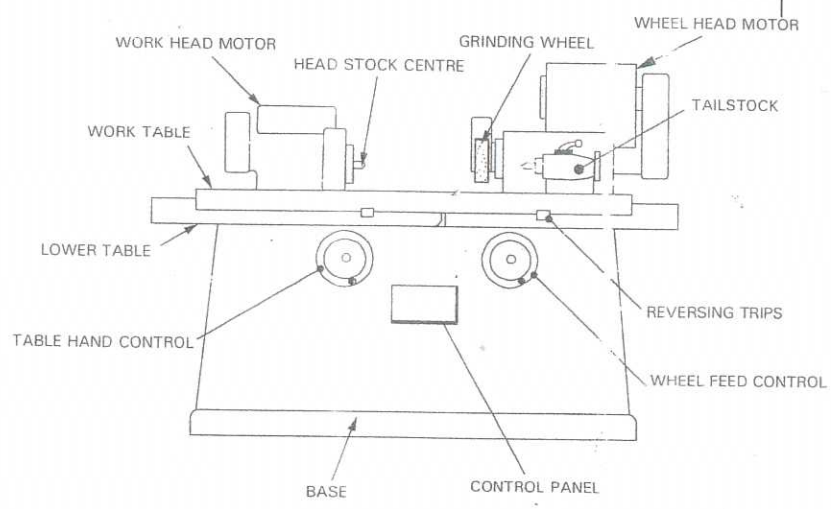
Revision: 2015. Course Code: TED (15) 6021

Course Title :ADVANCED PRODUCTION PROCESSES

Qst. No.	Scoring Indicator	Split up score	Sub total	Total
I .1	Automation is the use of machines and technology to make processes run on their own without manpower	2	2	2
I.2	Piercing of punching is a process of making a desired hole by using a punch and die.The blanked part is waste and sheet with a hole left on the dies is a desired product	2	2	2
I.3	Silicon Carbide SiC, Aluminium OxideAl2 O3 ,Boron carbide,Cubic boron Nitride	ANY 2x1	2	2
1.4	A technology comprised of a mechanical manipulator,sensors,software, and computer control which provides programmable automation capabilities called Robotics	2	2	2
1.5	AJM,USM,ECM,EDM,LBM	Any 4X 1/2	2	2
II.1.	INDEXING MECHANISM 	Exp,2 Fig.4	2 4	6

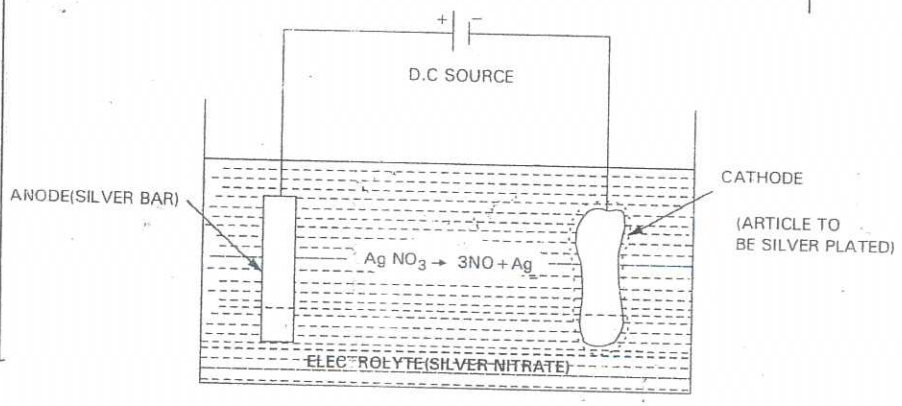
	WORKING OF INDEXING MECHANISM The plunger locks the index plate by spring pressure and prevents rotary movement when the turret is moving forward. During this advancement the tool held in the turret performs its operation. Now indexing of turret is done during backward motion of the turret. At backward position of turret, the actuating cam lifts the plunger out of the groove and unlocks index plate. This is due to riding of the pin on the bevel surface of the cam. By this time, the spring loaded pawl engages with a groove of the ratchet plate causes the ratchet to rotate as the turret moves backward.			
II.2.	1.Straight cutter holder 2.Multiple cutter holder 3.Knee tool holder 4.Flange tool holder 5.Knurling tool holder 6.Form tool holder Multiple cutter Holder:- It can accommodate double tools in its body as shown in figure.It facilitates taking multiple cuts with more than one tool from the same tool station 	1/2X4 Exp.1 Fig 3	2 1 3	6
II.3	Nomenclature with figue  Nomenclature of Broach Tooth Pull broach figure with details	2 4	2 4	6

