

[M17 CAD 1101]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
INDUSTRIAL ROBOTICS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. a) How do you specify a robot? Is robotics automation? Discuss the different classification systems of robots. 7 M
b) Define the terms 'Robot' and 'Robotics'. Discuss the role of robots in engineering. 7 M
2. a) What are the different actuators used in the robots? Describe them briefly. 7 M
b) Discuss the different feedback components used in robots. 7 M
3. Explain briefly the two stage control of manipulator using interpolation of end effectors position method. 14 M
4. a) Explain the working of magnet grippers used for robots. 7 M
b) Discuss the applications and working principle of the following sensors. i) Range sensors ii) Acoustic sensors iii) Tactile sensors. 7 M
5. a) Explain the following for smoothing of image: i) Neighbourhood averaging ii) Image averaging method 7 M
b) Discuss the current applications of machine vision system. 7 M
6. a) Discuss the textual robot language structure with the help of block diagram. 7 M
b) Discuss the relative merits and demerits of different textual robot languages. 7 M
7. What are the various robot cell layouts? Describe any two with the help of neat sketches. 14 M
8. What are the various fields in which the robots used? Discuss them in detail. 14 M

[M17CAD 1101]

[M17 CAD 1102]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
COMPUTER AIDED MANUFACTURING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. a) With the help of a neat sketch explain the flow of manufacturing information in the State-of-the-art CAD/CAM/CNC Chain. 8 M
 b) What are the advantages of CAM? 6 M
2. a) Briefly explain any 3 types of geometry commands used in APT. 7 M
 b) Write the APT program for the geometry shown in Figure 1 below. 7 M

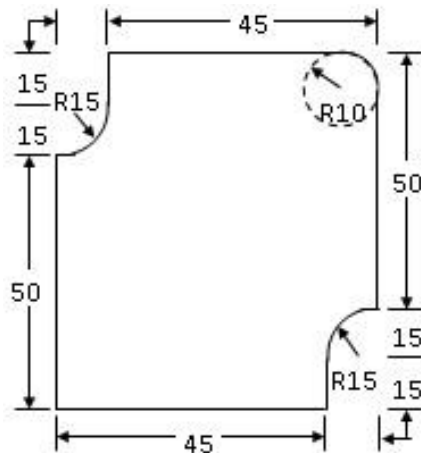


Fig. 1

3. a) Discuss about preset and Qualified Tooling systems used in CNC machines. Also describe about Automatic Pallet Changer (APC). 7 M
 b) Explain with the help of neat sketches the working of Automatic Tool Changer (ATC). 7 M
4. a) Describe Adaptive Control with Optimization for a milling machine with a neat sketch. 7 M
 b) Compare CNC with DNC and mention the advantages and disadvantages of DNC. 7 M
5. a) What is a process plan? And what are the various steps in developing a process plan? 7 M
 b) What are different approaches to CAPP? Describe briefly. 7 M
6. a) What is PLC? Draw the basic structure of PLC and discuss the various hardware components of PLC. 7 M

- b) Discuss the advantages of microcontrollers over microprocessors. 7 M
7. a) With the aid of a neat diagram, explain the structure of a post processor in a NC System. 7 M
- b) Explain about DAPP-based-Post processor. 7 M
8. a) How do you Classify Inspection methods? Explain the principle of operation of Non Contact type Optical Inspection methods. 7 M
- b) With help of a neat sketch explain the functioning of a CMM. Also mention the advantages and limitations of it. 7 M

[M17CAD1102]

[M17 CAD 1103]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
SPECIAL MANUFACTURING PROCESSES
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. a) Define a Coating and explain about electro forming on the components? 7 M
b) What is the purpose of ion implantation? Explain it with neat sketch? 7 M
2. Explain the working principle and the effect of process variables on MRR in the capabilities of WEDM with a neat sketch? 14 M
3. Explain in detailed the ECM process with a neat sketch and write the advantages and limitations of it? 14 M
4. a) Name the different methods of processing of ceramics and explain in brief any one method? 7 M
b) Briefly explain the applications of ceramics? 7 M
5. a) Explain the process of manufacture of fiber reinforced composites? 7 M
b) What are the characteristics and applications of the metal matrix composites? 7 M
6. a) Explain the steps involved in selective laser sintering? What are its advantages and disadvantages over Steriolithiography? 7 M
b) Expand the role of fusion deposition modeling in rapid prototyping? 7 M
7. a) What is lithography? Explain X-ray lithography with neat diagram? 7 M
b) Discuss the various bonding and packaging techniques applied to MEMS industries? 7 M
8. Write a brief note on : 14 M
a) Thermal Spraying; b) MMC, CMC and polymer matrix composites

