# AR13

**CODE: 13CE4037** **SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**IV B.Tech II Semester Supplementary Examinations, October / November-2020**

**PAVEMENT ANALYSIS AND DESIGN**

**(Civil Engineering)**

**Time: 3 Hours** **Max Marks: 70**

## PART-A

**ANSWER ALL QUESTIONS** **[1 x 10 = 10 M]**

1. a) Define contact pressure
   b) Write the uses of dowel bars and tie bar
   c) List the types of joints in rigid pavement.
   d) What is WBM road?
   e) What are types of failures in flexible pavements?
   f) List the types of pavements
   g) What is meant by warping stress?
   h) What is meant by relative stiffness of slab
   i) List the tests on bitumen
   j) List he types of overlays

## PART-B

**Answer one question from each unit** **[5x12=60M]**

### UNIT-I

2. Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the functions and importance of each component of the pavement. 12M

**(OR)**

3. Discuss the importance of gross wheel load and contact pressure in stress distribution pattern and in pavement design 12M

### UNIT-II

4. The plate bearing tests were conducted with 30 cm plate diameter on soil subgrade and over 15 cm based course. The pressure yielded at 0.5 cm deflaction are 1.25 $kg/cm^2$ and 4.0 $kg/cm^2$, respectively. Design the pavement section for 4100 kg wheel load with tyre pressure of 5 $kg/cm^2$ for an allowable deflection of 0.5 cm using Burmister's approach. 12M

**(OR)**

5. a) Explain how the elastic moduli of subgrade and base course are estimated using plate bearing test. 6M
   b) Calculate the stresses at interior, edge and corner region of a cement concrete pavement using westergaard's stress equations. Use the following data, wheel load 5100kg, modulus of elasticity of cement concrete 3.0 x $10^5$ $kg/cm^2$ pavement thickness 18 cm, poisson's ratio of concrete 0.15, modulus of subgrade reaction 6.0 $kg/cm^3$, radius of contact area 15 cm. 6M

# AR13

## CODE: 13CE4037 SET-1

### UNIT-III

| | | | |
|---|---|---|---|
| 6. | a) | Explain the CBR method of pavement design. How is this method useful to determine thickness of component layers? | 6M |
| | b) | Explain how the dimensions and spacing of tie bars are designed. | 6M |
| | | **(OR)** | |
| 7. | | Design the size and spacing of dowel bars at the expansion joints of a cement concrete pavement of thickness 25 cm with radius of relative stiffness 80 cm, for a design wheel load of 5000 kg. Assume load capacity of the dowel system as 40% of the design wheel load. Joint width is 2.0 cm, permissible shear and flexural stresses in dowel bar are 1000 and 1400 kg/cm$^2$ respectively and permissible bearing stress in CC is 100 kg/cm$^2$ | 12M |

### UNIT-IV

| | | | |
|---|---|---|---|
| 8. | | Explain briefly the marshall method of design. | 12M |
| | | **(OR)** | |
| 9. | | What are the various types of bituminous construction in use? Discuss the advantages and limitations of each. | 12M |

### UNIT-V

| | | | |
|---|---|---|---|
| 10. | a) | What are the general causes of pavement failures | 6M |
| | b) | Write a note on maintenance managements system. | 6M |
| | | **(OR)** | |
| 11. | | Explain the necessity of design approach and method of strengthening of existing pavements for flexible overlay over flexible pavement and rigid overlay over rigid pavement. | 12M |

# AR13

**CODE: 13EE4030** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**

**(AUTONOMOUS)**

**IV B.Tech II Semester Supplementary Examinations, October / November-2020**

## DIGITAL CONTROL SYSTEMS

**(Electrical and Electronics Engineering)**

**Time: 3 Hours** **Max Marks: 70**

### PART-A

**ANSWER ALL QUESTIONS** **[1 x 10 = 10 M]**

1. a) Mention the different types of sampling process?
   b) Explain First order hold device?
   c) Mention the Pulse Transfer function of Zero order Hold?
   d) Mention the applications of Z-Transform
   e) Obtain the Z-Transform for $f(k) = 2^k$
   f) Mention the types of state space models in discrete time systems?
   g) Write the expression for Controllability?
   h) Draw the state diagram for Data Control system
   i) Mention the necessary conditions for the stability of discrete system?
   j) Mention the condition for Bilinear Transformation?

