

Subject Code: G0401/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

INDUSTRIAL ROBOTICS

(Common to AM&MSD, CAD/CAM and AMS)

Time: 3 Hours

Max Marks: 60

**Answer any FIVE questions
All questions carry EQUAL marks**

1. (a) With neat diagrams explain four basic types of robot configurations, also indicate the directions of rotation and linear movements
(b) What is the role of Control Systems in robots
2. Derive Euler angles to define the orientation of a body
3. (a) A vacuum pump to be used in a robot vacuum gripper application is capable of drawing a negative pressure of 4.0 lb/sq.in. compared to atmospheric pressure. The gripper is to be used for lifting stainless steel plates, each plate having dimensions of 15×35 in. and weighing 52lb. Determine the diameter of the suction cups to be used for the robot gripper if it has been decided that two suction cups will be used for the gripper for greater stability. A factor of safety of 1.5 should be used in the design computations.
(b) Explain the features of safety sensors & safety monitoring of robots.
4. Compare the forward transformation and reverse transformation of a 2 degree of freedom arm?
5. (a) What are the basic characteristics of a robot-level language?-Discuss with the help of an example.
(b) Differentiate between VAL and RAIL robot programming language?
6. (a) How do you define the BRANCHING related to robot programming? Explain.
(b) What are the various possible interpolation schemes that can specify on many robots by the programmer? Explain.
7. (a) What are the desirable features of a robot for successful machine tool load/unload application
(b) Explain the different safety considerations for robot operations
8. Write a brief note on
 - a) Processing Operations
 - b) Inspection Operations
 - c) Assembly Operations



Subject Code: G1505/R13

M. Tech –I Semester Regular/Supply Examinations, February, 2016

DESIGN WITH ADVANCED MATERIALS

(Common to MD and MED)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a. What are the different mechanism involved in elastic deformation? Is there is any volumetric change in the case of elastic deformation? If yes, what could be the reason.
b. Explain about the dispersion strengthening mechanism.
2. a. Differentiate between physical and mechanical properties.
b. Explain work hardening and solid solution strengthening in metals.
3. Discuss the effect of the following on working range of an alloy:
 - a. strain rate
 - b. Strain induced precipitation
 - c. Phase transformation
4. a. Name some of the super alloys which are used in aircraft industry? Give their nominal compositions.
b. Give the microstructure, composition of Nickel base and cobalt base heat resistant casting alloys.
5. a. List out different types of polymerization techniques. Discuss in detail any two techniques.
b. Write the properties and applications of engineering polymers.
6. a. What are the unique properties of composite over conventional materials? Explain them?
b. Mention various phases in fibrous composites. Explain their functions.
7. What is a Matrix. What are the various types of matrices used in the composite material? Explain the advantages and disadvantages and applications of each one of them.
8. Name some shape memory alloys. Give the mechanical properties and applications of the above materials.

Subject Code: G2101/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

OPTIMIZATION TECHNIQUES & APPLICATIONS

(Thermal Engineering)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

- Mention the characteristics of Fibonacci method.
 - Min $f = x^2 - 10e^{0.1x}$ in the interval $(-10, 5)$ to the accuracy of 10%. Use Fibonacci Method. Calculate the actual accuracy achieved.
- Using Lagranges interpolation formula, find $y(10)$ from the following table.

X	5	6	9	11
Y	12	13	14	16

- Define the gradient of the function. Explain its importance in the multi variable optimization.
 - Using the variable metric method, find the minimum of the function
Min $f(X) = x_1^2 - x_1x_2 + 3x_2^2$ Take initial point as $[1, 2]$.
- Solve the geometric programming problem:
Min $Z_x = 2x_1x_2^{-3} + 4x_1^{-1}x_2^{-2} + \frac{32}{3}x_1x_2$
Subject to $10x_1^{-1}x_2^2 = 1$
- State arithmetic-geometric inequality theorem. Explain how it is used in deriving dual problem for a given unconstrained geometric problem.
 - Solve the following GP problem
Min $f = 4x_1^2x_2^{-3} + 5x_1^{-3}x_2 + 6x_1x_2$, $x_1, x_2 > 0$
- Find the shortest path from A to E in the following network using Dynamic Program.