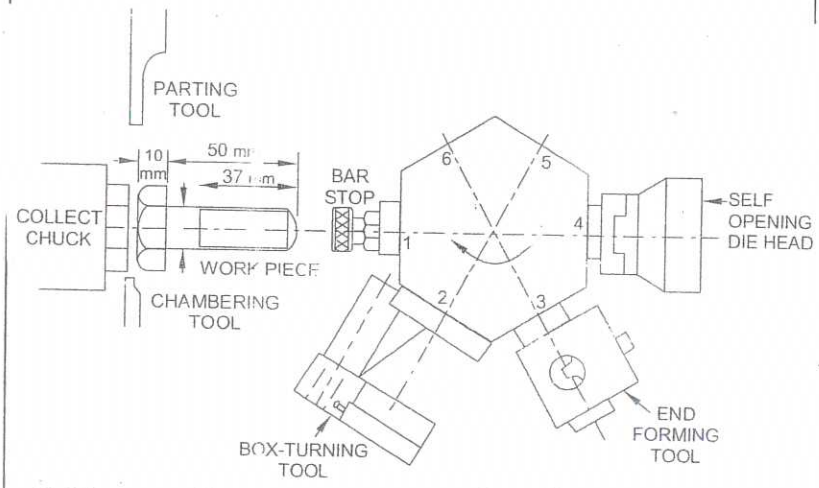
	 Internal Pull Broach			
II.4	Hobbing machine is used to generate gears at a faster rate.The hod is mounted on a spindle which is carried in the hob slide.Hob side can e traversed vertically in either direction.The spindle head can be tilted about its axis and set at any desired angle for cutting helical gears. The gear blank is mounted on a vertical arbor which is carried on the work table .arbor is supported at top bracket which is mounted upon slide ways or vertical stay.an over arm is provided to stiffness and to ensure complete rigidity during cutting. Fig.  Gear Hobbing Machine	expX2 figX 4	2 4	6
II.5	Cylindrical grinding:- In cylindricalg grinding the work is mounted between the centres and rotated against the grinding wheel. The work may also be held in a chuck for certain operation.	Exp X1 figX5	1 5	6



Cylindrical Grinding Machine

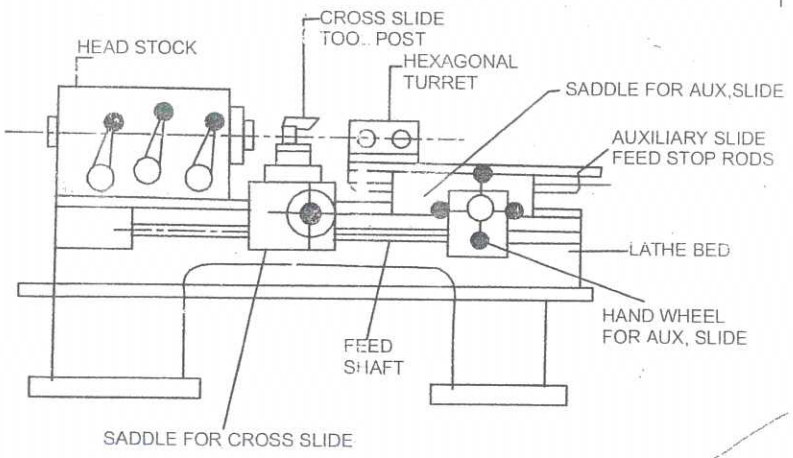
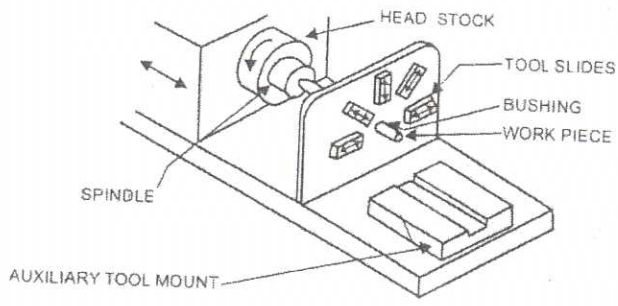
II.6	1.Electroplating 2.Hot dipping a)Galvanising b)Tin coating c)Parkerinsing 3.Anodising 4.Metal spraying Electroplaiting:- Electroplating is the most popular means of applying metallic coating.The theory of electroplating is based on Faraday's Law s of electrolysis.The principle of electroplating is that when DC is passed through electrolyte causes the metallic elements to separate from the solution and are migrated to the cathode(work piece) forming a deposit of pure metal.The particles from the anode (plating metal) pass into the soltionto maintain the concentration.	4X1/2 Fig & exp 4	2 4	6



