

(Autonomous) (ISO/IEC - 27001 - 2005 Certified)

Winter - 2016 EXAMINATION

Model Answer

Subject Code:-

17556

<u>Important Instructions to examiners:</u>

- 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 judgment 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.



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Q.No	Modal Answer	Marks	Total Marks
1 A)	Attempt Any Three	3x4	12 Marks
i)	Classify Non-Traditional Machining Processes. Depending upon the type of energy used, the non-traditional processes are classified as:- 1)	01 marks /point (For Any Four)	04 Marks
ii)	i. Chemical Milling (CHM) Explain with block diagram closed loop control system. Closed Loop Control System:- Machine control unit in which there is provision to compare the actual position of the cutting tool or work piece with the input command value are called closed loop system. In the closed loop system the displacement can be achieved to a very high Tachogenerator Welocity feedback loop (b) Closed loop control system degree of accuracy because a measuring or monitoring device is used to determine the displacement of the slide. Closed loop system is more expensive due to presence of monitoring devices and their maintenance is very complicated. Also this system is more accurate as compare to open loop control system.	02 Marks for Figure 02 Marks for Exp.	04 Marks



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abra The are exe cark esse tem iv) Enli A di	ans of borect out onling is noter walk or walk	check which is made up of common re equally spaced about the peainst the work surface with consumption of springs. The common aluminium oxide having griter the operation, to flush aware uniform.	stick cross-hatched surface pattern abrasive and bonding material. eriphery of the honing tool. They ontrolled light pressure, usually only used abrasives and to keep the are small chips and to keep the	for Figure 02 Marks for Exp.	04 Marks
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iv) Enli A di	bide and ential fo	aluminium oxide having grit rethe operation, to flush awa uniform.	size of 80 to 600. Coolants are		
iv) Enli A di	ential fo	r the operation, to flush awa e uniform.			
iv) Enli A di		e uniform.	7 Fr		1
iv) Enli A di	nperature			1	
1 B)	•	on of dielectric fluid used in ED	OM.	01	04
1 B)	ielectric i	fluid should posses the followin	ng functions:	Marks	Marks
1 B)		the required breakdown voltage		1	
1 B)		tained.		functio	ı
1 B)	b) It s	n	ı		
1 B)	reac	(For	1		
1 B)		Any 4)	ı		
1 B)		rrying away the molten metal. rapidly after the discharge has		1	
1 B)	OCCI	, ,		ı	
		ould cool the tool, work piece a	and the spark region.		ı
	•	Attempt Any (One	1x6	
i) Con	npare Ca	pston and Turret Lathe. (Any S	Six Points)	1M /	06
	Sr. No.	Capstan lathe	Turret lathe	points	Marks
		It is light duty manching	Turret lathes are relatively	(for	ı
		it is light duty machine	more robust and heavy	Any 6)	1
	01		duty machine.		,
	01		_,		
	01	The turret head is mounted	The turret head is directly		'
		The turret head is mounted on the ram and the ram is	The turret head is directly mounted on the saddle and		
	01		•		
		on the ram and the ram is	mounted on the saddle and		
		It is light duty machine	more robust and heavy duty machine.	-	



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		moved during machining	with the turret head during machining.		
	04	The lengthwise movement of turret is less	The lengthwise movement of turret is more.		
	05	Only short work pieces can be machined	Long work pieces can be machined.		
	06	Collet is used to hold the work piece	Jaw chuck is used to hold the work piece.		
	07	It is easy to move the turret Head as it slides over the ram.	It is difficult to move the turret head along with saddle.		
	08	The turret head cannot be moved crosswise	The turret head can be moved crosswise in some turret lathes.		
	09	As the construction of lathe is not rigid heavy cut cannot be given.	As the construction of lathe is rigid, heavy cut can be given.		
	10	It is used for machining work pieces up to 60 mm diameter.	It is used for machining work pieces up to 200 mm diameter		
	11	Capstan lathes generally deal with short or long rod type blanks held in Collet.	Turret lathes mostly work on chucking type jobs held in the quick acting chucks.		
	12	The turret travels with limited stroke length within a saddle type guide block, called auxiliary bed, which is clamped on the main bed	In turret lathe, the heavy turret being mounted on the saddle which directly slides with larger stroke length on the main bed.		
	13	External screw threads are cut in capstan lathe using a self opening die being mounted in one face of the turret.	In turret lathes external threads are cut by a single point or multipoint chasing tool being mounted on the front slide and moved by a short lead screw and a swing type half nut.		
	14	The turret of capstan lathe is called as a capstan head which may be circular or hexagonal.	The turret of turret lathe is called as a turret head which may be square, octagonal or hexagonal.		
ii)	What are th	e various types of maintenanc	e? Explain any one of them.	02	06
",		ng are the types of maintenance		marks	Marks
		ventive maintenance.	2. Predictive maintenance.	for	
		akdown maintenance.	4. Corrective maintenance.		
		edule maintenance.	4. Corrective maintenance.	types	
	Preventive	Maintenance:-			



