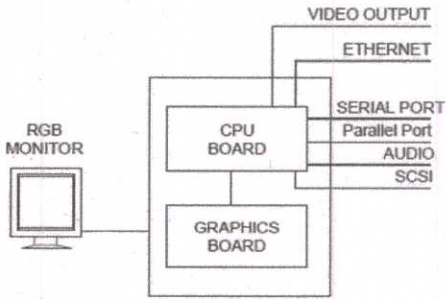
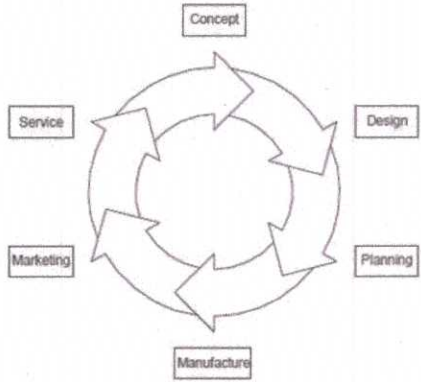


SCHEME OF VALUATION – Set A
(Scoring Indicators)

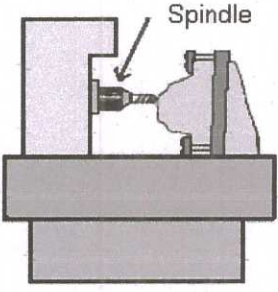
Revision: 2015		Course Code: 6024		
COURSE TITLE: CAD/CAM				
Qst. No.	Scoring Indicator	Split-up score	Sub Total	Total
I (1)	Floppy disk, hard disk, CD, DVD, flash drive etc.	4 x 0.5	2	10
I (2)	Use of computer systems to plan, manage and control the operations of a manufacturing plant through either direct or indirect computer interface with the plant's production resources..	2	2	
I (3)	Rotation axis of the headstock is Z Depth of cut is X	1	2	
		1		
I (4)	M03 used for spindle start CW M04 used for spindle start CCW	1	2	
		1		
I (5)	APT – Automatically Programmed Tooling is a NC programming language. It has Geometry statement/definition statement Motion commands Post processor statement Auxillary statement	4 x 0.5	2	
II (1)	 <p style="text-align: center;"><i>Fig. 4.10 System Level Block Diagram of a Graphics Workstation</i></p> <p>Low-end work stations generally consist of personal computers. Appropriate software and special hardware like graphics accelerator cards are added to these for boosting the performance. The processing capability of personal computers is generally enhanced by the addition of a co-processor in the microprocessor circuit which increases the processing speed by two or three times.</p> <p>High-end workstations are designed around one or more powerful RISC processors (RISC -reduced instruction set computer is a microprocessor that is designed to perform a smaller number of types of computer instructions so that it can operate at a higher speed). Hardware in these systems generally consists of high resolution graphics display. These will also have</p>	2	6	30
		4		

**SCHEME OF VALUATION – Set A
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<p>II (2)</p>	<p>the ability to operate in a computer network with other workstations or to work as host computers.</p> <div style="text-align: center;">  <p><i>Fig. 2.2 Product Development Cycle</i></p> </div>	<p>3</p>	<p>6</p>	
<p>Explanation</p>		<p>3</p>		
<p>II (3)</p>	<p><u>NC</u> Punched tape, hardwired, less flexibility, less interpolation schemes, improvements not easy, no MIS</p> <p><u>CNC</u> Part program once entered to memory, onsite editing, unit conversion, flexibility, complex contouring</p>	<p>6</p>	<p>6</p>	
<p>II (4)</p>	<p>NC program will consist of a number of lines called blocks. Each block will consist of a number of words. Each word will have two components: a word address and a numeric code representing information. The common word addresses are:</p> <p align="center">N - G - X - Y - Z - A - B - C - F - S - T - M</p> <p>where</p> <p>N = sequence number of instructions G = preparatory function XYZABC = co-ordinate and angular data F = feed S = spindle speed T = tool code M = miscellaneous function</p>	<p>6</p>	<p>6</p>	
<p>II (5)</p>	<p>List and explain any six G code</p>	<p>6 x 1</p>	<p>6</p>	

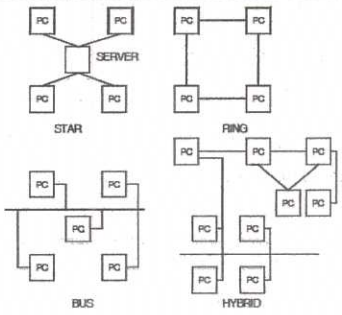
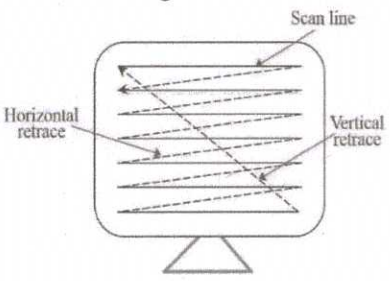
2