	B1	B2	B3
A	2	2	2

	C1	C2
B1	3	4
B2	4	-
B3	5	2

	D1	D2
C1	-	2
C2	5	3

	E1
D1	3
D2	4

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7. Deduce five point standard formula and five point diagonal formula to solve a two dimensional Laplace equation

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0.$$

8. Explain in detail about P.I and P.I.D controllers with neat sketch.

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Subject Code: G2201/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

APPLIED MATHEMATICS

(Common to TE, SE and SD)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

- 1) a) Find the solution of homogeneous heat equation

$$\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}, 0 < x < \pi, 0 < t$$

Which satisfies the following conditions

- (i) $u(x,0) = \pi - x, 0 < x < \pi$
(ii) $u(0,t) = u(\pi,t) = 0, 0 < t$

- b) Fit the curve
- $y = a/x + bx$
- for the following data (6+6)

X	10	15	20	25	30	35
Y	35.3	32.4	29.2	26.1	23.2	20.5

2. a) Solve the non homogeneous heat equation

$$\frac{\partial u}{\partial t} - a^2 \frac{\partial^2 u}{\partial x^2} = A \cos \omega t, 0 < x < \pi, 0 < t$$

Subject to the conditions (i) $u(0,t) = u(\pi,t) = 0, 0 < t$ (ii) $u(x,0) = 0, 0 < x < \pi$

- b) Fit the curve
- $y = ax^b$
- for the following data (6+6)

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

- 3) a) Solve the Laplace equation
- $\left(\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial z^2} \right) = 0, 0 \leq r < a, -L < z < L$

Subject to (i) $u(a,z) = 0$ (ii) $\frac{\partial u(r,-L)}{\partial x} + \frac{\partial u(r,L)}{\partial z} = 1$

- b) From the following data calculate the expected value of y when x = 12 (8+4)

	x	y
Average	7.6	14.8
Standard deviation	3.6	2.5
r = 0.99		

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- 4) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following figure by (12M)
 (a) Jacobi's iteration (b) Gauss-seidel iteration method

C	1	1	B
0	U_4	U_3	0
0	U_1	U_2	0
0	0	0	A

- 5) Solve the heat equation $\frac{\partial u}{\partial t} = \frac{1}{2} \frac{\partial^2 u}{\partial x^2}$ using Crank-Nicolson formula (12M)
 subject to the conditions $u(x,0) = 4x - x^2$ and $u(0,t) = u(4,t) = 0$
- 6) The following are the marks batch of 100 students in Statistics/mathematics (12M)

Statistics/mathematics	16-17	17-18	18-19	19-20	Total
30-40	20	10	3	2	35
40-50	4	28	6	4	42
50-60	0	5	11	0	16
60-70	0	0	2	0	2
70-80	0	0	0	5	5
Total	24	43	22	11	100

Then calculate (a) the correlation coefficient
 (b) The Regression lines

- 7) a) Find the Eigen values and Eigen Vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ (6+6)

b) Solve the system of equations $2x + y + 2z + w = 6$, $6x - 6y + 6z + 12w = 36$,
 $4x + 3y + 3z - 3w = -1$, $2x + 2y - z + w = 10$ by Gauss elimination Method

- 8) a) Find the Inverse of the matrix $A = \begin{bmatrix} 0 & 4 & -1 & 1 \\ 1 & 1 & 5 & -1 \\ 1 & 5 & 4 & 0 \\ 2 & 6 & 9 & -1 \end{bmatrix}$ using matrix operations (6+6)

b) Obtain the rank correlation for the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

Subject Code: G3801/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

OPTICAL COMMUNICATION TECHNOLOGY

(Common to DE&CS, E&CE, CS and DECE)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a) List and explain the advantages of Optical Fiber communication.
b) Explain various Linear Scattering Losses.
2. a) Write a short note on cross-phase modulation.
b). Explain the principle of solitons.
3. Explain the principles and operations of an isolator.
4. a) Write about the fiber Bragg-grating.
b) Discuss the operation of the optical amplifier, and types of the optical amplifier.
5. a) What are the optical duo binary modulations? Explain.
b) Write in detail about time recovery and equalization.
6. a) Discuss system model in transmission system engineering.
b) What is crosstalk and reduction of crosstalk explain.
7. a) Write in detail about dispersion limitations.
b) Explain the operation of the wavelength stabilization against temperature variations.
8. Explain about wavelength planning and All-Optical Networks in overall system design considerations.