[M17CAD 1103]

[M17 CAD 1104]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
GEOMETRIC MODELING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. a) What do you understand by Implicit and Explicit equations? Explain. 7 M
b) Distinguish between parametric and non-parametric equations. Explain why nonparametric equations are not suitable for CAD. 7 M
2. a) What are the characteristics of cubic spline? 7 M
b) What do you mean by blending function? Explain how these are evaluated? 7 M
3. a) What is the need of curve manipulation? Explain various curve manipulation techniques. 7 M
b) What are the characteristics of the B-Spline curve? 7 M
4. a) A Cubic Bezier curve is defined by the control points as P0 (1,1), P1(2,4), P2(4,3), P3(5,1). Find the equation of curve and its mid point. 7 M
b) Write short notes on the following terms Sweep Surfaces and ruled surfaces. 7 M
5. a) What conditions are required to convert a B-Spline surface to a Bezier Surface? 7 M
b) What are the closed and open splines? Explain 7 M
6. Derive the parametric form of following 14 M
a) Bezier surface
b) B-Spline surface
c) Coon's surface
7. a) Explain the solid modeling concepts of wire frames and Boundary representation methods. Discuss the advantages of each method. 7 M
b) How can you create a solid fillet using unbounded half spaces? 7 M
8. a) How solids are represented in geometric form. Explain with an example. 7 M
b) What are the properties of tricubic solid? 7 M

[M17CAD 1104]

[M17CAD 1105]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
COMPUTATIONAL METHODS IN ENGINEERING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. Solve using gauss – Jordan elimination 14 M
 $x - y + 2z = -8$
 $x + y + z = -2$
 $2x - 2y + 3z = -20$

2. Fit a curve of the form $y = ax^b$ for the following data: 14 M

x	1	2	3	4	5
Y	0.5	2	4.5	8	12.5

3. Using Shooting method, solve the BVP $y'' + y + x = 0$, $0 < x < 1$, $y(0) = 0$ and $y(1) = e^{-1}$. 14 M

4. Solve the heat conduction equation, $u_{xx} - u_t = 0$, subject to boundary conditions $u(0,t) = u(1,t) = 0$ and $u(x,0) = x - x^2$. Take $h = 0.25$ and $k = 0.025$. 14 M

5. Explain FFT by taking a suitable example. 14 M

6. Solve $4u_{xx} = u_{tt}$ $u(0,t) = 0$ $y(4,t) = 0$ 14 M
 $u_t(x,0) = 0$ and $u(x,0) = x(4-x)$.

7. Solve the Poisson equation $\Delta^2 = -15(x^2 + y^2 + 15)$ subject to the condition $u = 0$ at $x = 0$ and $x = 3$ $u = 3$ $u = 0$ at $y = 0$ and $u = 1$ at $y = 3$ for $0 < x < 3$. Find the solution taking $h = 1$ with a square. 14 M

8. Solve $u_{xx} + u_{yy} = 0$, $0 \leq x, y \leq 1$, with $u(0,y) = 10 = u(1,y)$ and $u(x,0) = 20 = u(x,1)$. 14 M
Take $h = 0.25$ and apply Liebmann method to 3 decimal accuracy.

[M17CAD 1105]

