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|  | | **MUTHAYAMMAL ENGINEERING COLLEGE**  **(An Autonomous Institution)**  (Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)  Rasipuram - 637 408, Namakkal Dist., Tamil Nadu. | | | | | |  | |
|  | | | **MUST KNOW CONCEPTS** | | |  | **MKC** | |
|  |  | |  | | | |  | |
| **MECH** | | |  | | | | **2019-20** | |
|  | | | |  |  | | | |
| **Course Code & Course Name** | | | | **:** | **16MED18 & Computer aided design** | | | |

**Year/Sem/Sec : III / VI / A**

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| **S.No.** | | **Term** | | **Notation**  **(Symbol)** | | | **Concept / Definition / Meaning /**  **Units / Equation / Expression** | | | **Units** |
| **Unit-I : FUNDAMENTALS OF COMPUTER GRAPHICS** | | | | | | | | | | |
| 1 | | Design Center palette | | --- | | | Standard toolbar | | | --- |
| 2 | | F9 key | | --- | | | Snap on/off | | | --- |
| 3 | | Dragging | | --- | | | Holding down the left-hand button of the mouse on an item can be moved to another point on screen. | | | --- |
| 4 | | Tool tip | | --- | | | The tool name appearing in a rectangle when the cursor is placed on a tool icon | | | --- |
| 5 | | Isometric drawing | | --- | | | A 2D (two-dimensional) pictorial view of the object. | | | --- |
| 6 | | AutoCAD sheet set | | --- | | | A number of AutoCAD drawings saved in Paper Space format and held in a file | | | --- |
| 7 | | Term UCS stands for | | --- | | | User Coordinate System. | | | --- |
| 8 | | Phases Of Cad | | --- | | | Geometric modeling, analysis and optimization  Design review and evaluation  Documentation and drafting. | | | --- |
| 9 | | Geometric Modeling | | --- | | | Geometric modeling involves the use of a CAD system to develop a mathematical description of the geometry of an object. | | | --- |
| 10 | | Geometric Modeling Techniques | | --- | | | Two & Three dimensional modeling  Wire frame modeling | | | --- |
| 11 | | Merits of cad | | --- | | | High productivity and reduced lead time.  Accuracy in design.  Modifications in design relatively easy. | | | --- |
| 12 | | Applications Cad Software package | | --- | | | Automated industries, Manufacturing companies  Aerospace designs, Civil engineering plans, | | | --- |
| 13 | | Cad Software Package | | --- | | | Auto CAD, CATIA, Iron CAD, Pro-E, Turbo CAD, Solid Edge | | | --- |
| 14 | | Wireframe Modeling merits | | --- | | | Simple to construct, Designer needs little training. It needs less memory space, | | | --- |
| 15 | | B-rep | | --- | | | Consists of entering all boundary edge for all surfaces. | | | --- |
| 16 | | CSG | | --- | | | Boolean combinations or primitives solids to build a part. | | | --- |
| 17 | | Advantages Of Solid Modeling | | --- | | | It is complete and unambiguous.  Automated applications like creating part program without much human involvement. | | | --- |
| 18 | | Solid works | | --- | | | Its complete product development cycle starting from concept design to Detailed design | | | --- |
| 19 | | CAM | | --- | | | Planning, Managing and Control | | | --- |
| 20 | | Plan Drawings | | --- | | | Objects drawn from above or a birds-eye view and kept two dimensional. | | | --- |
| 21 | | Wireframe | | --- | | | When drawing in plan view all drawings will be simple lines and lack any color | | | --- |
| 22 | | Images created in this CAD class utilize points | |  | | | Vector - Based | | | --- |
| 23 | | Open GL | | --- | | | The fastest way to view rendered three dimensional shapes in full color | | | --- |
| 24 | | 3D objects | | --- | | | X,Y,Z Axis System | | | --- |
| 25 | | Manager Design Tree | | --- | | | Part  Subassembly  Flexible Subassembly | | | --- |
| **Unit-II : GEOMETRIC MODELING** | | | | | | | | | | |
| 26 | | BOM In Solid works | | --- | | | In Solid Works, BOM creates bill automatically and cut lists for downstream manufacturing and purchasing operation | | | --- |
