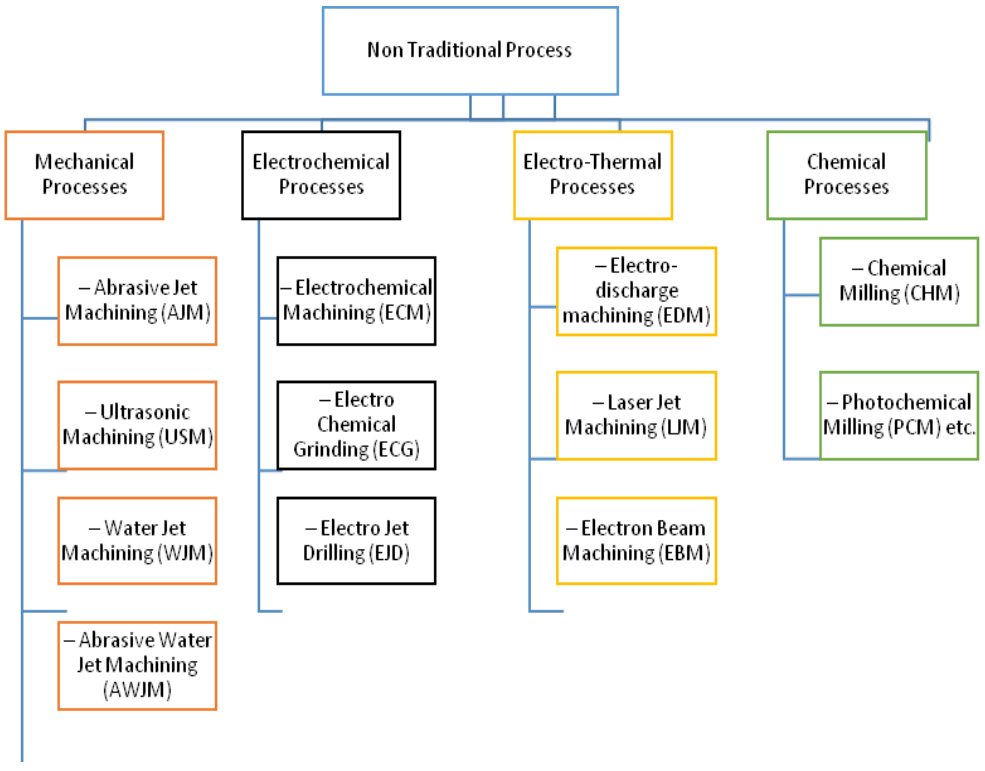
Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q. N.	Answer	Marking Scheme
1	A i)	Attempt any Three of the Following How are Nontraditional machining process classified? Sate its importance. Ans : Classification of non-traditional machining processes  	12 02 M
		Importance of Nontraditional Machining process. 1. Material removal may occur with chip formation or even no chip formation may take place.	02 M Any Similar 4

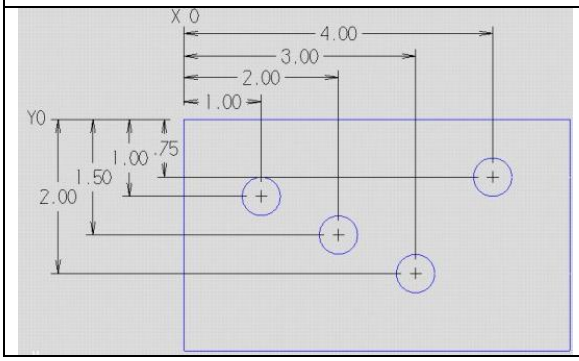
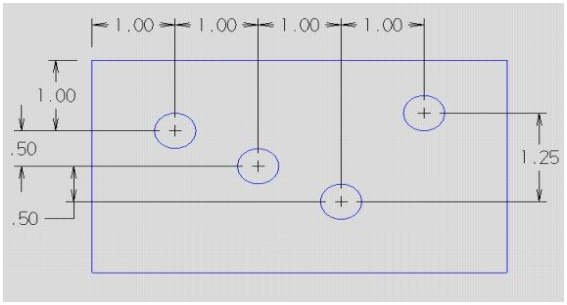
2. In NTM, there may not be a physical tool present.
3. In NTM, the tool need not be harder than the work piece material.
4. Mostly NTM processes do not necessarily use mechanical energy to provide material removal.
5. They use different energy domains to provide machining.

Point

1 ii) Differentiate between absolute and incremental coordinate system used in CNC part programing with an Example.

04 M

Any 4 Point with Example

Absolute	Incremental
The coordinate will measured with respect to the origin of the co-ordinate system also called zero point.	The co-ordinate of any point is calculate with reference to the previous point.
G90	G91
It Is easy to check and correct the program	It is difficult to check the part program written in incremental mode
The main advantage of the absolute system as compared with the incremental system , is in the case of interruption that force the operator to stop the machine	In incremental system, any time the work is interrupted , before switching on again, the operator must bring the tool manually to the exact place of the last operation occurred.
Almost all the point to point positioning system used absolute system.	Incremental system are not often used for controlling point to point machine tools
Absolute system is used for general program	Incremental system is used for canned cycle, do loop and subroutine program.
	

iii) Describe the prime features of horizontal boring machine.

The prime feature of horizontal boring machine are.

1. Heavy and Strong Bed: It has a heavy and strong bed, which carries the entire load of different parts, work piece and tool mounted over it.
2. Two Vertical columns: One column is mounted on each end of the table.
3. Head Stock: It can be moved vertically along the main column to facilitate different size work pieces.
4. Horizontal Table: It is mounted on the saddle and can be moved in longitudinal and cross

04 M

Any 4 Point

directions.