II.7	1.Programming for NC,CNC and industrial robots 2.Design of dies and moulds for casting, and complex dies for sheet metal operations. 3.Design of tool and fixtures. 4.Quality control and process planning. 5.Inspection and scheduling 6.Plant layout.	6X1		6
III.(a)		figX4 seqX4	4 4	8

SEQUENCE

1. Hexagonal bar stock is used. In the turret faces, bar stop, box turning tool, end forming tool and self opening die head are mounted.
2. For each tool position, the length of travel of the turret is set by feed stop screws.
3. Chambering tool is held is the front tool poor and the painting of tool is held is the rear tool past.
4. Bar stop is the turret face is brought position.
5. The collet opens and the bar stock is pulled our by the bar feeding mechanism till it but against the bar stop collet closes.
6. The Turret goes back and Indexed. The bar is turned down to 16mm dia for a length of 50mm.
7. The turret returns to starting position, and is indexed. The self opening die comes into position. The end forming tool machines the bolt end.
8. The turret returns and indexed. The forming thread is cut for 37 mm.
9. The chamfer is machined.
10. The front slide is withdrawn to original position
11. The parting tool moves forward and cuts off the component

III.(b)		figX5 partX2	5 2	7
IV (a)	***Swiss type automatic screw machine :*** In swiss-type automatic screw machine headstock is movable and the tools are fixed in the slides. It is also called as sliding head type automatic screw machine. These machines are employed for mass production of long accurate parts of small diameter bar stock. These machines are chiefly used in the precision industries for manufacture of watches, instruments, radio parts etc.  Fig. ~~3.2~~ shows a general layout of swiss type automatic machine. The stock held by a rotating collet in the headstock and is fed through a hard bushing in the centre of the tool head. Five single point tools are placed radially on the tool head (bracket) around the bushing. Tools on horizontal slide performs plain turning while other tools on three slides are used for knurling,	figX6 partX2	6 2	8

IV(b)	Difference between Single Spindle and Multi Spindle Lathe. 1. Productivity :- A multi spindle machine will typically have six main spindles whereas Single spindle machine have only one Spindle. Multi spindle machine can carryout multiple operations thereby increasing productivity. 2. Energy effiaiency:- The multi spindle lathe will use less energy when compared to Single spindle machine. 3. Space savings :- A multi spindle machine uses up much less space compared to a Single Spindle machine and for a company that is short on space, this kind of machine is the best option. 4. Cost :- A multi spindle machine is much costly compared to the Single spindle machine	7X1	7	7

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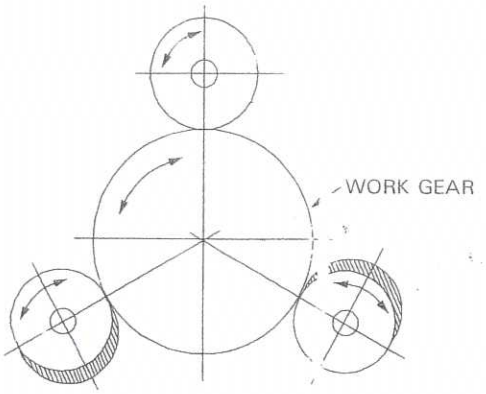
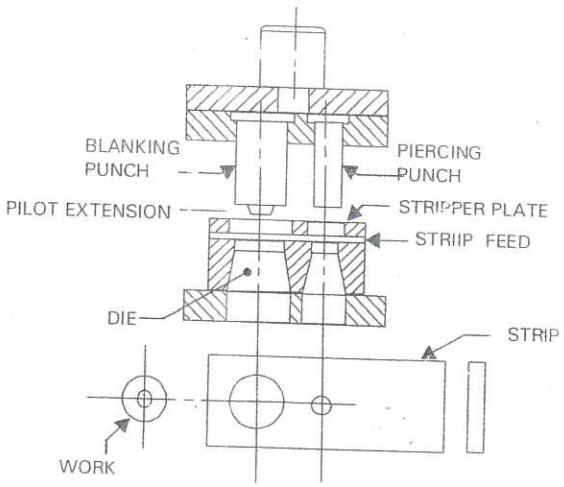
V(a)	1.Casting a).Sand Casting,b)Permanent moud casting, C).Die casting. 2'Powder metallurgy 3.Plastic Moulding 4.Stamping 5.Extruding 6.Coining 7.Rolling 8.Machining. Casting of Gears:- Gear may be cast in sand or permanent moulds. Large size cast iron gears can be made at relatively low cost.They are rough,inaccurate and posses low strength. This process is preffered where high precision is not required.Such gears are used in road making machinery and agricultural machinery. Many small gears of zinc and copper alloys are die cast.The gears produced in die casting possess high accuracy and good surface finish.	8X1/2= 4 expX4	4 4	8
V(b)	1.Gear shaving, 2.Gear burnishing,3.Gear grinding 4.Gear lapping 5.Gear honing.  1,2 AND 3 ARE LAP POIN ONS	4X1/2= 2 expX2 figX3	2 2 3	7

Gear lapping : The hardened gears are finished to size by gear lapping. Lapping improves surface finish and correct small errors.

