

R20

II B.TECH. I SEM

REGULAR EXAMINATIONS

FEBRUARY 2022

Subject Code: R20CC2101

II B.Tech. - I Semester Regular Examinations, February-2022

NUMERICAL METHODS AND TRANSFORMATIONS

(CE,EEE,ME,ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks | | | | | | | | | | | | | | | | |
|----------------|--|----|-----|-------|-----|------|------|----|----|------|----|----|-----|-----|-----|------|------|----|-----|-----|
| Unit-I | | | | | | | | | | | | | | | | | | | | |
| 1 | a Analyze the real root of the equation $x \log_{10} x = 1.2$ after solving the equation by (i) Regula-falsi method (ii) Newton-Raphson method Correct to four decimal places in each case. | L4 | CO1 | 14M | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | |
| 1 | b By Newton's forward interpolation formula find the polynomial which takes the following values <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> </tr> <tr> <td>f(x)</td> <td>12</td> <td>42</td> <td>144</td> <td>366</td> <td>756</td> <td>1362</td> <td>2232</td> </tr> </table> Either using Newton's backward formula or by Lagrange's formula find the value of f(1). Analyse the answers that you get by direct substitution in the polynomial with the answer through Newton's backward formula or Lagrange formula. | x | 0 | 2 | 4 | 6 | 8 | 10 | 12 | f(x) | 12 | 42 | 144 | 366 | 756 | 1362 | 2232 | L4 | CO1 | 14M |
| | x | 0 | 2 | 4 | 6 | 8 | 10 | 12 | | | | | | | | | | | | |
| f(x) | 12 | 42 | 144 | 366 | 756 | 1362 | 2232 | | | | | | | | | | | | | |
| Unit-II | | | | | | | | | | | | | | | | | | | | |
| 2 | a Evaluate y(2) from $\frac{dy}{dx} = \frac{2y}{x}$, y(1) = 2, using h = 0.25 by (i) Euler's method; and (ii) Heun's method (modified Euler's method) Also compare the answers of (i) and (ii) with the analytical solution. | L5 | CO2 | 14M | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | |
| 2 | b Evaluate the integral $\int_0^{\pi} \sin^5\left(\frac{x}{2}\right) dx$ by (i) Trapezoidal rule; and (ii) Simpson's 1/3 rd rule with 11 ordinates. Compare the answers of (i) and (ii) with the analytical solution. | L5 | CO2 | 14M | | | | | | | | | | | | | | | | |
| | Unit-III | | | | | | | | | | | | | | | | | | | |
| 3 | a (i) Determine the inverse Laplace transform of $\ln \left[\frac{s^2 + a^2}{(s+b)^2} \right]$. (ii) Solve the following differential equation $y'' + 2y' + 5y = e^{-t} \sin t$, y(0) = 0, y'(0) = 1 by Laplace transform. | L3 | CO3 | 7M | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | |

| | | | | | |
|----------------|---|--|----|-----|----|
| | | $t \left(\frac{\sin t}{e^t} \right)^2$ | L3 | CO3 | 7M |
| | b | (i) Illustrate the Laplace transform of the following function (ii) Apply inverse Laplace transform to the following function $\frac{(s+2)}{(s^2+4s+8)^2}$ | L3 | CO3 | 7M |
| Unit-IV | | | | | |
| | a | (i) Find the Fourier series for the function defined by $f(x) = \begin{cases} -1, & \text{for } -\pi < x < 0 \\ 0, & \text{for } x = 0 \\ 1, & \text{for } 0 < x < \pi \end{cases}$. Using the same, prove that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$ | L3 | CO4 | 8M |
| 4 | | (ii) Demonstrate the half range sine series for $f(x) = x \cos x$, in $(0, \pi)$. | L3 | CO4 | 6M |
| OR | | | | | |
| | B | (i) Find the half range cosine series for the function $f(x) = (x-1)^2$ in the interval $0 < x < 1$ and use the expansion to show that $\pi^2 = 8 \left(\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \right)$ | L3 | CO4 | 9M |
| | | (ii) Obtain the Fourier series for $f(x) = \left(\frac{\pi-x}{2} \right)^2$ in $0 < x < 2\pi$. | L3 | CO4 | 5M |
| Unit-V | | | | | |
| | a | (i) Given $F[e^{-x^2}] = \sqrt{\pi} e^{-s^2/4}$, predict the Fourier transform of (a) $e^{-x^2/a}$ (b) e^{-a-x^2} | L3 | CO5 | 7M |
| | | (ii) Apply Convolution theorem to show $\int_0^{\infty} \frac{t^2}{(4+t^2)(t^2+9)} dt = \frac{\pi}{10}$ | L3 | CO5 | 7M |
| OR | | | | | |
| 5 | b | (i) Find the Fourier transform of $f(x) = \begin{cases} 1, & x < a \\ 0, & x > a \end{cases}$, and hence solve $\int_{-\infty}^{\infty} \frac{\sin ax}{x} dx$ | L3 | CO5 | 7M |
| | | (ii) Determine the Fourier sine transform of $\frac{e^{-ax}}{x}, a > 0$ | L3 | CO5 | 7M |