| 27 | | Roles of geometric modelling | | --- | | | Analytical curves, interpolates curves, approximate curves. | | | --- |
| 28 | | Types of conic section | | --- | | | Hyperbola, elipse, parabola. | | | --- |
| 29 | | Equ. of parabola | | --- | | | Y2=4ax | | | --- |
| 30 | | Non-Parametric equation | | --- | | | X2+y2=r2 | | | --- |
| 31 | | NURBS | | --- | | | Non-uniform rational B-splines | | | --- |
| 32 | | Types of surface | | --- | | | Plane, ruled, tabulated, surface of revolution, Bezier, B-spline, coons, fillet, offset | | | --- |
| 33 | | C0 | | --- | | | Tangent Could Have Sudden Change In Curvature. | | | --- |
| 34 | | CSG | | --- | | | Constructive solid geometry | | | --- |
| 35 | | Euler’s operation | | --- | | | V-E+F=H+2(B-G) | | | --- |
| 36 | | Product cycle | | --- | | | The process of managing the entire lifecycle of a product from starting. | | | --- |
| 37 | | Product life cycle of | | --- | | | Concept, planning, marketing, design, Manufacture service. | | | --- |
| 38 | | Concurrent engineering | | --- | | | Various tasks are handles at the same time, and not essentially in the standard order. | | | --- |
| 39 | | Computer graphics | | --- | | | Graphical representation of objects in a computer. | | | --- |
| 40 | | Rendering | | --- | | | The making of 2D model to 3D model by means of computer programs. | | | --- |
| 41 | | Anti-aliasing | | --- | | | Process for better illustration with multiple color gradations during drawing a line. | | | --- |
| 42 | | Clipping | | --- | | | It is the method of cutting a graphics display to neatly fit a predefined graphics region. | | | --- |
| 43 | | Application of solid modeling | | --- | | | Engineering, entertainment industry, medical industry | | | --- |
| 44 | | Geometry | | --- | | | It is the study of shape and spaces. | | | --- |
| 45 | | Topology | | --- | | | Unchanged after twisting, stretching. | | | --- |
| 46 | | PI | | --- | | | Primitive instancing | | | --- |
| 47 | | SWP | | --- | | | Sweep Presentations | | | --- |
| 48 | | SPRs | | --- | | | Spatial partitioning representations | | | --- |
| 49 | | Solid modeling techniques | | --- | | | Sweeping, cell decomposition | | | --- |
| 50 | | Fillet surface | | --- | | | It is a B-spline surface that blends two surface | | | --- |
| **Unit-III : VISUAL REALISM** | | | | | | | | | | |
| 51 | | Rep.of curves and surfaces | | --- | | | Generic form, parametric form. | | | --- |
| 52 | | CAD tools | | --- | | | Solid works, PRO- E, CATIA, Vector works, | | | --- |
| 53 | | Computer Aided Manufacturing | | CAM | | | Use of software and computer-controlled machinery to automate a manufacturing process | | | --- |
| 54 | | Computer Graphics | | --- | | | Is a core technology in digital photography, film, video games, cell phone | | | --- |
| 55 | | Product life cycle | | --- | | | Product goes through from when it was first thought of until it finally is removed from the market | | | --- |
| 56 | | 4 Phases of the product life cycle | | --- | | | Introduction, Growth, Maturity, Decline | | | --- |
| 57 | | Morphology design | | --- | | | Morphology means 'a study of form or structure | | | --- |
| 58 | | Structure design | | --- | | | Structural design is the methodical investigation of the stability, strength and rigidity of structures | | | --- |
| 59 | | Sequential product development | | --- | | | stage of the process before passing the new product to the next department | | | --- |
| 60 | | Enforced-discipline approach | | --- | | | Discipline is the practice of making people obey rules or standards of behavior, and punishing them when they do not | | | --- |
| 61 | | Concurrent engineering | | --- | | | Method of designing and developing products, in which the different stages run simultaneously | | | --- |
| 62 | | Geometric modeling | | --- | | | The modelling of realistic objects for computer graphics and computer aided design | | | --- |
