AR 13

CODE: 13CE4037   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech II Semester Supplementary Examinations, February-2021

PAVEMENT ANALYSIS AND DESIGN
(Elective-IV)
(Civil Engineering)

Maximum Marks:70

Time : 3 Hours

PART-A

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

1. a) What is Bitumen.
    b) Differentiate between rigid and flexible pavement
    c) Define warping stress.
    d) Write the expression for radius of relative stiffness.
    e) Differentiate between expansion joint and contraction joint in rigid pavement.
    f) What is NPV?
    g) Why BC soils are not suitable for highway construction?
    h) What are the desirable properties of Aggregate ?
    i) What are reasons for damages in Rigid pavements?
    j) Define anRebound Deflection.

PART- B

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

UNIT -I

2   a) List out various soil factors affecting the pavement design. Explain in detail with
          the help of neat sketches.   (6m)
        (b) Explain the structural difference between the rigid and flexible pavements.   (6m)
                                    (OR)

3   a) As a pavement designer, what are the various vehicle parameters you would be
          interested in?   (6m)
        b) What is an equivalent single wheel load? How can it determined?   (6m)

UNIT -II

4   a) Write the salient features and assumptions of Burmister's theory of analysis of
          flexible pavements with a neat sketch showing details of a two layered pavement
          system.   (6m)
        b) State and write assumptions of Boussinesq's theory of analysis of two layers
          flexible pavement.   (6m)
                                    (OR)

5   a) Calculate the warping stress at edge, interior of a slab of 4.5m length and 3.5 m
           width. Take the elastic modulus of concrete as 3×10^4MPa, radius of relative
           stiffness as 0.92 m, temperature difference between the top and bottom surface of
           the slab as 17^OC, co-efficient of thermal expansion of concrete as 10×10^{-6} per ^{O}C
           and Poisson's ratio of concrete as 0.15.   (6m)
        b) Calculate the radius of relative stiffness and equivalent radius of resisting section
           for the following data: (6m)
           thickness of pavement = 25cm; elastic modulus of concrete as 3×10^5kg/ cm^2
           Modulus of sub grade reaction = 6.0 Kg/cm^3 ;Poisson's ratio of concrete = 0.15
           Radius of contact area = 15cm

UNIT -III

6   a) Explain shortly about Dowel bars and Tie bars   .   (6m)
        b) State the critical placement of wheel loading and critical combination of stresses
           considered in IRC: 58-2002.   (6m)
                                        (OR)
7   a) What are the salient features of design of Flexible pavement according to IRC :37-
           2001.   (6m)
        b) Differentiate between CBR and IRC methods of flexible pavement design.   (6m)

UNIT –IV

8   a) What are the desirable properties of Bitumen ?   (6m)
        b) Explain the test procedure of Aggregate Impact value test   (6m)
                                        (OR)
9   a) Write the construction steps in Cement concrete roads.   (6m)
        b) Explain the soil- cement stabilization   (6m)

UNIT –V

10   With the help of neat sketches explain the typical Rigid pavement failures.   (12m)

                                        (OR)
11   Write the procedure of conducting Benkelman Beam Deflection test with the help of neat
        sketches.   (12m)

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AR13

CODE: 13EE4030   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech II Semester Supplementary Examinations, February-2021

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 condition for ideal sampling process?
    b) Explain Zero order hold device?
    c) Mention the Pulse Transfer function of First order Hold?
    d) Mention the limitations of Z- Transform
    e) Obtain the Inverse Z-Transform for $G(z) = \frac{2}{(z+0.1)^2}$
    f) Write the properties for state transition matrix?
    g) Write the expression for pulse transfer function in terms of state space model?
    h) Mention the limitations of R-H criterion?
    i) Mention the disadvantages of Bilinear Transformation?
    j) Mention the advantages of Jury's stability test?