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	Preventive with the equipmer Protect as In December 1 December 2 D	04 marks for explain.			
	into your	operations/product manufacturing			16
2.		Answer Any Four of th	ne following	4x4	Marks
i)		iate between up milling and dow		01	04
	Sr.No.	Up Milling	Down Milling	mark/p	Marks
	1	In conventional milling the cutter rotates in a direction opposite to that in which the	In climb milling, the cutter rotates in the same direction to which the work is fed.	oint (For	
		work is fed.		Any 4)	
	2	The chip thickness progresses gradually from start to cut to end of cut (i.e. chip thickness is minimum at the beginning of cut and maximum at end of the cut).	The chip thickness is maximum at the beginning of cut and minimum at end of the cut.		
	3	The cutting force tends to lift the w/p away from the fixture.	The cutting force tends to seat the w/p into the fixture.		
	4	It is difficult to pour coolant at the point of machining.	It is easy to pour coolant at the point of machining.		
	5	It is difficult to design the fixture.	Fixture designer is easy.		
	6	Wavy type of surface finish is obtained.	Better surface finish is obtained		
	7	The cutter does not start cutting metal as soon as it comes in contact with the work piece	The cutter starts cutting metal as soon as it contacts the w/p.		
	8	The cutting force is down wordatbeginning and reaches to upward at the end of the cut.	The cutting force is upward at beginning of cut and reaches to downward at the end of the cut		



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ii)	State a	any two application of a) PAM b)	AJM.		04
	(a)	Application of PAM:-			Marks
	1.	For stock cutting, plate bevelling	. shape cutting and piercing.		
	2.	In manufacturing of automotive		02	
		It can cut hot extrusion to desire	·	Marks	
	4.		_	IVIAIKS	
			om casting in loundry.		
		Application of AJM:-			
	1.	5			
	2.				
	3.	02			
	4.	Machining of intricate profile on	hard and fragile materials.	Marks	
	5.	Cleaning and cutting operatio	ns on material like germanium,		
		silicon, quartz, and mica.			
	6.	Machining of brittle materials I	ike glass, ceramics, refractoriness		
		etc			
iii)	Differe	entiate between absolute and inci	remental co-ordinate system.	01	04
	Sr.	Absolute System	Incremental System	Mark /	Marks
	No.		-	Point	
		Absolute positioning means	In incremental system, the tool		
	01	that the tool locations are	locations are indicated with	(For	
		always defined in relation to	reference to the previous	Any 4)	
		the zero point.	location.		
		The main advantage of the	In incremental system, any		
		absolute system as compared	time the work in interrupted,		
		with the incremental system is	before switching on again, the		
	02	in the cases of interruption	operator must bring the tool		
		that force the operator to stop	manually to the exact place of		
		the machine.	the last operation in which the		
			interruption occurred.		
		Almost all point to point	Incremental system is not		
	03	positioning systems use	often used for controlling point		
		absolute systems.	to point machine tools.		
			Incremental system is used for		
	04	Ī			
	04	general program.	canned cycle, Do loop and Sub		
:. A	Classic	Cuinding Non-things	program.	04	0.4
iv)		y Grinding Machines.		01	04
		ng machines are classified as follow		Mark /	Marks
	(A)	According to the quality of surfa		Point	
		1. Rough or Non precision (
		 Bench pedestal or floor § 	grinders.		
		 Swing frame grinders. 			
		 Portable and flexible sha 	ft grinders.		
		 Belt grinders. 			
		2. Precision grinders.			
	В)	According to the type of the sur	face generated or work done:		
L		- //····		1	