[M17CAD 1106]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
THEORY OF ELASTICITY AND PLASTICITY
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) The displacement field in a body is specified as $u = x^3 + 3y^2$, $v = 3y^2 + 4x$, $w = 0$. Determine the stress and strain component at a point whose coordinates are (2,3) take $E = 2 \times 10^5$, Poisson's ratio = 0.3. 7 M
(b) Is the following state of stress a possible one? $\sigma_x = \sigma_y = ky^2/x^2$, $\tau_{xy} = ay/x^2$ assume k is a constant and zero body forces. 7 M
2. (a) Resolve the given state of stress into spherical and deviator state of stress determine the normal and shearing stresses on an octahedral plane. $\sigma_x = \sigma_y = \sigma_z = 2$; $\tau_{xy} = \tau_{yz} = \tau_{zx} = 1$. 7 M
(b) Determine the strain components from the displacement field specified as $u = 5 + x^2 + y^2 + x^4 + y^4$; $v = 6 + 3x^2 + 3y^2 + x^4 + y^4$; $w = 10 + 4xy(x^2 + y^2 + 2)$. 7 M
3. (a) Explain Hooke's law giving strains as a function of stress and also stresses in terms of strain in a plane stress case. 7 M
(b) Show that the change in volume of a strained cube of unit length given by $\Delta e = \epsilon_x + \epsilon_y + \epsilon_z$. 7 M
4. (a) Obtain the compatibility expression for 2 dimensional problems in polar coordinates. 7 M
(b) Determine the normal stress, circumferential stress and shear stress of the stress function $\phi = A \log r + Br^2 \log r + Cr^2 + D$ 7 M
5. (a) Explain St. Venant's principle and its importance? 7 M
(b) Investigate what problem is solved by stress function $\phi = [-Fx^2/d^3](3d-2y)$ applied to a region in $y = 0$; $y = d$; $x = 0$ on the x positive; 'd' is the depth of thin rectangular strip of unit thickness, F is the force. Compare this solution with the one obtained from elementary strength of materials. 7 M
6. (a) Explain plane stress and plane strain state of stress. 7 M
(b) A thick cylinder is subjected to internal and external pressures define equations for radial and circumferential stresses at the boundaries. 7 M
7. (a) Derive an expression for the stress components in a solid bar of elliptical cross section subjected to twisting moment? 7 M
(b) A hollow thin walled brass tube has an equilateral triangular section the mean length of the side of the triangle is 125 mm and thickness of the wall is 3 mm

the tube is subjected to a twisting moment of $2 \times 10^4 \text{N-mm}$. Find the maximum shearing stress and the angle of twist per unit length.

8. (a) Discuss the yield criteria and the flow rules for perfectly plastic and strain hardening materials. 7 M
- (b) A bolt of 25 mm diameter is subjected to an axial force of 50 kN. Determine the maximum shear force the bolt can sustain according to various theories of failure. Assume the yield stress of 300MPa and factor of safety = 2. 7 M

[M17CAD 1106]

[M17CAD 1107]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
NANO TECHNOLOGY
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Explain what you mean by nanoelectro-mechanical systems. 7 M
(b) Discuss nanoscale elements in conventional technologies. 7 M
2. (a) What are challenges being faced by Nanotechnology? Explain. 7 M
(b) Discuss the enhancement of mechanical properties with decreasing size. 7 M
3. Explain briefly the following: (a) Ion implantation and (b) Electron beam lithography. 14 M
4. (a) Discuss the top down and bottom up nanofabrication methods with their merits and demerits. 7 M
(b) Write a short note on sol-gel method and Explain its principle. 7 M
5. (a) What is the basic principle in Scanning Electron Microscope? How is it different from optical microscopy? Explain.. 7 M
(b) Discuss ultra-sensitive imaging for nanoparticles. 7 M
6. (a) Explain the optical and electronic properties of metal nanoparticles. 7 M
(b) Describe the synthesis of semiconductor nanoparticles. 7 M
7. (a) How can Carbon Nanotubes enable brighter TV screens? Explain. 7 M
(b) Explain the Electronic and Vibrational properties of carbon Nanotubes. 7 M
8. Discuss the applications of Nanowire transistors and sensors. 14 M

[M17CAD 1107]

[M17CAD 1108]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
DESIGN FOR MANUFACTURING AND ASSEMBLY
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) What is DFMA? How the development of DFMA is been progressed? 7 M
(b) Differentiate between DFA, DFM and DFMA. 7 M
2. (a) Explain the effect of part symmetry on handling time. 7 M
(b) Explain the effect of part thickness and weight on handling time. 7 M
3. (a) Briefly discuss the product design considerations in machining with neat sketches. 7 M
(b) Discuss the applications of design for machining rules. 7 M
4. (a) List out and explain the effect of casting discontinuities on the properties of a casted product. 7 M
(b) Briefly explain the design guidelines for extruded sections with neat sketches. 7 M
5. (a) Discuss the general design recommendations for forging operation. 7 M
(b) Explain the effect of thermal stress in weld joints. 7 M
6. (a) Discuss the importance of pre and post treatment of welds. 7 M
(b) Sketch and explain how to choose parting line in forging design. 7 M
7. (a) Briefly explain the factors that effect drawability. 7 M
(b) Explain component design for blanking operation. 7 M
8. Write a brief note on the following: 14 M
a) Multi station assembly system
b) Automated assembly system