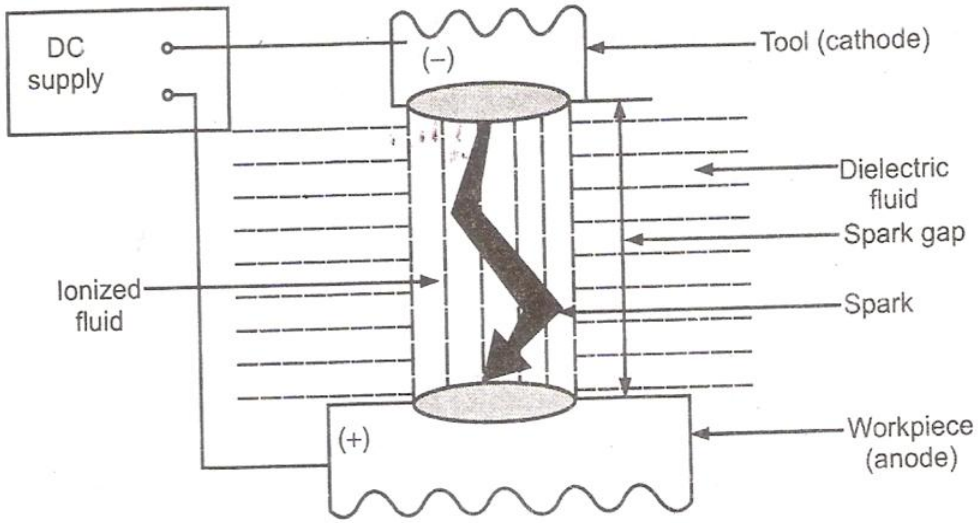
5. Horizontal Spindle: It is mounted in the head stock. This spindle apart from rotating can also be feed forward or Backward.

6. Bar Holder: It is also known as end support. It can be adjusted vertically over the end column.

Total 04 M

iv) Explain the principle of EDM with a neat sketch explain the process of metal removal

01 M



02 M

-EDM is electrical discharge machining. It is also known as spark erosion or simply spark machining.

-It is the process of metal removal, based on the principle of erosion of metals by an interrupted electric spark discharge between the electrode tool (usually cathode) and the work (anode).

-In this process, both the tool and workpiece are immersed in dielectric fluid.

-The work is connected to +ve terminal and tool is connected to -ve terminal.

-The tool end is brought near the workpiece by a servo motor. A small gap of about 0.01 to 0.5 mm is maintained in between tool and workpiece.

-When a difference of potential is applied between two conductors, the dielectric fluid will ionize.

-The potential difference reaches at high, spark will occur. The repetitive spark release their energy in the form of Local heat and metal is melted and eroded.

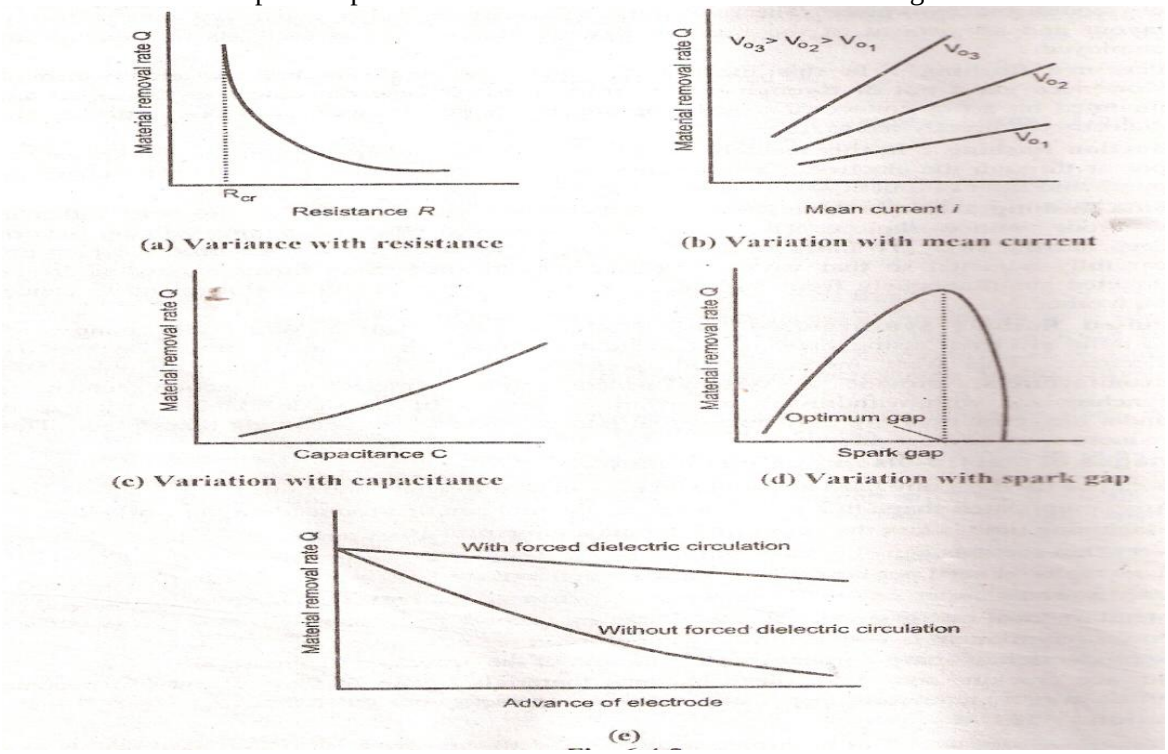
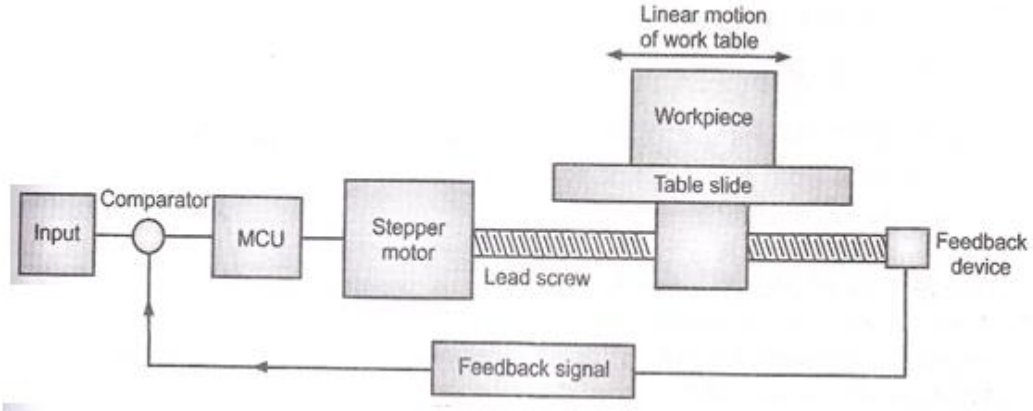
01