### PART-B

**Answer one question from each unit** **[5x12=60M]**

### UNIT-I

2. a) Draw the schematic diagram of basic digital control scheme and explain same. [6 M]

   b) Enumerate the advantages and disadvantages of digital control systems compared to analog control systems. [6 M]

**(OR)**

3. a) Explain zero order hold with derivation and its response. [6 M]
   b) What do you mean by the problem of aliasing and how we can overcome it [6 M]

### UNIT-II

4. a) Explain the properties and theorem of Z-transform. [8 M]
   b) Find the inverse Z-transform for the following function [4 M]

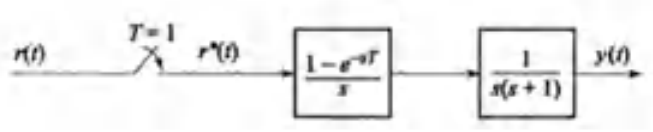
   i) $F(z) = \frac{2z+1}{(z-0.1)^2}$ ii) $G(z) = \frac{2}{(z+0.1)^2}$

**(OR)**

5. a) Explain mapping between s-plane and z-plane. [6 M]
   b) Find the Z-transforms of elementary functions i) Unit step ii) Exponential Function [6 M]

## UNIT-III

6. Find the response y(t) of the system shown in figure to a unit impulse input. [12M]




**(OR)**

7. Solve the following difference equation using Z-transform [12M]

$$y(k) - 3y(k-1) + 2y(k+2) = r(k)$$

Where $r(k) = \begin{cases} -1, & k = 0,1 \\ 0, & k \geq 2 \end{cases}$ ;

$$y(-2) = Y(-1) = 0$$

## UNIT-IV

8. Obtain Canonical state variable models for the following difference equation is Y(k+3)+5y(k+2)+6y(k+1)+2y(k) =3u(k+2)+2u(k+1)+4u(k) [12M]

**(OR)**

9. Obtain pulse transfer function and impulse response for the following system represented by the state models. [12M]

$$X(k+1)=\begin{bmatrix} 0 & 1 \\ -0.16 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(k);$$

$$y(k)= \begin{bmatrix} 1 & 0 \end{bmatrix} x(k)$$

## UNIT-V

10. The forward path gain of a unity negative feedback system is [12M]

G(S) $=\frac{1}{s(s+2)}$ if is preceded by an ideal sampler and a ZOH. Obtain the closed loop transfer function and find its stability using bilinear transformation.

**(OR)**

11. Check the stability of the discrete time system whose characteristic equation is given by $F(Z)=4Z^3-5Z^2-7Z-9=0$ Using by Jury test. [12M]



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# AR13

**CODE: 13ME4034** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**IV B.Tech II Semester Supplementary Examinations, October / November-2020**
**INDUSTRIAL AUTOMATION**
**(ELECTIVE-III)**
**(Mechanical Engineering)**

**Time: 3 Hours** **Max Marks: 70**

## PART-A

**ANSWER ALL QUESTIONS** **[1 x 10 = 10 M]**

1. a) What are different types of automation?
   b) What is an open-loop system?
   c) Define buffer storage.
   d) What is partial automation?
   e) State the components of numerical control systems
   f) What are the applications of Automated Production lines?
   g) What are different types of conveyors?
   h) What are the principles of material handling?
   i) Define down time on a machine.
   j) What are the different types of storage systems?

## PART-B

**Answer one question from each unit** **[5x12=60M]**

### UNIT-I

2. a) Define automation? Discuss if 100% automation can be achieved? 6M
   b) Discuss the different types of automation tools and the factors to be considered to select the automation tool? 6M

(OR)

3. What are the different types of automated assembly systems 12M

### UNIT-II

4. a) Classify the transfer lines 4M
   b) An eight-station automatic assembly machine has an ideal cycle time of 10 sec. Downtime is caused by defective parts jamming at the individual assembly stations. The average downtime per occurrence is 3.0 min. The fraction defect rate is 1.0 % and the probability that a defective part will jam at a given station is 0.6 for all stations. The cost to operate the assembly machine is $900 / hr, and the cost of components being assembled is $.60 / unit assembly 8M
   Ignore other costs. Determine: (i) yield of good assemblies, (ii) average production rate of good assemblies, (iii) proportion of assemblies with at least one defective component, and (iv) unit cost of the assembled product

(OR)

| | | | |
|---|---|---|---|
| 5. | a) | Discuss the terminology used in transfer line analysis | 4M |
| | b) | A 20--station transfer line is being proposed to machine a certain component currently produced by conventional methods. The proposal received from the machine tool builder states that the line will operate at a production rate of 50 pc/ hr at 100% efficiency. From similar transfer lines, it is estimated that breakdowns of all types will occur with a frequency $F = 0.10$ breakdown per cycle and that the average downtime per line stop will be 8.0 min. The starting casting that is machined on the line costs $3.00 per part. The line operates at a cost of *$75.00/hr.* The 20 cutting tools (one tool per station) last for 50 parts each, and the average cost per tool = $2.00 per cutting edge Based on this data, compute the following: (i) production rate, (ii) line efficiency, and (iii) cost per unit piece produced on the line. | 8M |