Subject Code: R20CC2102

II B.Tech. - I Semester Regular Examinations, February-2022
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 × 14 =70M)

| S.No | Questions | KL | CO | Marks | |
|---|-----------|--|-----|-------|-----|
| Unit-I | | | | | |
| 1 | a | Define Well Formed Formula? Explain about Tautology with example? | K1 | CO1 | 7M |
| | | Explain in detail about the Logical Connectives with Examples? | K2 | CO1 | 7M |
| | OR | | | | |
| | b | Show that the following statements is a tautology. $(\sim P \wedge (P \rightarrow Q)) \rightarrow \sim Q$ | K3 | CO1 | 7M |
| Obtain the Principal conjunctive normal form of $(P \rightarrow Q) \wedge (Q \leftrightarrow R)$ | | K3 | CO1 | 7M | |
| Unit-II | | | | | |
| 2 | a | What are Rules of Inference ? | K1 | CO2 | 7M |
| | | Define quantifiers, universal quantifiers and existential quantifiers by giving an example. | K1 | CO1 | 7M |
| | OR | | | | |
| | b | Explain in brief about Principle of Mathematical Induction with examples? | K2 | CO2 | 14M |
| Unit-III | | | | | |
| 3 | a | Compare and contrast Euler and Hamiltonian graphs using examples? | K2 | CO3 | 7M |
| | | Define (i) Simple Path (ii) Closed Path (iii) Circuit (iv) Cycle. | K1 | CO3 | 7M |
| | OR | | | | |
| | b | What are the rules for constructing a Hamiltonian path and Hamiltonian cycle? | K1 | CO3 | 7M |
| Explain kruskal's algorithm to find minimal spanning tree of a graph with suitable example? | | K2 | CO3 | 7M | |
| Unit-IV | | | | | |
| 4 | a | What is linear recurrence relation? Solve the recurrence relation $F_n = 5F_{n-1} - 6F_{n-2}$ where $F_0=1$ and $F_1=4$ | K3 | CO4 | 7M |
| | | Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$ for $n \geq 2$ using generating functions? | K3 | CO4 | 7M |
| | OR | | | | |
| | b | Explain Generating function and explain various operation on generating function | K2 | CO4 | 7M |
| Solve the following recurrence relation $a_n = 5a_{n-1} + 6a_{n-2} = 0$, $n \geq 2$ by the generating function method with $a_0 = 3$, $a_1 = 3$. | | K3 | CO4 | 7M | |
| Unit-V | | | | | |
| 5 | a | What is the mathematical form of Permutation and Combination? How many different five digit numbers can be formed from the digits 0,1,2,3 and 4? | K4 | CO5 | 7M |
| | | Four students namely P, Q, R, and S sit randomly at four corners of the classroom while playing a game. Find the probability that Q sits at the North-east corner of the room. | K4 | CO5 | 7M |
| | OR | | | | |
| | b | Discuss about Disjunctive and Conjunctive normal form with example? | K4 | CO5 | 7M |
| What is Boolean polynomial? Explain with truth table | | K4 | CO5 | 7M | |