[M17CAD 1108]

[M17CAD 1109]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
MECHATRONICS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. Mechatronics is the “Synergetic integration of MECHANICAL Engineering with Electronics and intelligent control algorithms in the design and manufacture of product processes”, justify the statement. 14 M
2. (a) What are the various Filters that you come across in Signal conditioning? Explain. 7 M
(b) Explain in detail the Inverting and Non-Inverting type amplifiers. 7 M
3. (a) Explain the working of an Electro-hydraulic actuating system with a neat sketch. 7 M
(b) Briefly explain the working of Timing belts and linear bearings. 7 M
4. (a) How do you classify Control systems? Explain with block diagrams. 7 M
(b) With the help of a neat sketch explain the working of an Automatic Washing Machine. 7 M
5. (a) Explain the principle of operation of a permanent magnet D.C. Motor, also differentiate between brushless and brushed Motors. 7 M
(b) How do you specify Stepper Motor? Explain the control of Stepper motors. 7 M
6. (a) Differentiate between Microprocessor and Microcontroller. 7 M
(b) What is PLC? Briefly explain the use of timers and counters in PLCs with suitable examples. 7 M
7. (a) What you mean by ADC? Explain the working of Flash ADC with neat sketch. 7 M
(b) Explain the working of R-2R Ladder DAC. 7 M
8. Write Brief note on: 14 M
a) Optical Encoders.
b) Data acquisition in Mechatronic systems

[M17CAD 1109]

[M17CAD 1110]
I/II MTECH I SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
COMPUTER AIDED PROCESS PLANNING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Compare Automated process planning system with conventional process planning. 7 M
(b) Explain any one method of feature recognition approaches in CAPP with example. 7 M
2. (a) Discuss about the knowledge based production planning system. 7 M
(b) Explain the information flow in retrieval – type CAPP system. 7 M
3. (a) Define cutting speed, feed and depth of cut in machining. 7 M
(b) Describe the effect of various machining parameters on surface quality. 7 M
4. Explain tolerance analysis and tolerance synthesis in machining parts design with neat sketch. 14 M
5. Determine the optimal index positions for executing fixed sequence in NC tool path generation. 14 M
6. What do you understand by machinability database system? Explain the different parameters required for machinability database system. 14 M
7. (a) Discuss the process of manual process planning taking a suitable example. 7 M
(b) Briefly discuss about interference engine. 7 M
8. Write short notes on following: 14 M
 - a) Design tolerances
 - b) Manufacturing tolerances
 - c) MIPLAN system

[M17CAD 1110]

[M17CAD 1201]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
MODELING AND SIMULATION OF MANUFACTURING SYSTEMS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Define model. Classify and explain them. 7 M
(b) Explain point estimation and interval estimation. 7 M
2. (a) State and explain the various techniques for increasing the model credibility. 7 M
(b) Obtain statistical procedures for developing credible model. 7 M
3. (a) Explain the inverse transform method to generate random variates from a given distribution. 7 M
(b) Derive a formula by which to generate Weibull distributed random variates with mean μ and shape factor α . 7 M
4. (a) Explain the different techniques of simulation output analysis. 7 M
(b) With illustrative example describe the output analysis for steady state simulations. 7 M
5. Explain about a M/M/1 queues with infinite and finite capacities. 14 M
6. (a) Describe about types 1 & 2 errors. 7 M
(b) Explain the following terms: (i) Verification and (ii) Validation 7 M
7. (a) Compare simulation packages with programming languages. 7 M
(b) What is output analysis? State its purpose. 7 M
8. Write short notes on following: 14 M
 - a) New boy paper problem
 - b) Welch algorithm
 - c) Strong law of large numbers

[M17CAD 1201]

[M17CAD 1202]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
OPTIMIZATION & RELIABILITY
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Minimize $3x_1^2+4x_2^2+5x_3^2$ such that $x_1+x_2+x_3 = 10$ using Lagrange multiplier method. 14 M
2. (a) What is the reason for possible divergence of Newton's method? 7 M
(b) What are the types of classical optimization techniques? 7 M
3. How do you perform (a). Crossover and (b) Mutation in GA? Explain with examples. 14 M
4. Write the typical optimization model for a machining problem. Discuss the objective functions and the constraints involved. 14 M
5. (a) Explain Pareto's analysis. 7 M
(b) What is Non-dominated sorted GA? Explain. 7 M
6. Explain the optimization model of a weight of a cantilever beam. 14 M
7. (a) Write the differences between GA and GP. 7 M
(b) Explain Nelder Mead's Simplex method. 7 M
8. (a) Discuss the procedural steps involved in Non-dominated sorted GA. 7 M
(b) What are the objectives of GA. 7 M