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	Cylindrical grinders.		
	 Plain cylindrical grinders. 		
	 Universal cylindrical grinders. 		
	 Centre less internal grinders. 		
	2. Internal Grinders.		
	 Plain internal grinders. 		
	 Universal internal grinders. 		
	 Chucking internal grinders. 		
	 Planetary internal grinders. 		
	 Centre less internal grinders. 		
	C) Surface Grinders.		
	 Reciprocating table. 		
	 Horizontal spindle. 		
	Vertical spindle.		
	2. Rotating table.		
	Horizontal spindle.		
	Vertical table.		
	D) Tool and cutter grinders.		
	• Universal.		
	• Special.		
of	aw a neat sketch of horizontal boring machine and label different parts it. Main End support column (Bar holder) Find support (Bar holder) Find support (Bar holder) Find support (Bar holder) Spindle Bed Saddle Block diagram of a horizontal boring,	03 Marks for Figure 01 Mark for labellin g	04 Marks



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3.	Attempt any Two.	2x8	16 Marks
i)	 With neat sketch explain working of EDM process and also list two application of EDM process. Working of Electrical Discharge Machining (EDM):- The Electric Discharge Machining (EDM) process involved controlled erosion of electrically conducting materials by the initiation of rapid and repetitive electrical discharge between the tool (Cathode) and work piece (Anode) separated by a dielectric fluid medium. A suitable gap between work piece and tool is maintained to cause to spark discharge. The gap can be varied to match the machining condition such as metal removal rate. As soon as the voltage gradient set up between tool and work piece is sufficient to break down the dielectric medium, a conducting electric path is developed for spark discharge owing to ionization of the fluid medium and thereby causes the current flow. 	04 M Explain	08 Marks
	The temperature of the spot hit by the spark may rise up to 10000°C causing the work surface to melt and vaporize and ultimately to take the form of sphere as it is quenched by the surrounding fluid. Servo Capacitor bank Dielectric fluid Workpiece (+)	02 M Fig.	
	 Electric Discharge Machining (EDM). If the tool is fed downwards maintaining the predetermine gap, the 		
	 tool shape profile will be reproduce on the work piece. The spark gap, generally 0.01 to 0.1 mm is adjusted so that the gap voltage is around 70 percent of supply voltage for charging the capacitor bank. Higher gap although increases the discharge energy but it decreases the spark frequency due to increase in charging time of the capacitor. The servo control unit is provided to maintain the predetermine gap. It senses the gap voltage and compare with the preset value and the 		



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difference voltage is the used to control the movement of servomotor to adjust the gap. Application of EDM:-		
 i) Very useful in tool manufacturing due to ease with which the hard materials and alloyed can e machined. ii) Resharpening of cutting tool and broach, trepanning of holes with straight or curved axis. iii) Machining of cavities of dies and reaching of die cavities without annealing operations. 	02 M Appl.	
 What is meant by indexing? Explain with neat sketch working of "Universal Dividing Head". Indexing:- The process of dividing a circular or straight part into equal spaces by means of a dividing head is known as indexing. The indexing head Is also known as dividing head. Universal Dividing Head:- Universal dividing head is an important work holding and indexing device used on a milling machine. With the help of the dividing head the work pieces can be accurately index to any fraction of revolution enabling the correct spacing of the grooves that can be machined on the periphery of the work piece. Universal dividing head find wide use in the production of spur gears, helical gears and other indexing requirement on the milling machine. 	02 M Def.	08 Marks
Worm wheel Spindle Crank pin Sector arms (Crank removed) Internal mechanism of universal dividing head The normal positional accuracy that can be obtained using a universal dividing head is 1 minute. The work pieces are usually held between the	02 M Fig. 04 M Explain.	



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del A	Answer		Winter – 2	2016 I	EXAMINA	TION Subject Code	e:- 17	556
	swivelle the gra worm w	ed up to duated vheel ca	110° about the ho scale. The spindle	rizonta e is dri ric hous	l axis and th ven normal sing. The ec	esing of the unit can be e angle can be read on by a 1:40 worm and centric housing can be lamping screw.		
ii)	lathe m	achine.	ogram to machine		·	hown in figure on CNC		08Mar
	Ø 4.	K	40 20	H N	M (15)	φ24 φ3ο (ορ) Β	01 M	
		sition .	nate of various too X and Z Co-ordina HOME 0,0 32, -40 30, 02 40, -60 40, -100 24, -25		Position B D F H J L	X and Z Co- ordinate 0, 02 32,0 40, 02 30, -40 30, -15 30,-25 24, -30	01 M	
	No. N100		ogram Block 21 G94 EOB	mm/n	ute mode, i nin.	eaning input in mm, feed in ock wise direction,	01 M	
	N110 N120 N130	G00 X0	0 72 EOB 0 F200 EOB	spindl Rapid move	e speed, coo tool travel t ment of too	olant on. to position B. I to the position C.	01 M	
	N140 N150	Z-40 E	ОВ	Turnir 40mm	ng to diame n.	ter 30 for a length of	01 M	
	N160 N170 N180		40 Z02 EOB 30 Z02 F200 EOB OB	Move	ment Of Too	ol to the position F. ol To The Position G. on (Position H)		