The thickness of material removed from gear teeth is very small and is not more than 0.05 mm. In lapping, work gear is rotated with the cast iron lap pinion of true form. The cutting is assisted by fine abrasive mixed with oil. In machining with three lapping gears, the axes of two of these cross the gear axis at an angle of about 4^0 while the axis of the third is parallel to the axis of the gear. All the lap pinions and work gear rotate with respect of each other. The lap pinion may also have a quick reciprocating motion also relative to the work.

VI(a)	Progressivedie:- Progressive die is used for batch production of small & medium size components. In progressive die two cutting operations(piercing and blanking) are performed at different stations by using seperate punch and die for each operation.The cost of progressive die is high and is used for high rate of production. The strip is fed to the first station where the piercing is done.When the ram ascents the strip is then fed to the second station under blanking punch .During the stroke of press blanking is performed at second station while piercing at the first station.From then each stroke of the pres will produce a complete component .  Progressive Die	expX2 figX6	2 6	8

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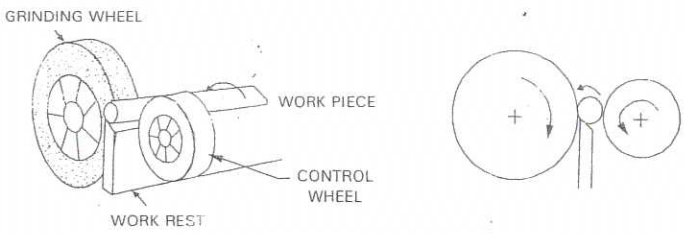
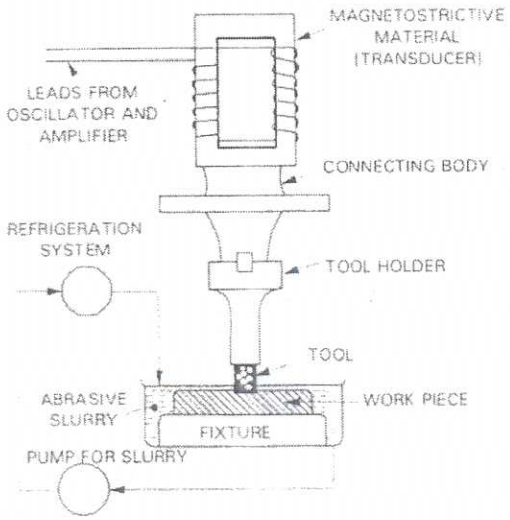
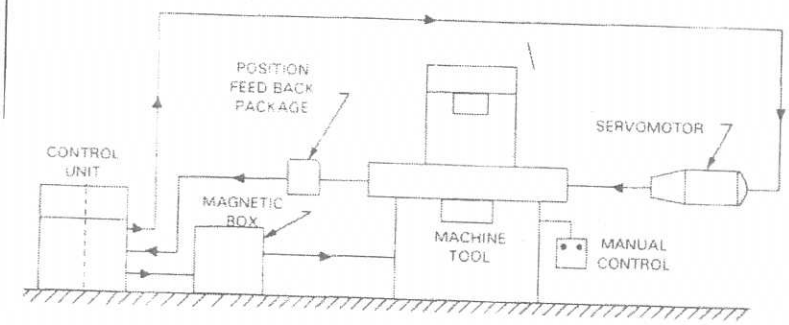
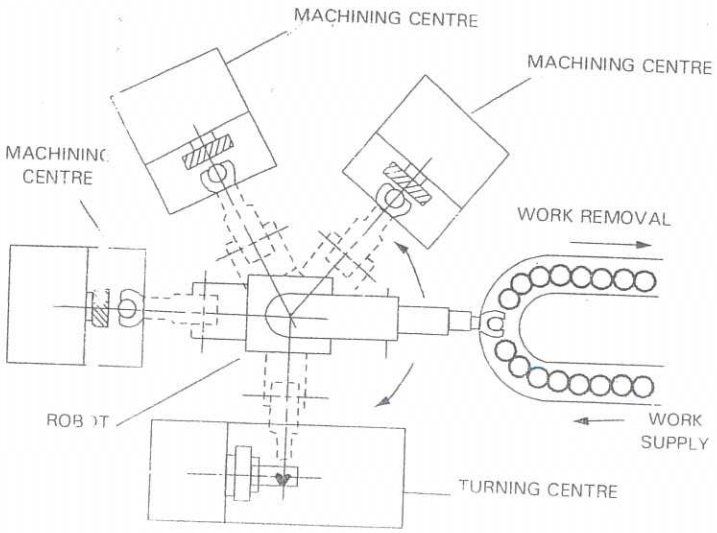
VI(b)	Advantages:- 1.Reduces the operation time, 2.Increases productivity 3.Facilitates uniform quality , 4.Ensure interchangeability of components. 5.Unskilled labour can do the job 6.Saving of labour cost. 7.Ensure high accuracy 8.Ensure higher surface quality 9.Reduce overall cost of product. Dis advantages:- 1. Design and manufacture of Jigs and fixture are costly	Any 7X1	7	7
VII (a)	In centreless grinding the work piece is supported by a combination of a work rest blade,a regulating wheel and a grinding wheel.It is performed on work which does not have centres.This can reduce the total operation time by eliminating the need for centre hole in the work piece and time taken to mount he work piece. The grinding wheel rotates at a higher speed than the regulating wheel and does the actual grinding operation, Regulating wheel controls the rotation of the work piece.A work rest is used to keep the work piece pressing against the face of the control wheel.  Cylindrical Centreless Grinding	Fig X 4 ExpX 4	4 4	8