[M17CAD 1202]

[M17 CAD 1203]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
COMPUTER GRAPHICS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Explain how rasterization accuracy is preserved despite using integer arithmetic in Bresenham line drawing algorithm. 7 M
(b) Explain the basic structure of a twisted pneumatic liquid crystal display with a neat sketch 7 M
2. (a) Distinguish between seed filling and scanline filling algorithm. Apply any of these algorithms to fill the polygon defined by (1, 1), (1, 5), (5, 2). 7 M
(b) Discuss displaying of lines, polygons and characters. 7 M
3. Explain midpoint subdivision algorithm with an example showing the stack position at all stages. 14 M
4. (a) Determine the form of the transformation matrix for a reflection about an arbitrary line with equation $y = m + b$. 7 M
(b) Derive the concatenated transformation matrix for rotation about an arbitrary point in 2 dimensions. 7 M
5. (a) Prove that a triangle P Q R with P(8, 2), Q(10, 4), R(8,6) after reflection about x axis and then about $y = -x$ will be the same as rotation about origin by an angle 270° . 7 M
(b) Reflect the diamond shaped polygon whose vertices are A(-1,0), B(0,-2), C(1,0), D(0, 2) about the line $y=2$ 7 M
6. (a) Discuss Z-buffer algorithm with an example. What are the merits and limitations of this algorithm? 7 M
(b) Discuss painters algorithm with an example. 7 M
7. (a) Explain Gourand shading algorithm with an example. 7 M
(b) Find the matrix for mirror reflection with respect to the plane passing through the origin and having a normal vector whose direction is $N = I + J + K$ 7 M
8. Write a short note on the following 14 M
 - a) Describe inside outside tests
 - b) Explain pattern filling
 - c) Differentiate between boundary fill and flood fill algorithms

[M17CAD 1203]

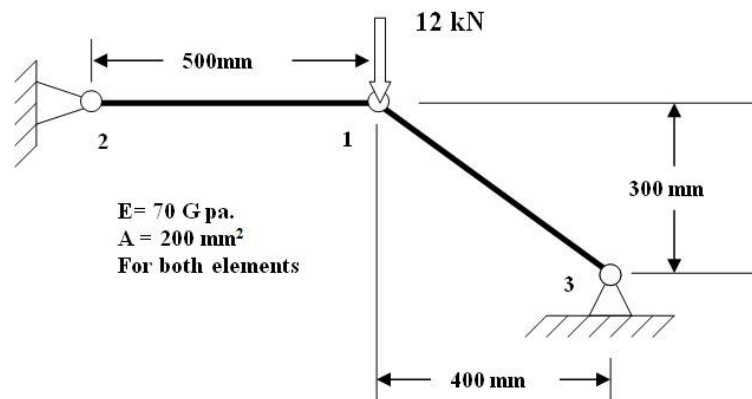
[M17 CAD 1204]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
FINITE ELEMENT METHODS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Differentiate between plane stress and plane strain problems. 6 M
 (b) Derive the stress and strain relations for a 3D system. 8 M
2. (a) Discuss in detail about the general procedure of FEM formulation with an example. 5 M
 (b) Derive the elemental stiffness matrix for one dimensional quadratic element. 9 M
3. (a) Differentiate between Bar and Truss elements in FEM formulation. 5 M
 (b) For the two-bar truss shown in Fig. 1, determine the displacements of node 1 and the stress in element 1-3. 9 M



4. A beam of 10 m length is fixed at one end and supported by a roller at the other end has a 20 KN concentrated load applied at the centre of the span. Calculate the deflection under the load and construct the shear force and bending moment diagrams for the beam. Assume $E = 20 \times 10^5 \text{ N/mm}^2$ and $I = 2500 \text{ cm}^4$. 14 M
5. Derive the shape functions for the following higher order elements (i) Nine Nodded Quadrilateral Element (ii) Eight Nodded Quadrilateral Element (iii) Six Nodded Triangular Element 14 M
6. For the triangular plate shown in Fig. 2, determine the deflection at the point of load application and also stress induced in the plate using a one element model by considering it as plane stress problem. 14 M