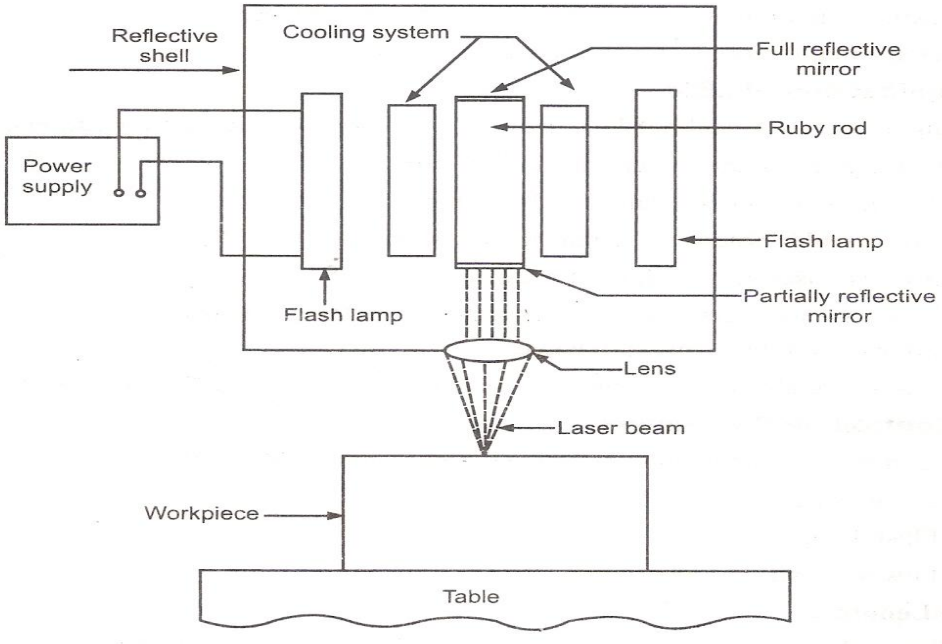
Application :

Any 2

1. For producing very small holes (as small as 0.1 mm dia.)

1	B	2. Embossing , engraving operation on harder materials and for making holes in nozzles. 3. Internal threads and internal gears can be produced in harder material. 4. Shaping Tungsten carbide dies, press tools and to give any intricate shape. Attempt any one of the following. i) Explain the different process parameters considered in EDM Process. How these parameters affect on EDM process. The Main process parameters in EDM are i) Supply Voltage ii) Break down voltage. iii) Resistance and Capacitance. iv) Spark gap setting v) Pulse duration. vi) Spark Frequency. i) Supply Voltage - It is the voltage which is provided by the power supply system. - It ranges between 50 V to 400 V DC ii) Break down voltage - It is the voltage at which the dielectric breakdown. - Increase in breakdown voltage results in increase of spark energy. - Consequently the metal removal rate increases which result in poor surface finish. iii) Resistance and Capacitance - Increase in capacitance will result in increase of metal removal rate. - Decrease in the resistance will result in increase of metal removal rate iv) Spark gap setting - Decrease in the spark gap result in the lower metal removal rate. - This result in better surface finish and high accuracy. v) Pulse Duration - The pulse duration ranges from 2 to 2000 μsec. - Decrease in pulse duration will result in high tool wear. - Increase in pulse duration results in lower metal removal rate.	06 M 04 M

1	B	vi) Spark frequency - It is about 1000 sparks /sec. - The increase in spark frequency results in improved surface finish. - Because the spark energy is shared by more number of spark , this decreases the crater size. The effect of various process parameters on metal removal rate is shown in fig.  ii) Explain the closed loop control system with block diagram and state the function of each element.  	02 M Total 6 M 02 M

		iii) **Closed Loops Control System** - The name indicates that the closed loop control system has a loop that is closed as shown in fig. A feedback device is used for this purpose. This makes the design of closed loop a little complicated and expensive. But a very high degree of accuracy is achieved in the movement of slide. - This system is similar to open loop control system. But it consists of two additional devices in the form of feedback transducer and a comparator as shown in Fig. - The transducer feedbacks the actual slide displacement to the comparator. - The comparator compares the actually achieved slide movement with command signal. If there is any error then it is feedback to the MCU. - The MCU then sends the corrective commands to the drive unit and the cycle repeats until there is no error signal from the comparator.	04 M
2	a)	Attempt any Four of the following. a) Explain LBM with neat sketch  Laser(amplification of light by stimulated emission of radiation) beam machining set up consists of a stimulating light source and a laser rod. The light radiated from the flash lamp is focused on to the laser rod from where it is reflected and accelerated in the path.	02 M 02 M