VII (b)	Bond Materials:- 1.Vitrified bond 2.Silicate Bond 3.Shellac Bond 4. Resinoid Bond 5.Rubber BOND 6.Oxychloride bond. Vitrified Bond:- Vitrified bond is made of clay. The clay and water is mixed with abrasive grins, and the mixture is moulded to form the wheel. It is then baked in a kiln up to a temperature about 1250 degree centigrade to develop structural strength. As the burning proceeds clay fuses and forms porcelain that hold the grain together. The wheels are then cooled slowly to avoid thermal cracking ,finished to size ,inspected for dimensional accuracy and tested for defects. Since vitrified bond wheels are baked at high temperature they can withstand high temperature generated during grinding process. The bond is used in about 75% of the wheel manufactured.	Any 4X1/2 expX5	2 5	7
VIII (a)	USM  	figX5 expX3	5 3	8

	USM ***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.			
VIII (b)	Advantages of EDM 1.Hardnes is neven a limitation of machining 2.High degree surface finishcan be obtained 3.The tool ana work are notin contact ,therefore no cuttingforce upon the work piece 4.Thin section and fragile parts can be machined without any distortion and damage. 5.Any complicated shapes can be produced on the work piece. 6.The process is readily updated to automatic operation. 7.EDM is the only proess available for machining some of the more difficult aerospace alloys, Disadvantges:- 1.Them MRR is low 2.Only suitable for electrically conducting materials. 3.Excessive tool wear	Any 5X1 Any2X1	5 2	7

	4. high specific power consumption.			
IX(a)	1. The control unit (NC Console or Director) 2. The drive unit 3. Magnetic box 4. The position feedback package 5. Manual control, and 6. Machine tool 	figX5 partX3	5 3	8
IX(b)	Advantages of CNC system 1.CNC are more flexible and posses Storage memory facilities. 2.CNC machines are faster than NC machines. 3.Suitale for small batch quantities . 4.Suitable for complex job with multiple operations. 5.Reduction in time for launching a new product by	7X1	7	7

	reducing Jigs and fixtures. 6.Requires less inspection and production of better quality products. 7.Editing of programmes at floor level is very conveniently done. Dis advantges:- 1.Costly investment. 2.High setp time due to coplex operation.			
X (a)	FMC  FLEXIBLE MACHINING CELL : The flexible machining cell (FMC) has more than one machine tool with some form of pallet changing equipment, such as a robot or other specialised material handling device. The FMC generally has a fixed process, and parts flow sequentially between operations. The cell locks central computer control with real-time routing, load balancing, and production scheduling logic. The use of machining cells reduces the cycle time of the parts produced and subsequently minimises in-process inventory. Typical FMC is shown in	figX6	6	8
		expX2		
X(b)	Basic components of FMS 1. Machine tool and related equipment's:-This includes CNC and special purpose machine tools along with required tooling system 2. Material handling equipment:- The functions of material handling system are to move the parts between machines and to locate these parts for processing at the machines. 3. Computer control system.The function of this system are to control machine tools,material handling system to monitor the performance of the system and to schedule the production 4. System manager.	2 2 3	2 2 3	7