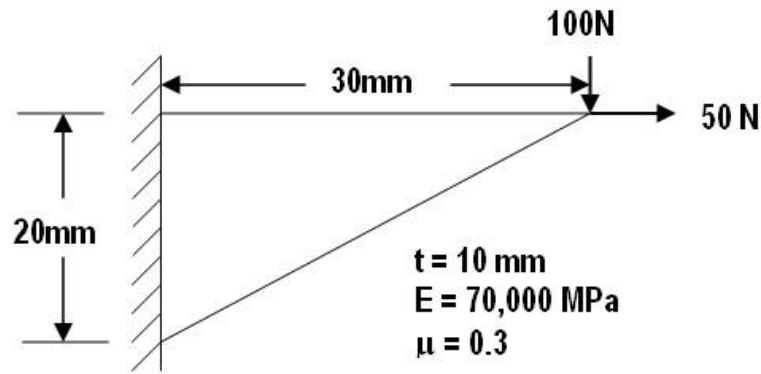


Fig. 2

7. A composite wall consists of three materials shown in Fig. 3. The outer temperature is 20°C . Convection heat transfer takes place on the inner surface of the wall with $h = 20 \text{ W/m}^2 \text{ }^{\circ}\text{C}$ and $T_{\alpha} = 1000^{\circ}\text{C}$. Determine the temperature in the wall. Assume $k_1 = 20 \text{ W/m }^{\circ}\text{C}$, $k_2 = 30 \text{ W/m }^{\circ}\text{C}$ and $k_3 = 40 \text{ W/m }^{\circ}\text{C}$. 14 M

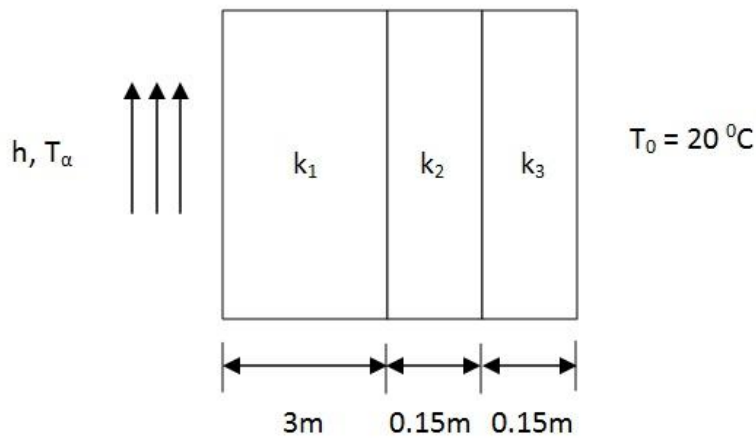


Fig. 3

8. Determine the natural frequencies and mode shapes for the stepped bar shown in Fig. 4. Take $E = 70 \text{ GPa}$ and specific weight 2700 kg/m^3 . 14 M

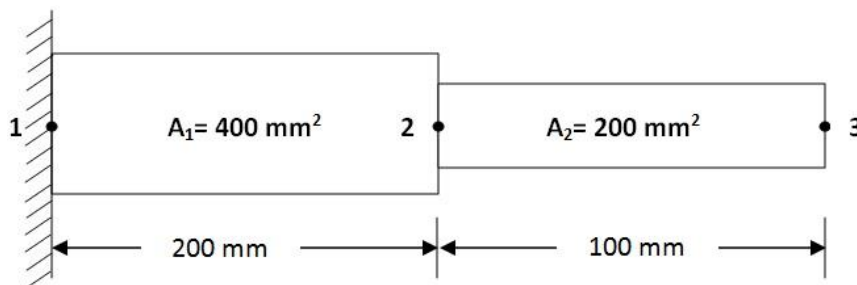


Fig. 4

[M17CAD 1204]

[M17 CAD 1205]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
QUALITY ENGINEERING IN MANUFACTURING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Explain Taguchi loss function with derivative for the model “Nominal the best”. 7 M
 (b) Explain how one attribute of the loss functions helps to determine the factory tolerances. 7 M
2. (a) Distinguish between system design, parameter design and tolerance design. 7 M
 (b) How the tolerance design is made for L-type characteristic systems? 7 M
3. A company wishes to test 4 different types of tires, A, B, C, D. The lifetimes of the tires, as determined from their treads, are given (in thousands of miles) in table below, where each type has been tried on 6 similar automobiles assigned at random to tires. Test at the 0.05 level whether there is a difference in tires. 14 M