| 63 | | Solid modeling | | --- | | | Principles for mathematical and computer modeling of three-dimensional solids. | | | --- |
| 64 | | Stereoscopic imaging | | --- | | | A variety of technologies that make images and movies appear more lifelike in print, on the computer, in the cinema or on TV | | | --- |
| 65 | | Hidden line removal | | HLR | | | Edges are not hidden by the faces of parts for a specified view and the display of parts in the projection of a model into a 2D plane | | | --- |
| 66 | | Computing silhouettes | | --- | | | Separates visible faces from invisible faces of an object with respect to a given viewing direction is called silhouette edges (or silhouettes). | | | --- |
| 67 | | Invisible face | | --- | | | Controls which edges of a 3D face are visible, allowing for accurate modeling of objects with holes | | | --- |
| 68 | | Visible face | | --- | | | A planar face is created that is similar to a region object. When you shade or render the object, planar faces are filled | | | --- |
| 69 | | Hidden line removal algorithms | | HLR | | | Edges are not hidden by the faces of parts for a specified view and the display of parts in the projection of a model into a 2D plane | | | --- |
| 70 | | Area oriented approach | | --- | | | An object-oriented tool integration methodology that treats the tools as objects is presented | | | --- |
| 71 | | Depth buffer | | --- | | | computer graphics, z-buffering, also known as depth buffering, is the management of image depth coordinates in 3D graphics | | | --- |
| 72 | | Area coherence | | --- | | | Computer-graphics algorithms often take advantage of area coherence, image compression being an example | | | --- |
| 73 | | Scan line | | --- | | | It is an image-space method to identify visible surface. This method has a depth information for only single scan-line | | | --- |
| 74 | | Texture mapping | | --- | | | Application of images to three-dimensional graphics to enhance the realism of their surfaces. | | | --- |
| 75 | | Key frame | | --- | | | A key frame in animation and film making is a drawing that defines the starting and ending points of any smooth transition | | | --- |
| **Unit-IV : ASSEMBLY OF PARTS** | | | | | | | | | | |
| 76 | | Assembly modelling | | --- | | | Computer software systems to handle multiple files that represent components within a product. | | | --- |
| 77 | | Constraints | | --- | | | It restricts an entity, project, or system from achieving its potential with reference to its goal | | | --- |
| 78 | | Tolerance | | --- | | | Total permissible variation of a size. It is the difference between maximum limit and minimum limit of size. | | | --- |
| 79 | | Deviation | | --- | | | The action of departing from an established course or accepted standard | | | --- |
| 80 | | Fundamental deviation | | --- | | | The minimum difference in size between a component and the basic size | | | --- |
| 81 | | Hole basis system | | --- | | | The nominal size and the limits on the hole are maintained constant and the shaft limits are varied to obtain the required fit. | | | --- |
| 82 | | Unilateral tolerance | | --- | | | A unilateral tolerance is a tolerance in which variation is permitted only in one direction from the specified dimension | | | --- |
| 83 | | Fit | | --- | | | When two parts are to be assembled the relation resulting from the difference between their sizes before assembly | | | --- |
| 84 | | Clearance fit | | --- | | | For any hole and shaft assembly, if the upper limit size of the shaft is less than the lower limit size of the hole then that type of **fit** | | | --- |
| 85 | | Interference fit | | --- | | | Is a fastening between two parts which is achieved by [friction](https://en.wikipedia.org/wiki/Friction) after the parts are pushed together, rather than by any other means of fastening | | | --- |
| 86 | | Transition fit | | --- | | | Transition fits are a compromise between clearance and interference fits | | | --- |