Subject Code: R20CC2103

II B.Tech. - I Semester Regular Examinations, February-2022
OOPS THROUGH JAVA
(CSE, IT, AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks |
|-----------------|--|----|-----|-------|
| Unit-I | | | | |
| 1 | D) Define a Byte code. Give the different states of Java program execution. | K1 | CO1 | 7M |
| | a ii) Write a program to create interface A in this interface we have two methods meth1 and meth2. Implements this interface in another class named MyClass. | K3 | CO1 | 7M |
| | OR | | | |
| | b i) Define Data type. Give the declaration of variable in Java. Write the Rules. | K2 | CO1 | 7M |
| | b ii) Write a program to give the example for 'this' operator. And also use the 'this' keyword as return statement. | K3 | CO1 | 7M |
| Unit-II | | | | |
| 2 | a i) Distinguish Method Overriding and Method Overloading. | K2 | CO2 | 7M |
| | a ii) Create class named as 'a' and create a sub class 'b'. Which is extends from class 'a'. And use these classes in 'inherit' class. | K3 | CO2 | 7M |
| | OR | | | |
| | b i) What is a package? How to create user defined package in java with example. | K1 | CO2 | 7M |
| | b ii) Write a program to create a class named shape. For this class we have three sub classes circle, triangle and square each class has two-member function named draw() and erase(). Create these using polymorphism concepts. | K3 | CO2 | 7M |
| Unit-III | | | | |
| 3 | a i) What is Java's Built-in Exception? Write the importance of finally block. | K1 | CO3 | 7M |
| | a ii) Write a program to create two threads. In this class we have one constructor used to start the thread and run it. Check whether these two threads are run are not. | K3 | CO3 | 7M |
| | OR | | | |
| | b i) What is a String? Explain different String declarations with an example. | K2 | CO3 | 7M |
| | b ii) Write a java program to create own exception for Negative Value Exception if the user enters negative value. | K3 | CO3 | 7M |
| Unit-IV | | | | |
| 4 | a i) What is collection in java? Describe about collection class in java. | K1 | CO4 | 7M |
| | a ii) Write a program to create a file and write data into it using the methods of OutputStream class. | K2 | CO4 | 7M |

| | | | | | |
|---|---------------|--|----|-----|----|
| | OR | | | | |
| | b | i) Discuss about the FileInputStream and FileOutputStream in java with examples. | K1 | CO4 | 7M |
| | b | ii) Write a java Program to read a text file and print the number of unique words. | K2 | CO4 | 7M |
| | Unit-V | | | | |
| | a | i) Write a Applet program that automatically display the text with Font Style, Font type Using getParameter Method. | K3 | CO5 | 7M |
| | a | ii) Write a java Program to implement an AWT based calculator with basic operations. | K2 | CO5 | 7M |
| 5 | OR | | | | |
| | b | i) List out the steps for creating simple user Registration form using TextField and TextArea java AWT controls | K2 | CO5 | 7M |
| | b | ii) Write a program that will display check boxes numbered from 1 to 3. Use a TextField to display the number corresponding to the check boxes selected. | K3 | CO5 | 7M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CC2104

II B.Tech. - I Semester Regular Examinations, February-2022

DATA STRUCTURES

(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | K L | CO | Marks |
|-----------------|---|-----|-----|-------|
| Unit-I | | | | |
| 1 | a i) What is Data structure? Explain the operation of singly linklist. | K4 | CO2 | 7M |
| | ii) Explain Space and Time Complexity. | K4 | CO2 | 7M |
| | OR | | | |
| | b i) Explain the various operations of the list ADT with examples | K4 | CO2 | 7M |
| | ii) Explain Worst Case, Best Case and Average Case Time complexity with examples | K4 | CO2 | 7M |
| Unit-II | | | | |
| 2 | a i) Explain Binary Search with example | K3 | CO1 | 7M |
| | ii) Rearrange following numbers using quick sort: 10, 6, 3, 7, 17, 26, 56, 32, 72 | K3 | CO1 | 7M |
| | OR | | | |
| b | i) Explain Binary search algorithm and compare it with linear search algorithm. | K3 | CO1 | 14M |
| Unit-III | | | | |
| 3 | a i) Explain the evaluation of prefix expression. | K4 | CO2 | 7M |
| | ii) Find the equivalent prefix of :8 6 3 + * 1 2 3 -/ - | K4 | CO2 | 7M |
| | OR | | | |
| | b i) Write an algorithm to push and pop an element from stack | K4 | CO2 | 7M |
| | ii) Explain the basic operations of queue with pseudo code. | K4 | CO2 | 7M |
| Unit-IV | | | | |
| 4 | a i) Write an algorithm to delete an element anywhere from doubly linked list. | K4 | CO2 | 7M |
| | ii) Write applications of single linked list to represent polynomial expressions. | K4 | CO2 | 7M |
| | OR | | | |
| | b i) Write an algorithm to Show how to reverse a single linked list. | K4 | CO2 | 7M |
| | ii) Explain deletion operation in circular linked list | K4 | CO2 | 7M |
| Unit-V | | | | |
| 5 | a i) Explain the procedure inserting an element in Binary Search Tree | K3 | CO3 | 7M |
| | ii) Explain how to find shortest path using Dijkstra's algorithm with an example. | K4 | CO4 | 7M |
| | OR | | | |
| | b i) Construct a binary search tree from these numbers- 90,36,58,96,32,92,12,93,24,97,38,60,98 . Delete nodes 12,60,36,96 | K3 | CO3 | 7M |
| | ii) Define Graph. Briefly explain the graph traversal algorithms with an example. | K4 | CO4 | 7M |



NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

Subject Code: R20CC2105

II B.Tech. - I Semester Regular Examinations, February-2022

FRONT END WEB TECHNOLOGIES

(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks |
|---|---|-----|-----|-------|
| Unit-I | | | | |
| 1 | a Explain different properties of multimedia elements in HTML5 with sample code | K2 | CO1 | 7M |
| | Create your class time table by using different table properties in HTML | K3 | CO1 | 7M |
| | OR | | | |
| | Describe the purposes of the five most commonly used HTTP methods. Explain how a web site could learn something about your browsing habits outside its site from an HTTP request sent to the site by your browser. | K1 | CO1 | 7M |
| | b Website Registration Form with Optional Survey - Create a mini-website registration form to obtain a user's first name, last name and e-mail address. In addition, include an optional survey question that asks the user's year in college (e.g., Freshman). Place the optional survey question in a details element that the user can expand to see the question. | K6 | CO2 | 7M |
| Unit-II | | | | |
| 2 | a Create a text shadow on the phrase "New features in CSS3" with a horizontal offset of 2px, a vertical offset of 5px, a blur radius of 6px and a text-shadow color deepskyblue. | K6 | CO3 | 7M |
| | Create an HTML5 document outline containing an ordered list of three items —ice cream, soft serve and frozen yogurt. Each ordered list should contain a nested, unordered list of your favourite flavours. Provide three flavours in each unordered list. | K6 | CO3 | 7M |
| | OR | | | |
| | b Explain the Change of CSS styles dynamically with Example. | K2 | CO3 | 7M |
| | How to set the background-attachment property whether a background image is fixed or scrolls with the rest of the page? Explain with example? How to fills CSS columns? Give one example. | K3 | CO3 | 7M |
| Unit-III | | | | |
| 3 | a Java script is referred to as Object based programming language'. Justify with one example. Explain how events are handled in JavaScript. | K2 | CO4 | 7M |
| | Write a script that finds the smallest of several nonnegative integers. Assume that the first value read specifies the number of values to be input from the user. | K3 | CO4 | 7M |
| | OR | | | |
| | b Write a script that reads a series of strings and outputs in an HTML5 text area for only those strings ending with the characters "ed." | K6 | CO4 | 7M |
| Implement the Javascript function fahrenheit returns the Fahrenheit equivalent of a Celsius temperature, using the calculation $F = 9.0 / 5.0 * C + 32;$ | K3 | CO4 | 7M | |

| Unit-IV | | | | | |
|--|-----------|--|-----|-----|----|
| 4 | a | Describe the various jQuery selector functions of the jQuery library. | K2 | CO5 | 7M |
| | | Write the code to Create two style classes and by default apply first one to one element. On click of a button change the elements associated property to other style. | K3 | CO5 | 7M |
| | OR | | | | |
| | b | Describe the most commonly used jQuery Event methods with examples. | K2 | CO5 | 7M |
| Write the code to Create one textarea and one button. On click of the button the length of text entered inside the textarea will be displayed. | | K3 | CO5 | 7M | |
| Unit-V | | | | | |
| 5 | a | Discuss on jQuery animate() using Relative values and manipulate Multiple properties. | K2 | CO6 | 7M |
| | | Write the code to Set a timer to delay execution of subsequent items in the queue. | K3 | CO6 | 7M |
| | OR | | | | |
| | b | Explain the usage of jQuery load(), get() and post() methods with example. | K2 | CO6 | 7M |
| Write the code for how to get the selected value and currently selected text of a dropdown box using jQuery? | | K3 | CO6 | 7M | |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome **M:**Marks