	I	II	III	IV	V	VI
A	33	38	36	40	31	35
B	32	40	42	38	30	34
C	31	37	35	33	34	30
D	29	34	32	30	33	31

4. Explain the process of DOE indicating the steps involved in the planning phase, conducting phase and analysis phase. 14 M
5. Briefly explain six sigma philosophy and benefits of its use in small organizations. 14 M
6. (a) Determine the S/N ratio for a process that has a temperature average of 21 °C and a sample standard deviation of 2 °C for four observations. Use nominal the better equation. 7 M
 (b) Explain their role in reducing the effects of noise factors during product and process design stages. 7 M
7. (a) How ANOVA is used for four level factors and multiple level factors? 7 M
 (b) Explain with an example the importance of Orthogonal Array in design of experiments. 7 M

8. Write short notes on following:

14 M

(a) Six sigma system

(b) Larger the better

(c) ANOVA

[M17CAD 1205]

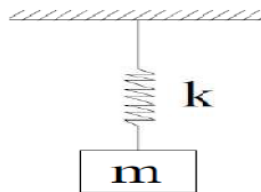
[M17 CAD 1206]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
MECHANICAL VIBRATIONS
MODEL QUESTION PAPER

TIME: 3 Hours

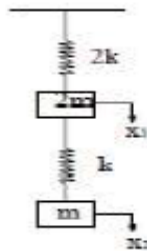
Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

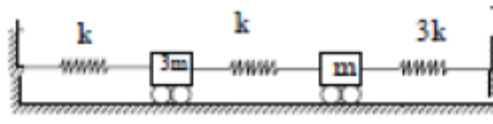
1. (a) Determine the differential equation of a spring mass system (shown in the figure below) and its natural frequency by using (i). D' Alembert's principle and (ii). Rayleigh's method. 7 M



- (b) Explain the classifications of vibration with examples 7 M
2. Find the natural frequency and mode shapes of the system if $m= 2 \text{ kg}$, $K= 400 \text{ N/m}$, for the figure given below. 14 M



3. Determine the Eigen values and test their orthogonality property for the given diagram. 14 M



4. a) Find the natural frequency of transverse vibrations for the system shown below by Rayleigh Method. 7 M
 b) Explain with neat sketch of working of Vibrometer. 7 M
5. Explain the procedure adopted for Rayleigh method to determine the natural frequency of multi-degree of freedom system with an suitable example. 14 M

6. Prove that the critical speed of whirling speed for a rotating shaft is same as the frequency of natural transverse vibration. 14 M
7. (a) A mass of 50 kg suspended from spring produces a static deflection of 0.017m and when in motion, it experience a viscous damping force with a value of 250 N at a velocity of 0.3m/s. calculate the periodic time of damped vibration if the mass is then subjected to periodic disturbing force having a maximum value of 200N and making 2 Cps. Find the amplitude of the ultimate force. 7 M
(b) Explain the transmissibility and transmitted force for a spring mass damper system. 7 M
8. Write short on any three of the following: 14 M
- a) Damping ratio
 - b) Undamped system (no damped)
 - c) Under damped
 - d) Critical damped
 - e) Logarithmic decrement.

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[M17 CAD 1207]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
CONCURRENT ENGINEERING
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Discuss the importance of various principles of concurrent engineering. 7 M
(b) Explain about various elements of concurrent engineering in detail. 7 M
2. Discuss in detail the modern methodologies and tools which are used in managing concurrent engineering. 14 M
3. (a) Explain briefly the principles of material handling 7 M
(b) Explain with an example how can we do assembly sequencing with toleranced parts. 7 M
4. (a) Explain importance of group technology in system feasibility analysis. 7 M
(b) Discuss about assembly resource alternatives. 7 M
5. Explain about roller and skate wheel conveyors and also belt conveyors which are used in material transport systems. 14 M
6. Explain about various issues in assembly workstation design. 14 M
7. (a) What are the objectives of modern fabrication system design? 7 M
(b) Explain about human resource considerations in design of automated fabrication systems. 7 M
8. Write a short note on the following
(a) Load stabilizing system 4 M
(b) Fixed & variable path conveying 3 M
(c) Part feeding alternatives 3 M
(d) Automobile air conditioning module 4 M

[M17CAD1207]