**SCHEME OF VALUATION – Set A
(Scoring Indicators)**

<p>II (6)</p>	 <p style="text-align: center;">Horizontal type</p> <p>Horizontal spindle machining centres are generally bed type machines with the structural configuration as shown in Fig. In this type of machining X-axis table or column provides traverse and spindle head provides Y-axis traverse. The saddle or column, or headstock or spindle head provides the Z-axis traverse. These machines are invariably used with a rotary indexing table to facilitate multiphase machining at different angles in a single setup</p>	<p style="text-align: center;">3</p>	<p style="text-align: center;">6</p>	
<p>II (7)</p>	<p>Explain any three devices (Keyboard, touchscreen, joystick, track ball, mouse, digitizer, scanner etc)</p>	<p style="text-align: center;">3 x 2</p>	<p style="text-align: center;">6</p>	
<p>III (a)</p>	<p>1) Plotter The plotters used before were the pen plotters where the movements of the pen were used to plot the graphics on the sheet. Depending on the maximum size of the drawing plotters are designated as A0, A1, A2, A3 and A4. There are plotters capable of creating drawings larger than A0 size. Nowadays inkjet plotters are used in which the horizontal motion of the ink head and rotation of the drum together produced the required output. Two Types 1) Flat bed type 2) Drum type (Explain)</p> <p>2) Printer a) Dot matrix/Impact printers- They use small hammers or print heads containing small pins to strike a ribbon to form dot matrix images. Because of the low resolution, copy quality is poor. Impact printers are suitable for high speed, low cost, high volume hard copies. b) Inkjet Printer- produce images by propelling fine droplets of ink on to the medium to be printed. The laser jet printers are capable of giving good quality color prints with shading at reasonable cost. c) Laser printer- Laser printer is one of the most widely used output devices. This type combines high speed with high resolution and the quality of output is very fine.</p>	<p style="text-align: center;">3</p>	<p style="text-align: center;">8</p>	<p style="text-align: center;">15</p>
<p>III (b)</p>	<p>List any five CAD software packages</p>	<p style="text-align: center;">3</p>		

3

**SCHEME OF VALUATION – Set A
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	Explain its applications (Design, assembly testing, Motion testing, Analysis, Automation etc)	4	7	
IV (a)		3 x 3	9	15
IV (b)	<p>Raster scan</p> <p>In a raster scan system, the electron beam is swept across the screen, one row at a time from top to bottom. As the electron beam moves across each row, the beam intensity is turned on and off to create a pattern of illuminated spots. The number of total screen scanning is made per second is called “Refresh rate”. Only one pixel is illuminated at a time but due to persistence of vision we see the image.</p>  <p align="center">Eg: CRT monitor</p> <p>Stroke writing</p> <p>In this technique, the electron beam is directed only to the part of the screen where the picture is to be drawn rather than scanning from left to right and top to bottom as in raster scan. It is also called vector display, stroke-writing display, or calligraphic display.</p> <p align="center">Eg: CRO</p>	2.5	6	
V (a)	Rapid prototyping (RP) is a family of fabrication methods to make engineering prototypes in minimum possible lead times based on a computer-aided design (CAD) model of the item. The traditional method of fabricating a prototype part is machining, which can require significant lead times—up to several weeks, sometimes longer, depending on part complexity, difficulty in			

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SCHEME OF VALUATION – Set A
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V (b)	<p>ordering materials, and scheduling production equipment.</p> <p>Available rapid prototyping technologies can be divided into two basic categories:</p> <p>(1) material removal processes</p> <p>(2) material addition processes.</p> <p>The material removal RP alternative involves machining primarily milling and drilling, using a dedicated Computer Numerical Control (CNC) machine that is available to the design department on short notice. The starting material is often a solid block of wax, which is very easy to machine, and the part and chips can be melted and resolidified for reuse when the current prototype is no longer needed. Other starting materials can also be used, such as wood, plastics, or metals (e.g., a machinable grade of aluminum or brass). The CNC machines used for rapid prototyping are often small, and the terms desktop milling or desktop machining are sometimes used for this technology.</p> <p>Addition RP work by adding layers of material one at a time to build the solid part from bottom to top. Starting materials include liquid monomers that are cured layer by layer into solid polymers, powders that are aggregated and bonded layer by layer</p> <p>Any three applications</p> <p>Greater design freedom, Increased productivity, Greater operating flexibility, Shorter lead time, Improved reliability, Reduced maintenance, Reduced scrap and rework, Better management control</p> <p>(Explain any six)</p>	6	9	15
VI (a)	<p>1) Minimize number of components.</p> <p>2) Use standard commercially available components.</p> <p>3) Use common parts across product lines.</p> <p>4) Design for ease of part fabrication.</p> <p>5) Design parts with tolerances that are within process capability</p> <p>6) Design the product to be foolproof during assembly.</p> <p>7) Minimize use of flexible components.</p> <p>8) Design for ease of assembly.</p> <p>9) Use modular design.</p>	6 x 1	6	9