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N190	G01 X-60 Z40 F200 EOB	Taper Turning Position I.		
N200	G00 X30 Z2 EOB	Rapid Travel Of Tool To The Position F.		
N210	G00 X0 Z2 EOB	Rapid Travel Of Tool To The Poisiton B.		
N220	G01 Z0 F100 EOB	Linear Interpolation (Position C).		
N230	G03 X30 Z-15 K-15 F120 EOB	Circular Interpolation Position J.	01 M	
N240		Rapid Motion of Tool away from workpiece.		
N250	G01 X40 Z-100 F200 EOB	TURNINING OF 40mm Diameter UPTO 100mm length.	01 M	
N260	M06 T001 EOB	Tool Change To Parting Tool		
N270		Rapid Tool Travel To Position L for Grooving operation.		
N280	G01 X24 Z-25 EOB	Grooving operation reduce diameter.		
N290	G01 Z-30 F0.03 EOB	Tool travel and reduce diameter over length of 5mm and make groove.		
N300	G00 X40 Z02 EOB	Rapid motion of tool away from workpiece		
N310	G28 EOB	Rapid return to machine refrence position.		
N320	M05 M09 M30 EOB	Spindle stop, coolant off, program end tape rewind.	01 M	
4 A)	Attempt Any	Three of the following.	3x4	12 Marks
The ax		e divided into two types. identified as linear axes		04 Marks



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X-axis:

- It is always horizontal and parallel to the work piece holding surface.
- It indicates the longitudinal travel of the work table.

Y-axis:

- It is perpendicular to both X and Z-axes.
- It is also horizontal and indicates the cross travel of the table

A-axis:

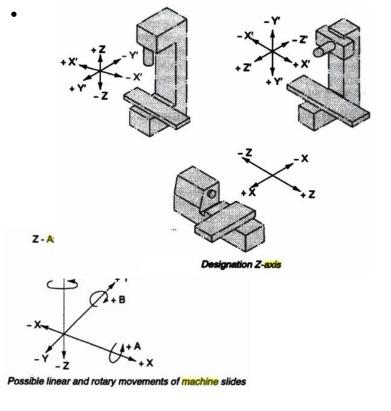
- It is the axis of-rotary motion of a tool along -axis.
- Clockwise rotation is considered as positive movement looking in +X direction.

B-axis:

- It is the axis of rotary motion of a tool along Y-axis.
- Clockwise rotation is considered as positive movement looking in +Y direction.

C-axis:

- It is the axis of rotary motion of a tool along Z-axis.
- Clockwise rotation considered as positive movement looking in +Z direction.



02 M Fig.



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Jour	MIISWCI	Subject cour	·	-
ii)	What i	s lapping? State its two applications.		04
	•	Lapping is an abrading processes employed for improving the		Marks
		surface finish by reducing roughness, waviness, and other		
		irregularities on the surface.	02 M	
	•	The principle of lapping is an abrasive rubbing process in which	Exp. & figure	
		loose abrasive with vehicles function as cutting points taking momentary support of the lap.	ligure	
	•	The basic purpose of lapping is to minimize the extremely minute irregularities left on the surface after some machining operation.		
	•	A very thin layer of metal around 0.005 to 0.01mm usually removed by lapping.		
	•	The lap material should be softer than work piece, so that abrasive		
		gets embedded in the lap until it fractures from the pressure of		
		lapping action. Cast iron is the best lap material but brass, lead and		
		soft P steel		
		can also be		
		/////////AP////		
		Vehicle Abrasive particle		
		Work piece		
		·		
		Scheme of lapping process		
		used.The abrasive used for lapping operation are aluminium oxide		
		for soft ferrous and non ferrous materials, silicon carbide is used		
		for hard steel. Diamond used for lapping cemented carbide and precious stones.		
	•	Lubricant to hold and retain the abrasive grains during lapping is		
		known as <i>vehicle</i> . The purpose of vehicle is to suspend abrasive		
		grains separated as well as lubricate the work. The vehicle is used		
		is machine oil, water soluble oil, vegetable oil, mineral oil,		
		petroleum jelly ad grease.		
	•	The speed and pressure for lapping soft material 0.7 to 0.2kg/cm ²		
		and for hard material up to 0.7 kg/cm ² is applied, and normal speed is used for lapping is between 1.5 m/s to 4 m/s.		
		Lapping may be carried out by hand or by machine lapping.		
	Annlic	cation:-		
	i)	Press work dies.		
	ii)	Limit gauges.		
	iii)		02 M	
	iv)	_	applica	
	v)	Piston rings.	tion	
	vi)	_		
	vii)			
		-	L	