Subject Code: G4001/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

**ADVANCED DATA STRUCTURES/ DATA STRUCTURES/
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS
(Common to IT, CS&T, CS and CS&E)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a) Write the pseudocode for an algorithm called *copyStack* that copies the contents of one stack into another.
b) Write a recursive algorithm to invert (pointer will point in reverse direction) a circular linked list. [6+6]
2. a) Suppose, a university has to maintain a list of all students, a list of all subjects and a record of which student has registered for which course. Write the pseudocode to maintain linked list structures.
b) Discuss about different graph storage representations with examples. [6+6]
3. a) Consider the following array elements to determine the value of the array elements after three more passes of selection sort algorithm.
7, 8, 26, 44, 13, 23, 98, 57
b) Trace the steps to find the element 20 using Binary search algorithm and at each loop iteration, include the *last*, show the contents of *first*, *last* and *mid*. [6+6]
4. a) What is a dictionary? What are its types? What are the methods supported by it?
b) Define Hashing. Explain the different Hash table representations in detail. [6+6]
5. a) Use linear probing, a hash table with $b = 13$ buckets, and the hash function $f(k) = k \bmod b$. start with an empty hash table and insert pairs whose keys in order are 7, 42, 25, 70, 14, 38, 8, 21, 34, 11. Draw the hash table following each insert.
b) What is priority queue? What are the applications of priority queue? [6+6]
6. a) What is a Binary search tree? Explain its insertion and deletion operations.
b) Discuss any three application areas of binary search trees. [6+6]
7. a) Write algorithm for insertion into B-tree. Explain it with examples.
b) Describe the sequence of rotations required to perform a single right rotation and a double LR rotation in an AVL tree. [6+6]
8. a) Describe the operations of Splay tree.
b) Explain about the LLr, LRr, LLb, LRb imbalances in a Red-Black tree with example. [6+6]

Subject Code: G4302/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

ANALYSIS OF POWER ELECTRONIC CONVERTERS

(Common to PE, P&ID, PE&ED, PE&D, EM&D and PE&PS)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a) Discuss the operation of ac voltage controller with PWM control.
b) A single-phase full-wave ac voltage controller controls power flow from a 230V, 60Hz ac source into a resistive load. The maximum desired output power is 10kW. Calculate
i) The maximum rms current rating of thyristors
ii) The peak current of thyristors iii) the peak value of thyristor voltage. (5+7)
2. a) Give examples for resistive –inductive loads.
b) What are full converters? With a neat diagram and waveforms, explain the operation of a single phase full converter with RL load. (3+9)
3. Single phase full converter connected to a 120 V, 60 Hz supply. The load current I_a is continuous and its ripple content is negligible. The turns ratio of the transformer is unity.
a) Express the input current in a Fourier series; also determine the harmonic factor of the input current, Displacement factor, and input power factor
b) If the delay angle is $\alpha = \pi/3$, calculate V_{dc} , V_n , V_{rms} , harmonic factor, Displacement factor, and power factor. (12)
4. a) List the main advantages and applications of power factor correction converters.
b) With a neat schematic diagram, discuss the operation of a Single-phase single stage boost power factor corrected rectifier. (5+7)
5. a) Describe the working of single phase half bridge inverter with RL load. What is its main drawback?
b) List the few industrial applications of inverters. (8+4)
6. With an appropriate power diagram discuss the principle of working of a three phase inverter. Draw the waveforms on the each thyristor conduct for 180° and the resistive load is star connected. (12)
7. a) What is multilevel inverter? List different types of multilevel inverters and explain its principle of operation.
b) Compare different multilevel inverters based on the requirement of number of power electronic devices. (8+4)
8. With a neat schematic diagram, explain the operation of a three-phase five level Cascaded Multilevel Inverter. Also list their merits. (12)



Subject Code: G4501/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

CODING THEORY AND APPLICATIONS

(Common to SSP, DIP, CE&SP, IP, C&SP, SP&C and SP&C)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a) Define the following
 - i. Information ii. Entropy
 - iii. Mutual information iv. Information rate

(6M)
- b) A code is composed of dots and dashes. Assume that the dash is 3 times as long as the dots, has one-third the probability of occurrence. Calculate:
 - i. The Information in a dot and that in a hash.
 - ii. Average Information in the dot-hash code.
 - iii. Assume that a dot lasts for 10 ms and that this same time interval is allowed between symbols. Calculate average rate of Information.