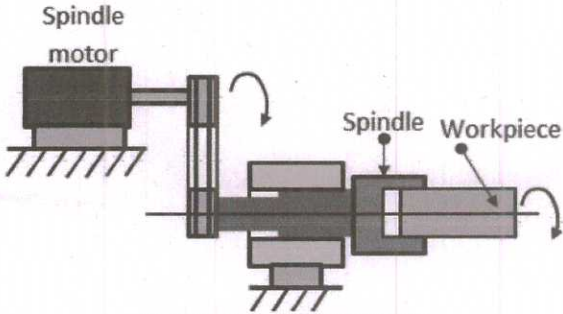
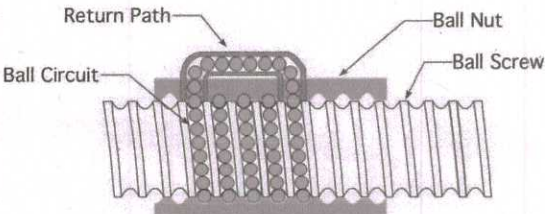
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**SCHEME OF VALUATION – Set A
(Scoring Indicators)**

<p>VI (b)</p>	<p>10) Shape parts and products for ease of packaging. 11) Eliminate or reduce adjustment required.</p> <p>(Any nine points)</p> <p>Reduction in the number of design changes in CE (concurrent engg.) Holistic approach to product development in CE Robust product in CE Reduction in lead time for product development in CE</p> <p>(Explain any three point)</p>	<p>3 x 2</p>	<p>6</p>	<p>15</p>
<p>VII (a)</p>	<div data-bbox="403 660 810 1043" data-label="Diagram"> </div> <p>+ Explanation (servo system for each axis, open loop or closed loop controller, pulse generator and pulse train)</p>	<p>4</p> <p>5</p>	<p>9</p>	<p>15</p>
<p>VII (b)</p>	<p>Spindle rotation taken as Z axis. If no spindle like shaper, then perpendicular to work holding surface is Z. Usually away from work holding is +ve.</p> <p>Of the remaining two, the principal axis is X and other is Y. Its +ve direction found out by right hand rule.</p> <div data-bbox="355 1355 1023 1682" data-label="Diagram"> <p>(a) Axis Designation for Horizontal Z</p> <p>(b) Axis Designation for Vertical Z</p> </div> <p>Explain about a, b, c axes</p>	<p>6</p>	<p>6</p>	
<p>VIII (a)</p>	<p>1) Reduced cycle time by machining complex components using a single setup. In addition to time savings, improved accuracy can also be achieved as positioning errors between setups are eliminated.</p>			

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VIII (b)	<p>2) Improved surface finish and tool life by tilting the tool to maintain optimum tool to part contact all the times.</p> <p>3) Improved access to under cuts and deep pockets. By tilting the tool, the tool can be made normal to the work surface and the errors may be reduced as the major component of cutting force will be along the tool axis.</p> <p>4) Higher axes machining has been widely used for machining sculptures surfaces in aerospace and automobile industry.</p> <p>Explain any five features of CNC</p>	4 x 2 7	8 7	15
IX (a)	 <p align="center">Fig. 4.1.1 Schematic of a spindle drive</p> <ul style="list-style-type: none"> • The spindle drives are used to provide angular motion to the workpiece or a cutting tool. • Figure shows the components of a spindle drive. These drives are essentially required to maintain the speed accurately within a power band which will enable machining of a variety of materials with variations in material hardness. • The speed ranges can be from 10 to 20,000 rpm. The machine tools mostly employ DC spindle drives. • AC drives are preferred to DC drives due to the advent of microprocessor-based AC frequency inverter. 	3 6	9	15
IX (b)	 <ul style="list-style-type: none"> • As the ball screw rotates the ball nut executes a linear motion • This linear motion is transferred to the part of CNC where it is required by attaching the ball nut with that part. • The recirculating balls in between nut and screw helps to reduce friction. 	3 3	6	

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SCHEME OF VALUATION – Set A
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X	N00 G90; // absolute programming N01 T01 M06; //execute tool change N02 M04 S1500; //spindle start CCW at 1500 rpm N03 G92 X0 Z90; //reference point shift to right end N04 G00 X50 Z0; //positioning tool to start turning N05 G01 F200 X30; //first step of cut in single step N06 Z-70; //turning first step N07 Z0; //return N08 X10; //next step cut in single step N09 Z-20; //turning N10 G28; //return to home position N11 M05 M30; // spindle stop, end of program	8 for progra m 7 for explana tion	15	15
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