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Winter - 2016 EXAMINATION

aei A	nswer Subject Code	e:- L I /	<u>556</u>
iii)	How preventive maintenance is better than break down maintenance?	01 M	04
•	Preventive maintenance is better than the break down maintenance for	/Point	Mark
	the following reason:-	•	
	It prevents occurring of break down.	Any	
	2) It can be done at the pre schedule time without disturbing the	Four	
	production.		
	3) It prevents the equipment from a large failure.		
	4) It provides safety to operator.		
	5) It is less costly over a large period of time.		
	6) Less stand by or reserve equipment and spare parts.		
iv)	Explain with sketch the rack cutter gear shaping process.		04
,	Rack Cutter Gear shaping Process:-		Mark
	In this method, the cutter has a rack form for the gear to be		111011
	generated.		
	 The gear blank is rotate slowly and uniform about the vertical axis. 		
	 The geal blank is rotate slowly and uniform about the vertical axis. The rack cutter reciprocates with the required cutting speed to 		
	remove the material from the gear blank.		
	The cutter is radically fed to obtain the correct teeth depth by magnetic from	02 M	
	means of cam.	Exp.	
	The cutter removes the material only during cutting stroke and	LAP.	
	relieved during return stroke.		
	Thus, because of reciprocating motion of cutter and angular		
	relative motion of gear blank, gear teeth is generated on the gear		
	blank.		
	The main limitation of this method is that once the full length of		
	rack is utilized the cutting operation in required to stop.		
	 In such case the blank is indexed next and the cut started as usual. 		
	↑ vr		
	N O Por VC		
	Tool rack	02 M	
		Figure	
		64. 6	
	Blank		
	B11 1111 111		



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Attempt Any One of the following. 1	1x6 06M	
	S	
plain with neat sketch AJM process. A typical set up of abrasive jet machining as shown in figure The abrasive particles are held in the hopper(7) through wihcih it is fed into the mixing chamber (11). A regulator(8) controls the flow of abrasive particles. Gas at high pressure is supplied to the mixing chamber through a pipe line as shown in figure. A pressure gauge(9) and a regulator(10) is incorporated in the pipe line to control the gas flow and its pressure. The mixing chamber, carrying the abrasive particles is vibrated by the device (12) and the amplitude of these vibrations controls the flow of abrasive particles. These abrasive particles travel through the hose (4) and enter into the nozzle (3). The control valve (5) and pressure gauge (6) controls the flow of abrasive particles. This out going high speed steam that comes out of the nozzle is known as abrasive jet (2). When such jet impinges on the work piece (1), the erosion caused by their impact enables the removal of metal.		is a Ope Ex by ne to of is



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lel Answer	Subject Code	e:- ∟ <u></u>	<u>556</u>
ii) State advant	ages, limitations of broaching process and draw any two		06
	s sections of work piece being machined by broaching		Marks
operation.			
Advantages:-			
1.	The process can be done for both internal and external machining.		
2.	It is simple operation, hence does not required highly skilled operator.		
3.	As loading and unloading is rapid, the rate of production is high.	02 M Adv.	
4.	As both rough and finishing can be done in one pass, so	Auv.	
_	broaching is fast operation.		
5.	Broaching is faster than any other machining operation.		
6.	High accuracy and high surface finish can be obtained.		
7.	The cutting force of the broach serves to clamp the work piece and hold it firmly in position.		
8.	Any form that can be produced on a broaching tool can be produced by the tool.		
Limitiations:-	•		
1.	It is a single purpose tool. Tool cost is very high, so the process is justified only for mass production.		
2.	In some cases, it is not suitable for low production rates.	02 M	
3.	The parts to be broached must be strong enough to withstand high cutting forces.	Limitati on	
4.	Surface to be broached must be acessble.		
5.	Blind hole can not be easily produced.		
6.	Tool sharpening is difficult and expensive process.		
s	errations Rectangle Angular Oval with double radius	02 M	
		Figure.	
	single radius inverted spline spline		
7			
	Round hole Hexagon Multiple inverted Single spline or keyway		
3	Square Multiple Involute Octagon straight spline splines &		
	straight spline splines & gears		