| 87 | | Depth sorting | | --- | | | An algorithm for creating a hidden-line drawing of polygon data sets by drawing the polygons from the most distant to the closest | | | --- |
| 88 | | Tolerance analysis | | --- | | | Activities related to the study of potential accumulated variation in mechanical parts and assemblies. | | | --- |
| 89 | | Tightness or looseness | | --- | | | Pixel Shading is a method used for rendering advanced graphical features such as bump mapping and shadows | | | --- |
| 90 | | Geometric progression | | --- | | | sequence of numbers where each term after the first is found by multiplying the previous one by a fixed, non-zero number called the common ratio | | | --- |
| 91 | | Unilateral tolerance | | --- | | | tolerance in which variation is permitted only in one direction from the specified dimension | | | --- |
| 92 | | Tolerance limits | | --- | | | consist of the upper and lower limits of a particular environmental condition which allows a certain species to survive | | | --- |
| 93 | | Hidden surface | | --- | | | hidden-surface determination algorithm is a solution to the visibility problem, which was one of the first major problems in the field of 3D computer graphics | | | --- |
| 94 | | Depth Sorting | | --- | | | An algorithm for creating a hidden-line drawing of polygon data sets by drawing the polygons from the most distant to the closest, in order. | | | --- |
| 95 | | Depth buffer algorithm | | --- | | | pixel on the display screen, we keep a record of the depth of an object within the pixel that lies closest to the observer | | | --- |
| 96 | | Depth texture | | --- | | | Also known as a shadow map, is a texture that contains the data from the depth buffer for a particular scene | | | --- |
| 97 | | Shaders in unity | | --- | | | Rendering in Unity is done with Materials, Shaders and Textures | | | --- |
| 98 | | Material in unity | | --- | | | Shades are small scripts that contain the mathematical calculations and algorithm | | | --- |
| 99 | | Depth testing | | --- | | | The defects are logged, are captured across all parameters, functional and non functional | | | --- |
| 100 | | Painter's algorithm | | --- | | | Is one of the simplest solutions to the visibility problem in 3D computer graphics | | | --- |
| **Unit-V :CAD STANDARDS** | | | | | | | | | | |
| 101 | | CAD Standards | | --- | | | Communication of design and Manufacturing data within engineering organization | | | --- |
| 102 | | Database Management | | --- | | | Collection of data at a single location to be used by various people for different applications | | | --- |
| 103 | | Computer graphics | | --- | | | It is used for processing image data received from the physical world. | | | --- |
| 104 | | GKS | | --- | | | Number of levels describing the level of support in terms of facilities | | | --- |
| 105 | | PHIGS | | --- | | | Programmer’s Hierarchical Interface for Graphics | | | --- |
| 106 | | IGES | | --- | | | Initial Graphics Exchange Specification | | | --- |
| 107 | | STEP | | --- | | | Standard for the Exchange of Product Model data | | | --- |
| 108 | | Graphics Standards | | --- | | | allow images to be moved from machine to machine, while languages let graphics programs be moved from machine to machine | | | --- |
| 109 | | Workstation Transformation | | --- | | | If the normalized device coordinates are translated into device coordinates | | | --- |
| 110 | | Core System | | --- | | | The standardization of graphic system | | | --- |
| 111 | | Primitives | | --- | | | Pictures are considered to be constructed from a number of basic building blocks | | | --- |
| 112 | | Neutral Formats | | --- | | | IGES, STEP, DXF | | | --- |
| 113 | | Layer of STEP | | --- | | | Application Layer, Logical Layer  Physical Layer | | | --- |
| 114 | | IGES File Section | | --- | | | Flag Section, Start Section, Global Section | | | --- |