This light is emitted in the form of divergent beam. A lens is incorporated in the path of this beam of light which converges and focuses the light beam on to the workpiece to be machined. This concentration of laser beam on the work piece melts the work material & vapourises it.

b) Explain the use of following codes in CNC part programming.

b)

Ans :

G80 : Canned cycle cancel.

G91 : Incremental Positioning.

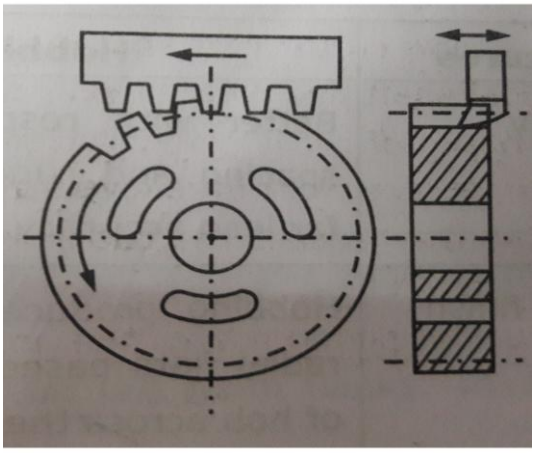
M03 : Spindle start (Clockwise).

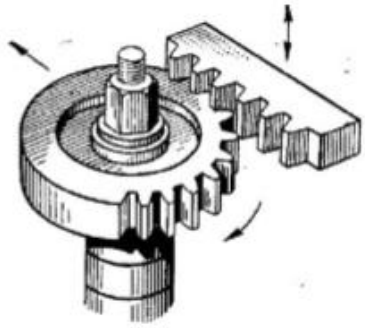
M98 : Call Subroutine.

01 Mark each

c) Explain with neat sketch rack cutter gear generating process

c)





External gear teeth generation by rack type cutter

02 M

02 M Any similar fig.

- Gear cutting using rack type cutter Gear shaping is performed by a rack cutter with 3–6 straight teeth.
- The cutters reciprocate parallel to the work axis when cutting spur gears, and parallel to the helix angle when cutting helical gears.
- In addition to the reciprocating action of the cutter, there is synchronized rotation of the gear blank with each stroke of the cutter, with a corresponding advance of the cutter in a feed movement.

02 M

d) Differentiate between gear hobbing process and gear shaping process.

d)

	Gear Hobbing Process	Gear Shaping
1	Generates teeth on gear by means of rotating cutter called as Hob.	Reciprocating motion of the cutter based on shaping process.

4 M

1 Mark

		2	Hobbing produces a series of radial flats based on feed rate of Hob across the work	Shaping produces a series of straight line parallel to the axis of the gear . surface finish may be better.	each for any Similar point
		3	It use as multipoint cutter Know as Hob.	It uses a rack cutter or pinion cutter.	
		4	It is rapid, economical and highly productive.	It required more time than hobbing.	
		5	It cannot generate internal gear	It can be used to produce internal gears also	

e) Explain the concept of repair cycle analysis and repair complexity.

REPAIR CYCLE ANALYSIS

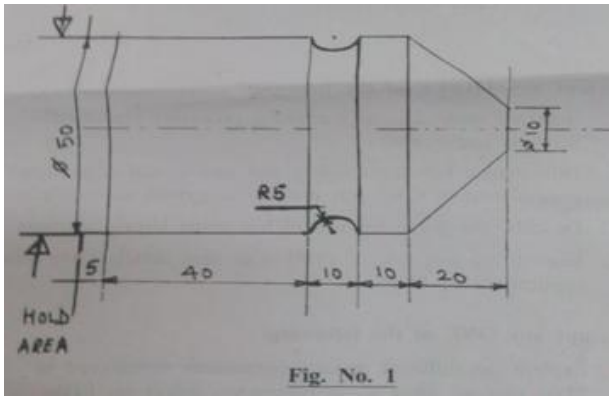
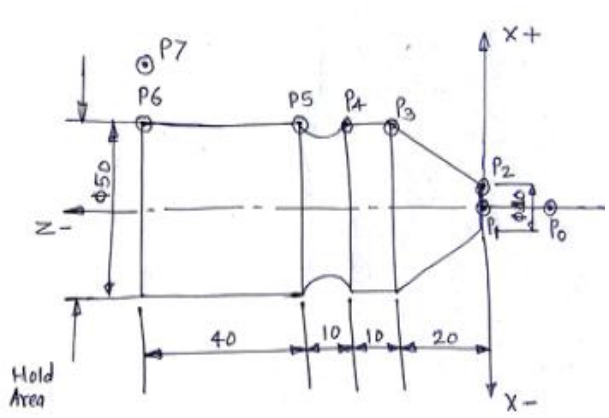
- The cycle of inspection, small repair, medium repair and complete overhaul is called as repair cycle. Inspection of machine tool is the first stage of maintenance.
- Small repair carry out repairs of coolant system, replace of belts, tool holder, pumps etc.
- Medium repair involves the activities like wash the parts, paint the surfaces, repair the assemblies, etc.
- Complete overhauling includes disassembly, repair, replace, paint and assembly of each unit.
- The inspection and repair activities are carried out on the machine tool in a particular sequence.
- This sequence is determined forehand in the early life of the machine.
- Thus the cycle of I (inspection) S,M(small or medium repair) and C(complete overhaul) is repeated till three or four overhauling.
- The cycle of inspection, small repair and medium repair between two complete overhauls is called as repair cycle. OR
- The cycle from machine commissioning to first complete overhaul is called as repair cycle.
- e.g. Repair cycle for particular grinding machine I1 - S1 -I2- S2 - I3 - M1 - I4 - S3 - I5 - S4 - I6 - M2 - I7 - S5 - I8 - S6 - I9 - C