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5	Answer Subject Code Attempt any Four of the following	4x4	10
_	The stand of the following		Ma
i)	What is preparatory function and miscellaneous function in case of CNC?		04
•	Preparatory Function (G-code):-		Mai
	The preparatory function and G-code informs the controller what		
	types of motion or action is to be carried out.		
	The mode of movement is indicated by the numerical value		
	following the G address.	02 M	
	G-codes thus may be modal or non-modal. For modal type, G-code		
	specification will remain effect for all subsequent block unless		
	replaced by another modal G-code. For non-modal type, G-code		
	specification will only effect the block in which it contains. For		
	example G90 is cancelled by G91, G21 is cancelled by G20.		
	Miscellaneous Function (M-Codes):-		
	The miscellaneous function is used to specify certain miscellaneous		
	or auxiliary functions which do not relate to dimensional		
	movement of the machine.	02 M	
	The miscellaneous function may be spindle start, spindle stop,		
	coolant ON/OFF, etc.		
	All M-codes are modal.		
ii)	Explain with figure gear hobbing process.		04
	Gear Hobbing:-		Mai
	Hob teeth are shaped to match the tooth space and are interrupted with grooves to provide cutting surfaces. It rotates about an axis normal to that	03 M	
	of the gear blank, cutting into the rotating blank to generate the teeth as	Explain	
	shown in Figure.	LXPIaIII	
	Virtual Rack Gear Material	01 M Figure	
	It is the most accurate of the roughing processes since no repositioning of tool or blank is required and each tooth is cut by multiple hob-teeth, averaging out any tool errors. Excellent surface finish is achieved by this method and it is widely used for production of gears.		



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Winter - 2016 EXAMINATION

17556 Subject Code:-Model Answer

iii)	With neat sketch explain internal cetreless grinding operation.		04
	Centre-less Internal Grinder		Marks
	 In centre-less grinding the work piece is supported between the three rolls. The rolls are pressure roll, supporting roll and a regulating roll (grinding wheel. A 		
	 All the three rolls rotate in the same direction and rotate the work piece with them. 		
	 The work piece and grinding wheel rotates in the same direction. The direction of rotation of the three rolls and work piece is opposite. T 	02 M Explain	
	 The grinding wheel always contacts the work piece at the horizontal centerline of the regulating wheel. 		
	 This ensures uniform wall thickness of the work piece and also ensures concentricity of the bore with the external surface of the work piece. 		
	 To load or unload the work piece, the pressure roll can be swung away. 		
	 The grinding wheel is given in feed so as to obtain the required depth of cut. 		
	Pressure Roll Workpiece Regulating Roll		
	Grinding Wheel	02 Figure.	
	Support Roll +		
	Internal Centreless Grinding		
	 This type of machine is used for work having repetitive nature. 		
	It has advantages similar to external centre-less grinding.		
iv)	State the importance of maintenance activity. Importance of Maintenance Activity:-	01 M / point	04 Marks.
	Effective maintenance is a crucial component in any organization's	/ μοιτιι	ivial KS.
	operating strategy. This is because it sustains the organization's		
	reputation in the eyes of its current and potential customers, its	For	
	owners and the general public.	Any	
	 Effective maintenance activity reduce injury to people, both empolyess and the general public. 	Four	
	 Increased efficiency and speed of the equipment. 		
	 It helps to avoid the replacing of the parts of the equipments 		
	before schedule time.		