(6M)
2. a) Explain the probability of an undetected error for linear codes over BSC. (6M)
- b) Write notes on Hamming codes and Perfect codes.
3. A (15, 5) linear cyclic code has a generator polynomial $g(x) = 1+x+x^2+x^4+x^5+x^8+x^{10}$
 - a) Draw block diagram of an encoder and syndrome calculator for this code.
 - b) Find the code polynomial for the message polynomial $D(x) = 1+x^2+x^4$ in a Systematic form.

(12M)
4. a) Explain the differences between Linear codes and Convolutional Codes. (4M)
- b) Explain the Viterbi decoding scheme if the decoder input sequence is
010 000 100001 011 110 001

(8M)
5. a) Explain Decoding of Single-Burst error Correcting Cyclic codes (6M)
- b) Explain Interleaved Cyclic codes (6M)
6. a) Explain any two decoding algorithms for BCH codes (6M)
- b) What is Syndrome computation and explain how it is calculated. (6M)
7. a) List the Applications of Convolutional codes in ARQ system. (6M)
- b) Explain the error correction capabilities of BCH codes (6M)
8. Write short notes on
 - a) Probability of an undetected error for linear codes over BSC (6M)
 - b) Trellis Diagrams (6M)



Subject Code: G5502/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

EMBEDDED –C

(Embedded Systems)

Time: 3 Hours

Max Marks: 60

**Answer any FIVE questions
All questions carry EQUAL marks**

1. a) Define Embedded system and explain its importance in present generations [6+6]
b) List out the different programming languages used in different embedded system with examples
2. a) Explain the TCON and TMOD frame formats of 8051 Microcontroller and explain the function of each bit [6+6]
b) Explain the important features of 8051 microcontroller in detail
3. a) Write an embedded C program for reading and writing bits in a simple version along with explanation [6+6]
b) Explain the need for pull up resistors along with importance
4. Write an embedded C program for a string "Hello Embedded World" by using the concepts project header and port header [12]
5. a) Explain the different delays presented in real time constraints and how to avoid it
b) Write an embedded C programming for generating a 50ms delay by using timer 0 and timer 1. [6+6]
6. Explain the case study of intruder alarm system along with block diagram and write an embedded C programming for it [12]
7. Write an embedded C programming for an reading switch inputs basic code and explain its procedure in detail [12]
8. Write short notes on following terms in detail [3X4=12]
 - a) SCON and PCON register formats of 8051 microcontrollers
 - b) Internal RAM and ROM capacities of 8051 microcontrollers
 - c) How do you develop embedded software?

Subject Code: G5601/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

MICROPROCESSORS & MICRO CONTROLLERS

(Common to PS, PSC & A, EPE, EPS and APS)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. a) Discuss the functions of AX, BX, CX and DX registers of 8086 microprocessor.
b) Explain the functions of Direction flag, Interrupt flag and Tarp flag.
c) Explain the physical memory organization of 8086 microprocessor. (4+3+5)
2. a) What are addressing modes? List and discuss different addressing modes of 8086 microprocessor with examples.
b) Explain the use of HOLD and HLDA pins of 8086 microprocessor. (10+2)
3. a) Draw and discuss the schematic diagram of 8086 microprocessor connected to peripheral devices and memory in its minimum mode.
b) What is a bus controller? Discuss its need? (8+4)
4. a) What is DMA data transfer? Briefly explain its working.
b) Discuss the organization of Stack in 8086 microprocessor. (6+6)
5. Design and stepper motor controller and write an assembly language program to rotate the shaft of a four phase, 200 teeth stepper motor
a) Six rotations in clockwise direction, and
b) By angle of 135° in anticlockwise direction.
Use single-phase excitation scheme. (12)
6. a) Compare between static memories and dynamic memories.
b) Discuss the basic processor for interfacing semiconductor RAM to an 8086 microprocessor.
c) Discuss the need for A/D converters. (3+6+3)
7. With a neat block diagram, discuss the operation of Programmable Interval timer 8254. (12)
8. a) What are timers? What is their need?
b) Discuss in detail the memory organization of 8051 microcontroller. (3+9)