02 M

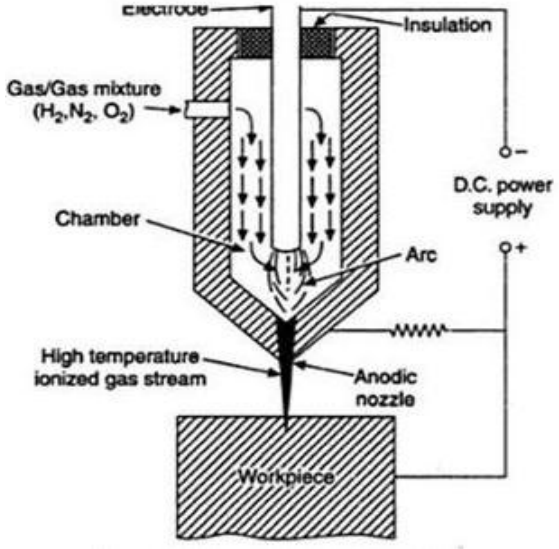
REPAIR COMPLEXITY

- Repair complexity is indicated by a numbers (figures) E.g. R.C. for a centre lathe of small size is 5 R.C. for a medium duty milling machine is between 11 to 15.
- It tells about how complex a machine is to repair.
- Repair complexity cannot be measured.
- It can be decided from relative figures of similar machines.

02 M

		- It changes with change in specifications of machine. - It increases with increase in capacity of machine.	
3		Attempt any TWO of the following	
	a)	**Write a part program for a job as shown in Fig. No. 1. Take only finish cut. Spindle speed is 1200 rpm and feed rate is 150mm/rev. Assume suitable machining data, if necessary**  Fig. No. 1	
	Ans	 N002 G90 G21 G53 G41G94; N003 M03 S1200 M08; N004 G00 X 0.0 Z 5.0; N005 G01 X 0.0 Z 0.0 F 150; N006 G01 X 10.0 Z 0.0; N007 G01 X 50.0 Z - 20.0; N008 G01 X 50.0 Z - 30.0; N009 G02 X 50.0 Z - 40.0; N010 G01 X 50.0 Z – 80.0;	1 Mark for diagram And 1 Mark for Coordinates 6 Marks for Logical program

Point	X Coordinate	Z Coordinate
P0	0.0	5.0
P1	0.0	0.0
P2	10.0	0.0
P3	50.0	-20.0
P4	50.0	-30.0
P5	50.0	-40.0
P6	50.0	-80.0

		N011 G01 X 60.0 Z – 80.0; N012 M05 M09; N013 G28 U 0.0 W 0.0; N014 M30;	
	b)	**Explain working principle of PAM with neat sketch. Disadvantages and applications of PAM.**	
	Ans	**Plasma Arc Machining** **Principle:-** The material is removed by directing a high velocity jet of high temperature (11000 to 30000 Degree C) ionized gas on the work piece.  **Figure:- Plasma Arc Machining** **Working** A gas (H2, N2, O2) is passed through a small chamber in which a high frequency spark is maintained between tungsten electrode (Cathode) and Copper nozzle (Anode). The high velocity electrons generated by arc collide with gas molecules results into ionization of the atoms and causing large amounts of thermal energy to be liberated. The plasma forming gas is forced to the nozzle with high exit velocity and high temperature. The plasma jet melts the work piece material and the high velocity gas stream effectively blows the molten metal away. **Disadvantages** [1] High initial cost [2]Maintaining the equipment is very difficult [3] Skilled personnel is required [4] Difficult to handle due to higher temperature **Applications** [1] For machining hard to cut metals such as super alloys, stainless steel, particularly during cut-off or rough slitting operations [2] For rough turning of very difficult material [3] For stock cutting, plate beveling, profiling and piercing	1 Mark for Principle 1 Mark for neat Diagram 2 Marks for working 1 Mark each for any two Disadvantage And 1 Mark each for any two applications