PART-B

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

2. a) Explain the advantages of Sampling in Digital control systems?   [6M]
    b) Explain the Sampling theorem with necessary conditions?   [6M]
                                    (OR)
3. a) Explain the conditions to be satisfied for reconstruction of sampled   [6M]
        signal into continuous signal.

    b) Compare the characteristics of continuous and discrete-time systems with an   [6M]
        example?
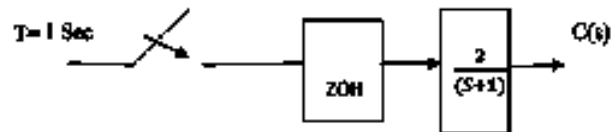
UNIT-II

4. a) Determine the Z transform for the following functions   [8 M]

        a) $f(k)=k^2$ (b) $f(k)=te^{-t}$ c) $f(t) = \sin(t)$ d) $\cos t(t)$

    b) Explain the Mapping between s-plane to Z-plane   [4 M]
                                    (OR)
5. a) Find the inverse z-transform of   F(z) using the following method   [4M]

        Partial-fraction expansion.
        $$F(z) = \frac{z(z+1)}{(z-1)(z^2-z+1)}$$
    b) Explain the theorems and Properties of Z- Transforms   [8M]

UNIT-III

6. For the system shown in fig. Obtain output response when unit step input is applied to the system　　　　　　[12M]

where $ZOH = (1-e^{-Ts})/s$

(OR)

7. Determine the output response for the following discrete time systems　　　　　[12M]

$$y(k+2) + \frac{1}{4}y(k+1) - \frac{1}{8}y(k) = 3r(k+1) - r(k)$$

Applying an input $r(k) = (-1)^k.u(k)$ having initial conditions

$y(-1) - 5 \; and \; y(-2) - 6$

UNIT-IV

8. Obtain the state space model for the discrete system described by the difference equation Y(k+3)+ 6y(k+2) +11y(k+1)+8y(k)=10U(k)　　　[12M]

(OR)

9. 　　　　　　[12M]

The input output of a sampled data system is described by the difference equation C(k+2) +3C(k+1)+4C(k)=R(k+1)-R(k)

(a) Determine the Z transfer function

(b) Also obtain the response for unit step input.

UNIT-V

10. The characteristic equations of linear discrete-data systems are given below. Determine the values of K for the systems to be asymptotically stable.　　[12M]

(i) $z^4 + 0.2z^3 - 0.25z^2 - 0.05z + k = 0$

(ii) $z^3 + z^2 - z + k = 0$

(OR)

11. Use the Jury criterion to determine the stability of the following polynomials　[12M]

$$F(z) = z^5 + 0.2z^4 + z^2 + 0.3z - 0.1 = 0$$

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CODE: 13ME4034   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech II Semester Supplementary Examinations, February-2021

INDUSTRIAL AUTOMATION
(Mechanical Engineering)

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

PART-A
ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) Define Automation
    b) What is the USA principle?
    c) What is an automated production line?
    d) State any two linear work part transfer mechanisms.
    e) What is a programmable parts feeder?
    f) Name four typical products that are made by automated assembly.
    g) Define material handling
    h) Identify the two application areas of automated storage/retrieval systems.
    i) What is machine vision?
    j) What is concurrent engineering?

PART-B

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

2. a) Identify three situations in which manual labor is preferred over automation.   **[6 M]**
    b) What are the three phases of a typical automation migration strategy?   **[6 M]**
    (OR)
3. a) What is flexible automation and what are some of its features?   **[7 M]**
    b) Describe the hydraulic and pneumatic components used in automation   **[5 M]**

UNIT-II

4. a) Name some of the industrial applications of automated production lines.   **[6 M]**
    b) A Geneva with eight slots is used to operate the worktable of a dial indexing machine. **[6 M]** The slowest workstation on the dial indexing machine has an operation time of 2.5 seconds, so that the table must be in a dwell position for this length of time. (i) At what rotational speed must the driven member of the Geneva mechanism be turned to provide this dwell time? (ii) What is the indexing time each cycle?
    (OR)
5. a) What are three problem areas that must be considered in the analysis and design of an **[6 M]** automated production line?
    b) An eight station rotary indexing machine operates with an ideal cycle time of **20s**. The **[6 M]** frequency of line stop occurrences is **0.06 stops/cycle** on an average. When a stop occurs it takes an average of 3min to make repairs. Determine the following:
       i) Average production time
       ii) Average production rate
       iii) Line efficiency
       iv) Proportion downtime