[M17 CAD 1208]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
MECHANICS & MANUFACTURING METHODS OF COMPOSITES
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) What are the types of composites and classification of composites? 7 M
(b) Distinguish between natural and man-made composites. 7 M
2. (a) Explain about the failure of composites. 7 M
(b) Give the characterization of composite properties. 7 M
3. (a) Explain about autoclave and tape production. 7 M
(b) Hookes law for different types of materials. 7 M
4. (a) What are the micro mechanical predictions of elastic constants? 7 M
(b) What is the relationship between engineering constants and reduced stiffness? 7 M
5. (a) Discuss about first-ply failure and free edge-effects? 7 M
(b) Make a critical assessment of various lamina failure theories. 7 M
6. (a) What are the important strength criteria that are commonly used to evaluate failure of an orthotropic lamina? 7 M
(b) Determine the deflection equation for a square symmetric laminated plate subjected to a transverse load $q=q_0 x_1/a$ when the edges at $x_1 = 0, a$ are simply supported and those at $x_2 = 0, b$ are clamped. 7 M
7. Explain and derive the equations for orthotropic plate with symmetric cross-ply lamination and angle-ply? 14 M
8. Explain the following terms: 14 M
 - (a)Thermosetts
 - (b)Polymer composites
 - (c)Filament winding
 - (d) Pultrusion

[M17CAD 1208]

[M17 CAD 1209]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
MATERIALS TECHNOLOGY
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Define work hardening. Explain about the Grain boundary strengthening. 7 M
(b) Explain the deformation of non-crystalline material. 7 M
2. (a) Explain the Griffith's criterion used for smaller cracks. What is Griffith's crack length? Explain. 7 M
(b) What is the difference between Precipitation Hardening and Dispersion Hardening? By giving a suitable example elucidate the mechanisms for precipitation strengthening. Enumerate in detail the underlying deformation mechanisms for underaged, peak aged and overaged conditions of the alloy system 7 M
3. (a) What is DBTT? Explain its significance. 7 M
(b) Explain why brittle fracture is more prevalent at low temperature. 7 M
4. (a) What is the effect of stress concentration on fatigue? Explain. 7 M
(b) What is Paris law? Explain the crack initiation and propagation mechanism. 7 M
5. Write short notes on the following: a) Size effect on fatigue and b) Surface effects on fatigue. 14 M
6. (a) What is the criterion for selecting the materials based on service requirements, cost and motivation? 7 M
(b) What are metallic foams? Explain their important characteristics and applications. 7 M
7. (a) Write down the compositions and applications of HSLA and TRIP steels. 7 M
(b) What are structural ceramics? Discuss about the processing of structural ceramics. 7 M
8. (a) Discuss about polymeric materials and their molecular structures. 7 M
(b) Write down the properties, processing techniques of WC and SiC materials. Give their applications. 7 M

[M17CAD 1209]

[M17 CAD 1210]
I/II MTECH II SEMESTER REGULAR EXAMINATIONS
CAD/CAM
DEPARTMENT OF MECHANICAL ENGINEERING
INTELLIGENT MANUFACTURING SYSTEMS
MODEL QUESTION PAPER

TIME: 3 Hours

Max.Marks: 70

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1. (a) What are the various components of CIM & mention its advantages & limitations? 7 M
(b) Describe the importance of CAD, CAPP & CAM and their effects on quality and quantity of production. 7 M
2. (a) What is the need of manufacturing automation protocol and technical office protocol in implementing the networks. 7 M
(b) Differentiate between conventional and intelligent manufacturing systems. 7 M
3. (a) What are the advantages of knowledge based systems and mention its applications in CIM? 7 M
(b) What are the various knowledge acquisition systems are used in practice and mention its draw backs? 7 M
4. (a) How the artificial neural networks are used in the automated manufacturing? 7 M
(b) What are the various methods of CAPP and explain the retrieval type computer aided process planning systems? 7 M
5. (a) Differentiate between retrieval type and generative type computer aided process planning systems and mention their advantages. 7 M
(b) Describe the knowledge based system an equipment selection (KBSEB) and mention the structure and problem solving. 7 M
6. (a) How the features of the component be recognized and sequence of operations for process planning be done? 7 M
(b) What is the importance of group technology and mention the algorithms for cluster analysis method. 7 M
7. (a) Differentiate between cluster identification method and knowledge based group technology. 7 M
(b) Describe the structure of knowledge base system for group technology. 7 M
8. Write a short note on the following 14 M
(a) Computer aided quality control.
(b) System architecture & data flow.
(c) Artificial intelligence in CIM.

[M17CAD 1210]