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1odel Answ	Winter – 2016 EXAMINATION ver Subject Code	:- 17	556
	 It reduce the cost when the work done is faster and the machine dosen't break down in the middle of the work schedule. It is better because it saves from spending too much when the machine break down completelyand requires big time repair and replacement. 		
mar The mea kno	 iat is direct indexing and compound indexing in case of gear nufacturing? is process of dividing a circular or straight part into equal spaces by ans of a dividing head is known as indexing. The indexing head is also own as dividing head. iect indexing: For direct indexing the worm and worm wheel of index head is disengaged. Index plate having 24, 30 and 36 hole circle is the fitted to the front end of the spindle nose. A spring loaded pin can be pushed into any hole to lock the spindle with frame. While indexing, the pin is first taken out and then the spindle is rotated by hand. After required position is reached, index pin is once again locked with frame. With 24 hole plate we can divide the periphery of work into 2, 4, 6, 8, 12 and 24 equal division. 	02 M	04 Marks
To o The afte	 Direct indexing is used for milling of square, hexagonal nut and bolts on milling machine. Imple:- divide the work periphery in 8 division with the help of 24 hole plate. e index movement is 24/8=3. Thus, we should move the pin by 3 holes er each teeth is cut. Impound Indexing:- Compound indexing isused when the available capacity of the index plate is not sufficient for the given indexing job. In other words when the work piece periphery can not be divided by simple indexing method, compound indexing is used. It's a trail and error method. The method consisit of two basic operation. First operation is to turn the index crank through a required amount as it is done in case of simple indexing. Second operation involves turning the index plate and crank both either in same or reverse direction, thus adding or subtracting the further movement, from that obtained in the first operation. Index crank movement = 40/N = n1/N1 ± n2/N2 	02 M	



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	Where,		
	N= number of division required.		
	N1= hole circle used by crank pin.		
	N2= hole circle used by lock pin.		
	n1= hole moved by crank pin in N1, hole circle plate.		
	n2= holes moved by plate and crank pin in N2 hole circle.		
vi)	draw a labelled sketch of horizontal broachin machine and state function		04
	of each part in brief.		Mar
	the function of various parts of a horizontal broaching machine are:		
	i) Power Head:- it provides arrangement for getting required		
	power to run the system.	02.14	
	ii) Machine bed:- it is support to all machine members. It also absorb shock and vibrations as it is made of cast iron.	02 M Functio	
	iii) Tool holder:- it is a device to hold the tool correctly in position		
	in order to maintain precision and accuracy in all machined	n	
	work piece.		
	iv) Supporting table:- it gives enough support to the wqork piece.		
	It provides stability to the work piece during operation.		
	Supporting face plate		
	Power head		
	-Work piece		
	Hydraulic cylinder Broach		
	Tool holder Supporting table	02 M	
	Tool Holder	Figure	
	Bed		
	Parts of a horizontal broaching machine		
6	Attempt any four of the following	4x4	16
			Mar
i)	Explain with figure working principle of LBM process.		04
	Working Principle of LBM:-		Mar
	Laser beam Machining (LBM) is based on the conversion of electrical		
	energy into light energy and then to thermal energy.		
	 In the beginning in atom all the crystal are in ground state. 		
	When the light is flash over the crystal, most of the atoms are	02 M	
	raised to the excited state.some light waves incline to the axis of	Principl	
	the crystal will leave the box either after only a few reflections or	е	
	without strike on mirror.		
	Some of the waves that travel parallel to the axis of the crystal, will		
	spontaneously emit photon from chromium ions. These photon		

stimulate another atom to contribute a second photon.these process continues as the photons are reflected to and fro between



Model Answer

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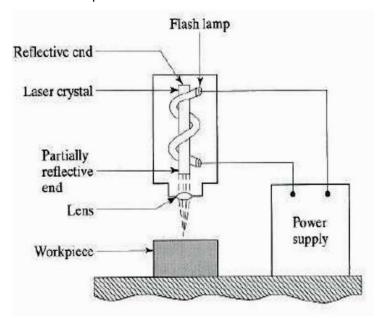
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the mirror.

- At the each refelction a certain loss occurs.
- It is very intresting that laser has to be used on materials where it absorbs laser energy.
- Upon absorption of the laser energy, ther is rapid rise in the temperature leading once again to melting and vaporization and material removal.
- Although several types of laser exist, all laser produce (emit) intense, coherent, highly collimated beam of single wavelength light. In material processing applications, this narrow beam is focused by an optical lense to produce a small, intense spot of light on the work piece surface.