Subject Code: G6804/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS

(Common to VLSI &ES, ES & VLSI, VLSID & ES, ES & VLSID, VLSI, VLSID, VLSISD, VLSI&ME)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. (a). Write the difference between Programmable Logic Arrays & Programmable Array Logic
(b). Explain about Architecture of Xilinx Cool Runner XCR3064XL CPLD.
2. (a). Explain about Programmable Interconnects of FPGA
(b). Briefly explain about FPGA Programming Technologies
(c). List out the applications of FPGAs.
3. (a). Explain about device Architecture of Xilinx XC2000.
(b). Briefly explain about technology mapping for FPGA
4. (a). Compare the performance parameters of ACTEL based FPGAs ACT-1,2 and 3
(b). Explain about anti-fuse programming technique in detail.
5. (a). Explain about a Position Tracker for a Robot Manipulator.
(b). Distinguish CPLD and FPGA.
6. (a). With suitable example, explain the top down design approach for FPGAs using finite state machines.
(b). Is CPLD and FPGAs are PLDS, justify.
7. (a). Discuss about simulation, synthesis, & floor planning of FPGA design flow.
(b). Describe the speed performance and In-system programmability of Lattice CPLD.
8. (a). Design Adder and Accumulator with the ACT Architecture
(b). Explain how to estimate signal delay in RC networks.

Subject Code: C4301/R09

M. Tech –I Semester Supply Examinations, February, 2016

ELECTRICAL MACHINE MODELLING AND ANALYSIS

(Common to PE, PE&D, PE&ED, P&ID and EM&D)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

1. (a) Explain the need and method for two-pole machine representation of a commutator machine.
(b) Explain the speed torque characteristics of a synchronous machine.
2. Explain the transient analysis of separately excited DC motor for a practical transient situation.
3. Derive the transfer function of a shunt motor and analyze the transfer function.
4. What is the need for phase transformation? Explain the technique used for three phase quantities to two phase transformation.
5. Discuss the modelling and explain the analysis part of single phase shaded pole type induction motor.
6. Derive and explain the three phase induction machine modelling with stator reference frame.
7. Discuss the modelling aspects of a BLDC motor and explain its analysis part.
8. Explain the modelling aspects of switched reluctance motor and discuss its applications.

Subject Code: C5201/R09

M. Tech –I Semester Supply Examinations, February, 2016

POWER SYSTEM OPERATION AND CONTROL

(Common to PE&PS, PS and P.S.C&A)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

- 1 a) What are various thermal unit constraints in the unit commitment problem? Explain. 6M
- b) Explain about the priority list method in getting the optimal solution of unit commitment problem with an example? 6M
- 2 a) Obtain the solution of an optimal unit commitment problem with dynamic programming method? 6M
- b) Write the advantages of dynamic programming method over priority list scheme? 6M
- 3 a) Discuss the importance of constant frequency in the power system? 6M
- b) Explain the isolated power system with the help of block diagram? 6M
- 4 a) Two generators of rating 100MW and 200MW are operated with a droop characteristic of 6% from no load to full load. Find the load shared by each generator, if a load of 270MW is connected across the parallel combination of those generators? 6M
- b) Find the static frequency drop if the load is suddenly increased by 25MW on a system having the following data: Rated capacity is 500MW, operating load is 250MW, inertia constant is 5s, governor regulation $R = 2\text{Hz/p.u MW}$, frequency is 50Hz. Also find the additional generation? 6M
- 5 a) Explain the static response of two area system for un controlled case? 6M
- b) Find the frequency of oscillations of the tie line power deviation for a two identical area system given the following data:
 $R = 3.0\text{Hz/p.u}$; $H = 5\text{s}$; $f^0 = 60\text{Hz}$. The tie line has a capacity of 0.1p.u and is operating at a power angle of 45° ? 6M
- 6 a) Explain about the optimal load flow control with an example? 6M
- b) What is meant by performance index? Explain its importance? 6M
- 7 a) Derive the composite generation protection cost function? 6M
- b) Explain how the fuel scheduling is done by linear programming? 6M
- 8 a) Explain the concept of power pools with an example? 6M
- b) Explain about the economy inter change evaluation with an example? 6M