| 115 | | Application Programming Interface | | API | | | Number of function | | | --- |
| 116 | | OpenGL | | --- | | | Is a cross language, multi-platform Application Programming Interface (API) for rendering 2D and 3D vector graphics | | | --- |
| 117 | | Flag section | | --- | | | Used only with the compressed ASCII and binary format | | | --- |
| 118 | | Physical Layer | | --- | | | Deals with the data structures and data format for exchange file itself | | | --- |
| 119 | | Application Layer | | --- | | | Consist of information of various application areas | | | --- |
| 120 | | Logical Layer | | --- | | | Provide a consistent, computer-independent description of the data constructs that contain information to be exchanged | | | --- |
| 121 | | CALS | | --- | | | Is an attempt to integrate text, graphics and image data into standard document architecture | | | --- |
| 122 | | Output Primitives in GKS | | --- | | | Polyline, Polymakers, Text and Fill area | | | --- |
| 123 | | IGES Problem | | --- | | | Export choices  Tolerances, accuracy and resolution | | | --- |
| 124 | | GKS-3D | | --- | | | Display of 3D graphical primitives  Mechanisms to obtain 3D input | | | --- |
| 125 | | GKS Cell Array | | --- | | | Array function displays raster like images in a device- independent manner | | | --- |
| **Placement Questions** | | | | | | | | | | |
| **126** | How many times are the hands of a clock at right angle in a day? | |  | | | A. 22  B. 24  **C. 44**  D. 48  Explanation:  In 12 hours, they are at right angles 22 times.  In 24 hours, they are at right angles 44 times. | | |  | |
| **127** | A train moves with a speed of 108 kmph. Its speed in metres per second is : | |  | | | A.10.8  B.18  **C.30**  D.38.8  Explanation:108 kmph = 108\*[5/18] m/sec = 30 m/s. | | |  | |
| **128** | Determine the probability that a digit chosen at random from the digits 1, 2, 3, …12 will be odd. | |  | | | Total no. of Digits = 12. Equally likely cases = 12. There are six odd digits. Probability = 6 / 12 = 1 / 2 | | |  | |
| **129** | In covering a distance of 40 km, Kamlesh takes 2 hours more than Pankaj. If Kamlesh doubles his speed, then he would take 1 hour less than Pankaj. Then what is Kamlesh's speed? | |  | | | A. 11 kmph  **B. 5 kmph**  C. 9 kmph  D. 6 kmph  Answer:B  Explanation: Let Kamlesh’s speed be x km/hr.  Then, `40/x - 40/(2x) = 4`  8x = 40  x = 5 km/hr | | |  | |
| **130** | Solve the equation x+34=82 | |  | | | A. 58  **B. 48**  C. 55  D. 60  Explanation: x=82-34=48 | | |  | |
| **131** | An accurate clock shows 8 o'clock in the morning. Through how may degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon? | |  | | | A.360.  **B.180**  C.90  D.60  Answer: B) 180  Explanation:  Angle traced by the hour hand in 6 hours=(360/12)\*6 | | |  | |
| **132** | Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour? | |  | | | A. 9  **B. 10**  C. 12  D. 20  Explanation:  Due to stoppages, it covers 9 km less.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Time taken to cover 9 km = |  | 9 | x 60 | min | = 10 min. | | 54 | | | |  | |
| **133** | Find the no., when 15 is subtracted from 7 times the no., the result is 10 more than twice of the number | |  | | | Let the number be x. 7x -15 = 2x + 10 => 5x = 25 => x = 5 | | |  | |
| **134** | If 0.75: x :: 5:8, then x is equal to: | |  | | | A.1.12  B.1.16  **C.1.20**  D.1.30  Explanation:(x \* 5) = (0.75 \*8) X=6/5 = 1.20 | | |  | |
| **135** | Today is Monday. After 61 days, it will be : | |  | | | A. Tuesday  B. Monday  C. Sunday  **D. Saturday**  Answer: D) Saturday  Explanation: Each day of the week is repeated after 7 days. So, after 63 days, it will be [Monday](https://www.sawaal.com/data-sufficiency-questions-and-answers/first-day-of-the-month-is-tuesday-and-last-day-of-the-same-month-is-monday-then-which-one-will-be-th_10821).  After 61 days, it will be [Saturday](https://www.sawaal.com/probability-questions-and-answers/what-is-the-probability-that-a-leap-year-has-53-saturdays-and-52-sundays-_12030). | | |  | |
