

Subject Code: G0401/R13

M. Tech – I Semester Regular/Supplementary Examinations, April, 2015

INDUSTRIAL ROBOTICS

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

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

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

Subject Code: G3801/R13

M. Tech – I Semester Regular/Supplementary Examinations, April, 2015

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) State and derive snell's law.
b) A step-index multimode glass fiber has a core diameter of 50 μm and cladding refractive index of 1.45. If it is to have a limiting intermodal dispersion δT of 10 ns/km, find its acceptance angle. Also calculate the maximum bit rate for transmission over a distance of 20 km.
2. a) Consider a step-index fiber with a core radius of 4 μm and a cladding refractive index of 1.45. (i) For what range of values of the core refractive index will the fiber be single moded for all wavelengths in the 1.2-1.6 μm range?
(ii) What is the value of the core refractive index for which the V parameter is 2.0 at $\lambda = 1.55 \mu\text{m}$? What is the propagation constant of the single mode supported by the fiber for this value of the core refractive index?
b) Explain quantitatively about cross phase modulation..
3. a) What is a Directional coupler?. Explain about it's principle of operation.
b) Derive the power transfer function of the Fabry-Perot filter
4. a) What is the function of Mach-Zehnder Interferometers. Explain it' principle of operation.
b) Explain the operation of vertical cavity surface emitting laser.
5. a) What are various Signal formats used in OOK modulation and explain them.
b) Explain about reed-solomon codes for error detection and correction
6. a) Explain about different types of cross talks in fibre optic systems.
b) Explain about Polarization mode dispersion.
7. a) Explain about stimulated brillouin scattering..
b) In an experiment designed to measure the attenuation coefficient α of optical fiber, the output power from an optical source is coupled onto a length of the fiber and measured at the other end. If a 10 km-long spool of fiber is used, the received optical power is -20 dBm. Under identical conditions but with a 20 km-long spool of fiber (instead of the 10 km-long spool), the received optical power is -23 dBm. What is the value of α (in dB/km)? If the source-fiber coupling loss is 3 dB, the fiber-detector coupling loss is 1 dB, and there are no other losses, what is the output power of the source (expressed in m W) ?.
8. Write short notes on the following
a) Cross Phase Modulation b) Optical Amplifiers



Subject Code: G4001/R13

M. Tech – I Semester Regular/Supplementary Examinations, April, 2015
ADVANCED DATA STRUCTURES/ ADVANCED DATA STRUCTURES AND
ALGORITHM ANALYSIS/ DATA STRUCTURES
(Common to IT, CS&T, CS and SC&E)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. Explain all the operations of double linked lists ?
2. Explain merge and insertion sorts with suitable examples?
3. Explain separate chaining and open addressing in detail?
4. Explain all the operations of binary search tree?
5. Explain the operations on AVL Trees in detail?
6. a) Explain the procedure to sort the nodes in a single linked list?
b) Explain breadth first travel with an example?
7. a) Explain how post fix can be evaluated?
b) Explain one of the ways to represent a Hash table?
8. a) Explain the concept of Dequeue?
b) What is the purpose of Red-Black Trees?

Subject Code: G4302/R13

M. Tech – I Semester Regular/Supplementary Examinations, April, 2015

ANALYSIS OF POWER ELECTRONICS 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). Explain the PWM control on ac voltage controllers and draw the waveforms of output voltage and load current?
b). What is Synchronous tap changer? Obtain expressions of output voltage and current with Resistive load?
- 2 a). The three-phase full wave ac voltage controller supplies a Y-connected resistive load of $R = 15\Omega$ and the line-to-line input voltage is $V_s = 208\text{ V}$ at 50 Hz. The delay angle is $\alpha = \pi/6$. Determine
i) The input PF &
ii) The expression for the instantaneous output voltage of phase A.
Draw the waveforms.
b). What are the effects of source and load inductances on the operation of ac voltage controller?
- 3 a). What is Extinction angle and symmetrical angle control of converters?
b). A single phase full converter is connected to RLE load. The source voltage is 230V, 50 Hz. The average load current of 10 A is continuous over the working range. For $R = 0.4$ and $L = 2\text{ mH}$, compute firing angle delay for $E = 120\text{ V}$?
- 4 a). Explain the operation of a Three-Phase 12 Pulse converter along the necessary circuit diagrams and wave forms?
b). Evaluate the input power factor and harmonic factors for a Three-Phase half controlled converters?
- 5 a). How can the input current of the rectifier-fed boost converter be made sinusoidal and in phase with the input voltage?
b). Obtain the steady state analysis of rectifier-fed boost converter for improving power factor?
- 6 Explain the single PWM, multiple PWM, and sinusoidal PWM and modified sinusoidal PWM techniques of a single phase inverter?
- 7 a). Briefly explain the operation of modified diode-clamped multilevel inverter?
b). Compare various merits and demerits of multilevel inverters?
- 8 Briefly explain the following
 - a) Operation of variable dc link inverter
 - b) Features of cascaded multi level inverter