**UNIT-III**

| | | | |
|---|---|---|---|
| 6. | a) | Explain briefly following assembly systems**:**<br>i. Manual single-stations assembly system.<br>ii. Automated assembly system. | 6M |
| | b) | Manual production flow line is arranged with six stations and a conveyor system is used to move parts along the line. The belt speed is 120 cm/min and the spacing of raw work parts along the line is one for every 90 cm. The total line length is 900 cm, hence each station length equals 150 cm. Determine the following<br>i. Feed rate.<br>ii. Tolerance time.<br>iii. Theoretical cycle time. | 6M |

**(OR)**

| | | | |
|---|---|---|---|
| **7.** | a) | Describe the different ways to improve the line balance | 6M |
| | b) | Explain about flexible assembly lines | 6M |

**UNIT-IV**

| | | | |
|---|---|---|---|
| 8. | a) | Discuss the following factors in materials handling equipment**:**<br>i. Routing.<br>ii. Scheduling. | 6M |
| | b) | Discuss briefly the special features of AS/RS components? | 6M |

**(OR)**

| | | | |
|---|---|---|---|
| 9. | | Briefly describe the following AS/RS units:<br>(a) Unit load AS/RS.<br>(b) Mini load AS/RS.<br>(c) Man-on-board AS/RS.<br>(d) Automated item retrieval system | 12M |

**UNIT-V**

| | | | |
|---|---|---|---|
| 10. | a) | Describe the liquid based Rapid Prototyping system with the help of neat sketch. | 6M |
| | b) | Write about Applications & Benefits of RP | 6M |

**(OR)**

| | | | |
|---|---|---|---|
| 11. | a) | State the applications of Concurrent Engineering. | 6M |
| | b) | Discuss briefly the different Types of RP. | 6M |



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# AR13

**CODE: 13EC4037** **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**IV B.Tech II Semester Supplementary Examinations, October / November-2020**
**OPTICAL COMMUNICATIONS & NETWORKS**
**(ELECTIVE-III)**
**(Electronics & Communication Engineering)**

**Time: 3 Hours** **Max Marks: 70**

## PART-A

**ANSWER ALL QUESTIONS** **[1*10=10M]**

**1.**
a) Define acceptance angle?
b) Define numerical aperture?
c) What is the significance of normalized frequency?
d) What is population inversion?
e) Define responsivity in optical detectors?
f) What is the max bit rate to avoid ISI?
g) What is quantum limit?
h) Compare LED and LASER?
i) Expand SDH?
j) Write an equation for number of guide modes in step index fiber?

## PART-B

Answer one question from each unit [5*12=60M]

### UNIT-I

2. a) Explain the advantages of optical fibers? 6M
b) A step index fiber has a solid acceptance angle in the air of 0.115 radians and relative refractive index of 0.9%. Estimate speed of light in the fiber core. 6M

**(OR)**

3 a) Explain about SRS and SBS scattering in brief? 6M
b) Explain briefly about various losses in optical fiber. 6M

### UNIT-II

4. a) What are the merits and demerits of LED's compared with injection laser? 7M
b) A photodiode has a quantum efficiency of 65% when photons of energy $1.5 \times 10{-}19$ J are incident upon it. 5M
(i) At what wavelength is the photodiode operating?
(ii) Calculate the incident optical power required to obtain a photocurrent of 2.5 μA when the photodiode is operating as described above

**(OR)**

5. a) Explain PIN photo diode working principle? 6M
b) Describe following in detail 6M
i) Detector response time
ii) ii) Temperature effect on Avalanche gain

## UNIT-III

| | | | |
|---|---|---|---|
| 6. | a) | Explain intermodal dispersion in step index fiber? | 6M |
| | b) | Explain lensing coupling for fibers? | 6M |
| | | **(OR)** | |
| 7. | a) | Draw the schematic diagrams for dispersion in different fibers? | 6M |
| | b) | A multimode graded index fiber exhibits total pulse broadening of 0.1 μs over a distance of 15 km. Estimate:<br>(i) the maximum possible bandwidth on the link assuming no inter symbol interference;<br>(ii) the pulse dispersion per unit length;<br>(iii) the bandwidth–length product for the fiber. | 6M |

## UNIT-IV

| | | | |
|---|---|---|---|
| 8. | a) | Explain digital receiver performance in brief? | 6M |
| | b) | Explain optical power budgeting in brief? | 6M |
| | | **(OR)** | |
| 9. | a) | Draw the block diagram of optical receiver and explain in brief? | 6M |
| | b) | Explain different multiplexing strategies? | 6M |

## UNIT-V

| | | | |
|---|---|---|---|
| 10. | a) | Explain wavelength division multiplexing in brief? | 6M |
| | b) | Mention different optical switches employed in link? | 6M |
| | | **(OR)** | |
| 11. | a) | Mention different types of optical amplifiers employed in link? | 6M |
| | b) | What are broad categories of networks? | 6M |