02 M Figure

Fig. Laser Mechanism



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Subject Code:-Model Answer

· <u> </u>	Allswei Subject Cour	•	
ii)	Explain with neat sketch Planomiller.	02 M	04
	It is used for heavy duty works. It resembles a planer as it has cross rail,	Explain	Marks
	cutter head and column or uprights. They may be a number of		
	independent spindles carrying cutters on the cross rail along with two tool		
	heads on the uprights. This is most power ful milling machine and the		
	modern plano-millers have high power driven spindles powered upto 100H		
	P ensuring tremendous metal removal capacity.		
	Vertical vertical milling milling head head Planer type milling machine. Motor Table Planer type milling machine.	02 M Figure	
iii)	Explain with figure the process of straddle milling and gang milling.	02	04
	Gang Milling:-	Marks	Marks
	The gang milling is the Milling Cutters	With	
	operation of machining	figure	
	several surface of a		
	workpiece simultaneously by		
	feeding the table against a		
	number of cutters having		
	same or different diameters		
	mounted on the machine.		
	The distance between the		
	two cutters is adjusted by Gang Milling Operation		
	placing spacer in between		



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Model Answer Subjec

<u> Model <i>A</i></u>	Answer Subject Code	e:- 	330
	them. • The method save machining time and widely used in		
	repetitive work.		
	Straddle Milling:- The straddled is the operation CUTTERS		
	The straudied is the operation		
	of production of vertical flat	02	
	surface on both side of	Marks	
	workpiece by using two side ()	With	
	milling cutter mounted on same arbour.	figure	
	The distance between the two		
	cutters is correctly adjusted by using suitable spacing work		
	collars. Straddle Milling Operation		
	The straddle milling is very commonly used to produce square or		
	hexagonal surface.		
iv)	Explain repair cycle analysis.		04
'	Repair Cycle Analysis		Marks
	Preventive maintenance involves carrying out inspection, repair		
	and complete overhaul of the machine.		
	The inspection and repair activities are carried out on the machine		
	tool in a particular sequence.	02 M	
	This sequence is determined forehand in the early life of the		
	machine.		
	Thus the cycle of I, R (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.		
	For example,		
	I. I1- S1 - S2 - I3- M1- I4- S3 - I5- S4 - I6- M2- I7-S5 - I8 - S6 - I9- C is A repair cycle for a particular grinding machine. After every		
	inspection, Small repair is carried out. However, after every three		
	inspections, medium Repair is carried out and after two medium	02 M	
	repairs, complete overhauling is carried out.		
	II. C - I1- I2- S1 - I4- I5- I6- M1- I7- I8 - I9- S2 - I10- I11- I12- C is a repair		
	cycle for an elevator which consists of one, medium repair, Two		
	small repairs and twelve inspections between two overhauls.		
v)	Explain gear burnishing and state its advantages.		04
',	Gear Burnishing Operation:-		Marks
	Gear burnishing is the cold finishing process of gear teeth and used		
	for gears after cutting but before hardening to improve the surface	02 M	
1		Explain	



vi)

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17556 **Subject Code:-Model Answer** finish and uniformity. The gear is mounted on a vertical reciprocating shaft in mesh with three hardened and ground burnishing gears. These gears are power driven and are fed into the cut gear and rotated through a few turns in both directions. This makes the gear surface smooth and also imparts little hardness on it. The load is provided by means of pneumatic, hydraulic or electrical means. Advantages:-Improves the size and finish of revolution like cylinders and conical I. 02 M Advant Internal and external surfaces can be burnished. II. ages Improves surface hardness. III. IV. Increases, wear-resistance, decreases fatigue and fights corrosion How grinding wheels are designated? 04 **Designation of Grinding Wheel:-**Marks It is also refered as specification of the grinding wheel or marking scheme of grinding wheel. Method of grinding wheel specification differ with the manufacture and country, in order to bring the uniformity, Bureau 02 M of Indian Standard hs suggested the marking scheme consisting of following six characters in sequence. This codification is as per Bureau of Indian Standard Code IS 551: 1989. 0 1 2 3 4 5 6 Prefix Abrasiv Abrasiv Grade Structur Nature Manufa e Type e Grain e (Use of Bond cturer's 02 M optional symbol (Type of Bond)

Prefix:-

- Manufacturer may use a suitable prefix preceding the type of abrasive notation to indicate his own trade brand of the abrasive used.
- Use of prefix is optional.

Manufacture's Symbol:-

- Manufacturer may use a suitable suffix to the type of bond.
- Use of suffix is also optional.