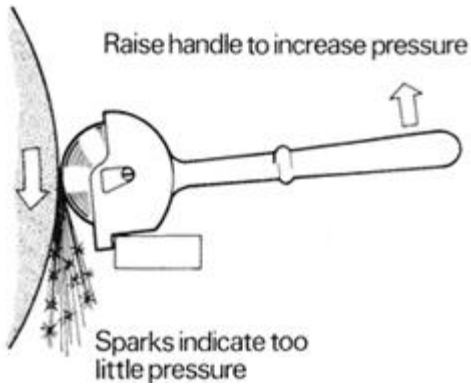
		[4] For removing gates and riser from casting in foundry [5] It cuts hot extrusion to desired lengths. [6] It finds use in the manufacturing of automotive and rail road components	
	c)	**Explain the cutting parameters of milling machine. How is the machining time is calculated on a milling machine.**	
	Ans	**Cutting Parameters:-** **1) Cutting Speed:-** The speed of the milling cutter is its peripheral linear speed resulting from rotation. It is expressed in meters per minute. $V = \frac{\pi d n}{1000}$ Where, V = the cutting speed in m per min. d = the diameter of the cutter in mm n = the cutter speed in r.p.m. **2) Feed:-** The feed in the milling machine is defined as the rate at which the workpiece advances under cutter. The feed in milling machine is expressed by the following methods a) Feed per tooth (Sz) b) Feed per revolution (Srev) c) Feed per minute (Sm) **a) Feed per tooth (Sz):-** The feed per tooth is defined by the distance the work advances in the time between engagement by the two successive teeth. It is expressed in mm/tooth of the cutter. **b) Feed per revolution (Srev):-** The feed per cutter revolution is the distance the work advances in the time when the cutter turns through one complete revolution. **c) Feed per minute (Sm):-** The feed per minute is defined by the distance the work advances in one minute. It expressed in mm/min. **3) Depth of cut:-** The depth of cut in the milling machine is the thickness of the material removed in one pass of the work under the cutter. It is the perpendicular distance mesured between the original and final surface of the work piece and is expressed in mm. **Calculation of Machining Time:-** **T= L/Sz X Z X n** Where, T = the time required to complete the cut in minutes L= the length of the table travel to complete the cut in mm Sz = the feed per tooth in mm Z = the number of teeth in the cutter n = the rpm of the cutter	2 Marks each for correct 3 parameters and 2 Marks for Time Calculation
4		**Attempt any THREE of the following**	
	a)	**Differentiate between plain milling machne and universal milling machine**	
	Ans		

Sr. No.	Plain Milling Machine	Universal Milling Machine
1	Table has 3 movements Cross,	Table has 4 movements Cross, longitudinal,

			longitudinal, vertical	vertical, Swivelling	1 Mark each for any 4 correct points
		2	Helical milling cannot be performed without using spiral milling attachment	No such attachment is required	
		3	It is more rigid and heavier in construction	It is less rigid and light in construction	
		4	Its overarm is fixed	It overarm can be pushed back or removed	
		5	No auxiliaries are provided	Number of auxiliaries are provided	
		6	Table has 3 movements Cross, longitudinal, vertical	Table has 4 movements Cross, longitudinal, vertical, Swivelling	
		7	Helical milling cannot be performed without using spiral milling attachment	No such attachment is required	
	ii)	**Explain the steps of compound indexing with suitable example**			
	Ans	If none of the index plate provided with the indexing head has a number of holes that is suitable for providing the correct number of holes for the required fractional turn of the index crank the problem can be overcome by compound indexing. [1] The desired spindle movement can be obtained by, first turning the index crank through a required number of spaces in one of the hole circles of the index plate in one direction [2] Then turning the index plate together with the index crank in the same direction or in opposite direction through a calculated number of spaces of another hole circle [3] the effective indexing movement will be the algebraic sum of the movement of the index crank and of the index plate Example:- Index for 257 divisions Two hole circles ‘a’ and ‘b’ Use the expression N(a-b)/ 40 a.b Take an index plate having holes 18 and 27 N(a-b) / 40 a.b = 27(27-18) / 40. 27 X 18 = 27 X 9 / 40 X 27 X 18 = - 1/80 Hence, X /18 +/- Y/27 = 40/ N = 40/27 which is the required rotation		2 Marks for steps And 2 Marks for Example
	iii)	**Explain the dressing and truing of grinding wheel with neat sketches**			
	Ans	**Grinding Wheel Dressing & Truing:-** Dressing removes loading and breaks away the glazed surface so that sharp abrasive particles are again presented to work. A common type of star dresser is used to dress the wheel. The dresser is held			

against the wheel and moved across the face of revolving wheel. Dressing is done to regain grinding wheels cutting capability. The dressing improves the surface finishing obtained while grinding. It is carried out where high degree of surface finishing is desired.

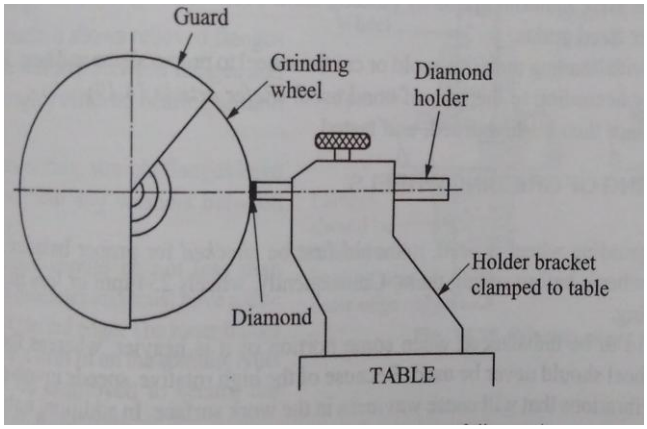
1 Mark for explanation and 1 for diagram



Truing of Grinding wheel:-

Truing is the process of changing the shape of grinding wheel as it becomes worn from an original shape owing to the break away of the abrasive and bond. This is done to make wheel true and concentric to the bore. Truing and dressing are done from the same tool but not for the purpose. The truing can be done with the help of diamond tool but the feed rate must not exceed 0.02 mm otherwise grooves may be cut on the wheel.