UNIT-III

6. a) Name three reasons for including a storage buffer in an automated production line. **[6 M]**

   b) The total work content time of a certain assembly job is 7.8 min. The estimated downtime of the line the lines is D = 5% and the required production rate is Rp = 80 units/hr. **[6 M]**

   i) Determine the theoretical minimum number of workstations required to optimize the balance delay.

   ii) For the number of stations determined in part (i), compute the balance delay d.

(OR)

7   Assign the work elements to stations following any line balancing algorithm **[12M]**

Element	T_{ek} (min.)	Immediate predecessors
1	30	-
2	18	1
3	48	1
4	12	2
5	6	2
6	36	3
7	24	4,5
8	30	3,5
9	18	7,8

UNIT-IV

8. a) Name the four major categories of material handling equipment. **[8 M]**
   b) How does material handling fit within the scope of logistics? **[4 M]**

(OR)

9. a) Name three categories of automated guided vehicles. **[6 M]**
   b) Briefly describe the two basic storage location strategies. **[6 M]**

UNIT-V

10.   Write short notes on
    a) 3D printing **[4 M]**
    b) Concurrent engineering **[4 M]**
    c) Machine Vision **[4 M]**

(OR)

11. a) Name the four categories into which the methods of operating and controlling a CMM can be classified. **[6 M]**
    b) What are the advantages various RP techniques? What is meant by material removal RP and material deposition RP? **[3 M]**
    c) State the importance of business process re-engineering **[3 M]**

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech II Semester Supplementary Examinations, February-2021

OPTICAL COMMUNICATIONS & NETWORKS
(Electronics and Communication Engineering)

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

PART-A
ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) What is Snell's law?
    b) What are the applications of optical fiber?
    c) Distinguish between single mode and multi mode step-index and graded index fibers.
    d) Why attenuation arises in fibers
    e) What are fiber connectors
    f) Mention the Emission mechanism in light emitting diode
    g) What is the main difference between the DFB laser and DBR laser?
    h) What are the LAN topologies?
    i) Define the rise time budget in fibers
    j) Define BER

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

UNIT-I
2. a) Distinguish between optical fiber communication system and conventional system.
    b) An optical fiber has light collecting capability of 0.24 and cladding refractive index of 1.54. Determine the angle of acceptance for the fiber in water and further estimate optimum angle of incidence for the light to enter into core region.

(OR)

3. a) Explain how light propagates in step index and graded index fibers. Also explain about skew rays.
    b) List the difference between micro bending and macro bending loss.

UNIT-II
4. a) Explain the phenomenon of light emission in LED
    b) Discuss the operation of edge-emitting double-hetero junction LED, with neat schematic diagram

(OR)

5. a) List the advantages and disadvantages of LASER .
    b) Discuss PIN and Avalanche photodiode.

UNIT-III
6. a) Mention the dispersion mechanism in fibers
    b) Explain the phenomenon Pulse broadening

(OR)

7. a) Explain about intermodal dispersion and intramodal dispersion
    b) Describe about Polarization mode dispersion

UNIT-IV
8. a) Requirements in designing an optical link
    b) Explain about the digital system planning considerations

(OR)

9. a) Describe about Digital receiver performance
    b) Explain about the optical system design considerations.

UNIT-V
10. a) Describe briefly about WDM and OTDM
    b) Briefly discuss the possible sources of noise in optical Transreceiver

(OR)

11. a) Analyze different advance multiplexing strategies.
    b) Describe briefly about WDM Networks, optical CDMA

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