| **136** | Adam can do a job in 15 days; Eve can do the same job in 20 days. If they work together for 4 days, what fraction of job is incomplete? | |  | | | Adam can do 1/15 of the job per day Eve can do 1/20 of the job per day If they work together they can do 7/60 of the work together Remaining job 1 - 7/60 = 32/60 = 8/15 | | |  | |
| **137** | Which one of the following is not a prime number? | |  | | | A.31  B. 61  C. 71  **D. 91**  Explanation:  91 is divisible by 7. So, it is not a prime number. | | |  | |
| **138** | Find c, if 5c - 2 = 33 | |  | | | **A. 7**  B. 9  C. 11  D. 13  Explanation:  We add 2 to both sides and get 5c-2+2=33+2, or 5c=35. We divide both sides by 5 to get c=7. | | |  | |
| **139** | A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour? | |  | | | A. 3.6  **B. 7.2**  C. 8.4  D. 10  Explanation:  Speed = 600/ 5 x 60 m/sec. = 2 m/sec.  = 2 x 18/5km/hr =7.2 km/hr | | |  | |
| **140** | A and B can do a piece of work in 4 days, while C and D can do the same work in 12 days. In how many days will A, B, C and D do it together? | |  | | | A, B, C and D will together take ¼ + 1/12 = 4/12 = 1/3.  3 days to complete the work. | | |  | |
| **141** | The average of five numbers is 27. If one number is excluded, the average becomes 25. The excluded number is? | |  | | | A.25  **B.35**  C.45  D.55  Answer:B  Explanation:  (27\*5)-(25\*4)  135-100  35 | | |  | |
| **142** | The maximum gap between two successive leap year is? | |  | | | A.4  **B.8**  C.2  D.1  Answer: B) 8  Explanation: This can be illustrated with an example. Ex: 1896 is a leap year. The next leap year comes in 1904 (1900 is not a leap year). | | |  | |
| **144** | A guy bought 10 pencils for Rs. 50 and sold them for Rs. 60.What is his gain in terms of percentage? | |  | | | A. 10%  B. 5%  **C. 20%**  D. 12%  Answer:C  Explanation: `"Gain%"=("Gain"/"C.P")\*100=20%` | | |  | |
| **145** | Two trains starting at the same time from 2 stations 200 km apart and going in opposite direction cross each other at a distance of 110 km from one of the stations. What is the ratio of their speeds? | |  | | | In the same time, they cover 110 km and 90 km respectively.  For the same time, speed and distance is inversely proportional.  So ratio of their speed = 110:90 = 11: 9 | | |  | |
| **146** | In 100 m race, A covers the distance in 36 seconds and B in 45 seconds. In this race A beats B by: | |  | | | **A. 20m**  B. 25m  C. 22.5m  D. 9m  Explanation:  Distance covered by B in 9 sec. = (100/45)\*9m = 20m | | |  | |
| **147** | Half percent, written as a decimal, is | |  | | | A.0.2  B.0.02  **C.0.005**  D.0.05  Answer: C  Explanation:  As we know, 1% = 1/100 Hence, (1/2)% = (1/2 \* 1/100) = 1/200 = 0.005 | | |  | |
| **148** | A pump can fill a tank with water in 2 hours. Because of a leak, it took 2.5 hours to fill the tank. The leak can drain all the water of the tank in: | |  | | | A. 4 1/3 Hours  B. 7 Hours  C. 8 Hours  **D. 10 Hours**  Explanation:   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Work done by the leak in 1 hour = |  | 1 | - | 2 |  | = | 1 | . | | 2 | 5 | 10 |   Leak will empty the tank in 10 hrs. | | |  | |
| **149** | If a number is chosen at random from 1 to 100, then the probability that the chosen number is a perfect cube is | |  | | | We have 1,8,27 and 64 as perfect cubes from 1 to 100. Thus, the probability of picking a perfect cube is 4/100 = 1/25 | | |  | |
| **150** | Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is: | |  | | | A. 9  B. 11  C. 13  **D. 15**  Explanation:  Let the three integers be *x*, *x* + 2 and *x* + 4.  Then, 3*x* = 2(*x* + 4) + 3      *x* = 11.  Third integer = *x* + 4 = 15. | | |  | |
| **Faculty Team Prepared** | | | | | **Signatures** | | | Signature | | |
| 1.Mr.M.Soundarrajan | | | | |  | | |  | | |
| 2.Mr.R.Gowdaman | | | | |  | | |  | | |
| 3.Mr.M.Arulmani | | | | |  | | | **HoD** | | |