1 Mark for explanation and 1 for diagram



iii) Differentiate between breakdown maintenance and preventive maintenance

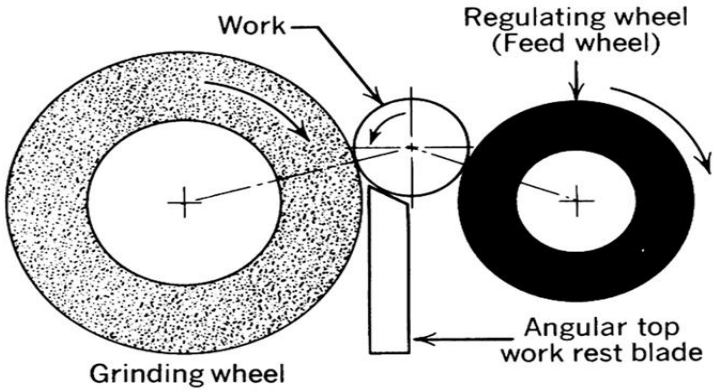
Ans

Sr. No.	Breakdown Maintenance	Preventive Maintenance
1	Breakdown maintenance is basically the "run it till it breaks" maintenance mode. No actions or efforts are taken to maintain the equipment	Actions performed on a time- or machine-run-based schedule that detect, preclude, or mitigate degradation of a component
2	Increased cost due to unplanned downtime of equipment.	Reduced equipment or process failure
3	Increased labor cost, especially if overtime is needed	Less labor cost because of planned maintenance.

1 Mark each for any 4 correct points

		4	Cost is involved with repair or replacement of equipment	Estimated 12% to 18% cost savings over breakdown maintenance program	
		5	Possible secondary equipment or process damage from equipment failure	Increased component life cycle.	
		6	Inefficient use of staff resources	Efficient use of staff resources	
4	**b)**	**Attempt any ONE of the following**			
	i)	**Differentiate between up milling and down milling**			
	Ans	**Sr. No.**	**Up Milling**	**Down Milling**	1 Mark each for 6 points
		1	There is a tendendcy to lift the work piece so extra clamping force is required	Forces are enough on job to press to press down. So no need of extra clamping forces	
		2	Cutter rotates against direction in which the work being fed	Cutter rotates in similar direction in which the work being fed	
		3	Cutting force varies from Zero to max.	Cutting force varies from max to zero	
		4	Chip thickness varies from minimum to maximum	Chip thickness varies from max to minimum	
		5	Higher surface finishing can be obtained	Obtains lower surface finish	
		6	Use of cutting fluid is difficult	Use of cutting fluid is easy	
		7	Job and tool moveemnt is opposite diretion	Job and tool ovement in same direction	
	ii)	**What are the precision grinders? Explain with neat sketch working of centreless grinding machine.**			
	Ans	**Precision Grinders**:- Those grinding machines that finish parts to a very accurate dimensions. This is concerned with producing good surface finishing and high degree of accuracy. The wheel or work both are guided in precise paths. Following are the precision grinders A) Cylindrical grinders B) Surface grinders C) Internal grinders D) Tool and cutter grinders **Centreless grinding** Centreless grinding is a method of grinding exterior cylindrical, tapered and formed surfaces that are not held and rotated on centres. The principle elements of the grinders are, 1) Grinding wheel 2) Work 3) Regulating wheel 4) Work rest An angular adjustment of 0 to 10^0 is provided In the machine by tilting regulating wheel. The actual feed can be calculated by, $\mathbf{S = \prod dn \sin\dot{\alpha}}$ Where, S= Feed in mm/min, N = rpm		2 Marks for explanation 2 Marks for explanation and 2 Marks for diagram

d= dia. Of regulating wheel, ά= angle of inclination if any



Both the wheels are rotated in the same direction. The work rest is located between the wheels, the work is rest upon the work rest and together with regulating wheel fed forward, forcing the work against grinding wheel. The axial movement of the work past the grinding wheel is obtained by tilting regulating wheel at a slight angle from horizontal.

5 a) Attempt any FOUR of the following

Ans Explain the maintenance manual

Maintenance Manual:-

The maintenance of a machine tool is carried out by a maintenance department and while performing the maintenance activities the maintenance personnel face the problems of assembly details and functioning of the components.

For resolving this issue the document/ booklet is prepare which clearly indicates all details of machine tool components, assemblies, performance level, maintenance practices etc. is termed as maintenance manual.

4 Marks for explanation

Need of Maintenance Manual

1) It helps to understand the basic maintenance practices for machine tools.

2) It helps to decide the type of maintenance for particular machine tool

b) Differentiate between honing and lapping

Ans

Sr. No.	Honing	Lapping
1	Honing is applied to get high degree of surface finish as well as to correct the roundness, taper in the work.	Lapping is applied to get geometrical true surfaces, correct minor surface imperfections and improve the dimensional accuracy.
2	Honing is slow speed finishing process.	Lapping is low pressure, low speed abrading process to refine surface finish.
3	Honing action is rotates and reciprocate in the hole of work piece.	Lapping action is either rotary or reciprocating

1 Mark each for any 4 correct

4	Honing is applied to get high degree of surface finish as well as to correct the roundness, taper in the work.	Lapping is applied to get geometrical true surfaces, correct minor surface imperfections and improve the dimensional accuracy.	
5	Metal removal rate in honing is 0.5 mm in primary and 0.01 mm for secondary.	Metal removal rate in lapping is 0 .005 mm to 0.01 mm	
6	Honing stones are used as cutter.	Abrasive particles are loaded on laps are used as a tool.	
7	Applications are on internal and external cylindrical surfaces.	Mostly used on flat or regular surfaces.	

points

c) Why balancing of grinding wheel is necessary? State safety precautions while performing grinding operations

Ans

Necessity of Balancing

1) Balancing provides effective surface finishing on work piece
2) Prevents damage to worker and machine
3) Improves Service life of wheel
4) Increases utilization of wheel

1 Mark each for any 2 correct Points

Safety Precautions

1) Always wear safety goggles while grinding.
2) Stand to one side of the wheel before starting the grinding machine.
3) Always have wheel guard covering the half portion of grinding wheel.
4) Never run the grinding wheel faster than the recommended speed.
5) Before starting the machine always make sure that all magnetic chucks are in turn on position.
6) Do not try to clean, mount, remove the work or magnetic chuck until the wheel has completely stopped.

½ Mark each for any 4 correct points

d) Differentiate between surface and cylindrical grinding process

Ans

Sr. No.	Surface Grinding	Cylindrical Grinding
1	Surface grinding process is employed to finish plane or flat surfaces	Cylindrical grinding process is employed for cylindrical surfaces
2	In surface grinding operation the work is held on table and rotating wheel is allowed to move on it	In cylindrical grinding process the work is held between two centers and rotated with rotating wheel allowed to move on it
3	Used for grinding irregular, curved, convex, & concave surfaces	Used for contoured cylinders, fillets, and even cam & shafts
4	Work piece is kept on the table and accordingly reciprocating motion will be provided	Work piece is held between two centers or chuck and wheel rotates

1 Mark each for 4 correct points

e) Compare Pull Broach hand Push Broach

Ans

Sr. No.	Pull Broach	Push Broach
1	It is designed to be pulled through the holes	It is designed to be pushed through the work piece by special press
2	The pull broach undergoes tensile force	The push broach undergoes compressive force
3	Length of broach is more	Length of broach is short
4	Long and slender broaches are possible to use	Short and stocky broaches are used
5	Pull broaches are used for sizing as well as removal of large stock	Push broaches are used for sizing only
6	It has large number of teeth	It has less number of teeth

1 Mark each for any 4 correct points

f) State applications and advantages of broaching machine over other similar process

Ans

Advantages:-

1) Rate of production is very high
2) Semiskilled operator can perform the operation
3) High accuracy
4) High surface finishing
5) Both roughing and finishing cuts are perform in one pass
6) The process can be used for internal and external surfaces

1 Mark each for any 4 correct points

6 Attempt any FOUR of the following

a) List the basic parts of column and knee type of milling machine State the function of each part

Basic parts of column and knee type milling machines:-

Ans

1) Base: - Serves as a foundation made up of gray cast iron. Carries a column at its one end. All the parts are mounted on it.

2) Column: - Main supporting frame mounted vertically on the base. It houses (includes/ enclosed) all the mechanisms for spindle and table feed.

3) Knee: - Rigid gray cast iron body which slides up & down on vertical ways of column. It contains the feed mechanism of table & different controls to operate it.

4) Table: - Table rests on saddle and travels longitudinally. It provides place to mount work piece and other fixtures on it.

5) Spindle: - located on upper part of machine and receives power from motor. It holds all the tools and arbors.

½ mark each for list any 4 points and

½ Mark each for their functions

b) **Give Classification of broaching machine**

Ans

Classification of Broaching Machine

According to the Construction

[1] Horizontal Broaching Machine

[2] Vertical Broaching Machine

[3] Continuous Broaching Machine

According to the Working Principle

[1] Hydraulic Broaching Machine

[2] Mechanical Broaching Machine

[3] Electromechanical Broaching Machine

[4] Computer Controlled Broaching Machine

1 Mark for any 4 correct point

According to the application of Broaching Machine

[1] Internal Broaching Machine

[2] External Broaching Machine

c) **State the basic maintenance practices for chains in chain drives**

Ans

a) Proper lubrication and servicing of chain.

b) Checking for chain adjustments.

c) Checking for chain elongation, wear out, sprocket alignment, condition of lubricants, lubrication system, drip rate of lubricant. Lubrication pump condition.

d) Remove accumulation of dirt or foreign materials

e) Chain and sprocket wheel should be protected by cover

1 Mark each for any 4 correct points

d) **Differentiate between capstan and turret lathe**

Ans

S. N.	Capstan Lathes	Turret Lathes
1	The turret of capstan lathe is mounted on slides on the saddle	The turret of the turret lathe is directly mounted on bed
2	Less rigidity provided to the tool	More rigidity provided to the tool
3	Suitable for light weight bar works	Suitable for Larger and heavier loads
4	Handy for small components	Larger works can be machined easily
5	High production rate as fast cut is possible	High production rate can not be achieve easily as larger and heavier parts do not permit fast cut

1 Mark each for any 4 points

e) **Define part program. Explain the term preparatory function and miscellaneous function in the**

	Ans	**context of CNC programming** **Part Program** Part programming – Part program defined as the way in which the blocks of instructions are planned and written such that after its execution on the CNC machine the required shape is obtained on the work piece in minimum possible time. OR - Part program is a set of instructions the machine tool about the processing steps to be performed the manufacture of component. **Preparatory functions** are G codes. G codes are designated by the letter G and a two digit numeric value. These codes are the most important functions in CNC programming because they direct the CNC system to process the coordinate data in a particular manner. Some examples are rapid traverse, circular interpolation, linear interpolation, and drilling. **Miscellaneous function** The M word is used to specify certain miscellaneous function such as spindle starts, spindle stop, coolant ON/OFF etc. The miscellaneous function as are those functions which do not related to the dimensional movement of the machine. These function actually operate some control on the machine. For example M02 which indicate end of program.	2 Marks for definition 1 Mark 1 Mark