SubjectCode: R20CE2102

II B.Tech. - I Semester Regular Examinations, February-2022

FLUID MECHANICS

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks | |
|-----------------|---|----|-----|-------|--|
| Unit-I | | | | | |
| 1 | a) i) Explain the differences between manometer and mechanical gauges. What are the different types of mechanical pressure gauges | K1 | CO1 | 7M | |
| | ii) A metal ball weighs 9500N in air and 8000N in water. Find out its volume and specific gravity. $\rho_{air}=1.2 \text{ kg/m}^3$ | K3 | CO1 | 7M | |
| | OR | | | | |
| | b) i) A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is open to the atmosphere. The centre of the pipe is 100mm below the level of mercury (specific gravity=13.6) in the right limb. If the difference of mercury level in the two limbs is 160mm, determine the absolute pressure of the oil in the pipe | K4 | CO1 | 7M | |
| | ii) State and explain the Newton 's law of viscosity. Deduce the expression for the dynamic viscosity. | K2 | CO1 | 7M | |
| Unit-II | | | | | |
| 2 | a) i) Differentiate between: (i) Steady and Unsteady flow (ii) Uniform and non uniform flow (iii) Laminar and turbulent flow (iv) Rotational and irrotational flow | K1 | CO2 | 7M | |
| | b) Derive the equation of continuity for one dimensional flow of an incompressible fluid. | | | | |
| | i) The flow field of a fluid is given by $V = xyi + 2yzj - (yz + z^2)k$. Show that it represents a possible three dimensional steady incompressible continuous flow | K5 | CO2 | 7M | |
| OR | | | | | |
| | b) i) a) Mention the different characteristics of laminar and turbulent flows b) A crude oil of viscosity 0.9 poise and relative density 0.9 is flowing through a horizontal pipe of diameter 120 mm and length 12m. Calculate the difference of pressure at the two ends of the pipe, if 785 N of the oil is collected in a tank in 25 seconds. | K4 | CO2 | 14M | |
| Unit-III | | | | | |
| 3 | a) i) State and derive Bernoulli's theorem, mentioning clearly the assumptions underlying it. | K2 | CO3 | 7M | |
| | i) A 30 cm diameter horizontal pipe terminates in a nozzle with the exit diameter of 7.5 cm. If the water flows through the pipe at the rate of $0.15 \text{ m}^3/\text{s}$. What force will be exerted by the fluid on the nozzle? | K5 | CO3 | 7M | |

| | | | | | |
|---|-----------|--|-----|-----|-----|
| OR | | | | | |
| | b | I) What are the applications of Venturimeter? Explain the working principle of venturimeter. | K2 | CO3 | 7M |
| | | ii) What are the surface and body forces associated with fluid flow? How are they incorporated in Euler's equation? | K2 | CO3 | 7M |
| Unit-IV | | | | | |
| 4 | a | I) Define velocity of approach. How can you account for it while computing the discharge over weirs? | K1 | CO4 | 7M |
| | | ii) A pitot-tube is inserted in a pipe of 300mm diameter. The static pressure in pipe is 100mm of mercury (vacuum). The stagnation pressure at the center of the pipe, recorded by the pitot tube is 0.981N/cm ² . Calculate the rate of flow of water through pipe, if the mean velocity of flow is 0.85 times the central velocity. Take $C_v=0.98$. | K3 | CO4 | 7M |
| | OR | | | | |
| | b | I) A right angled V-notch is used for measuring a discharge of 30 l/s. an error of 2mm was made in measuring the head over the notch. Calculate the percentage error. Take $C_d=0.62$ | K3 | CO4 | 7M |
| ii) What are the different types of notches? Explain Rectangular and Stepped notches | | K1 | CO4 | 7M | |
| Unit-V | | | | | |
| 5 | a | I) Explain how Reynold's experiment is conducted in the lab and bring its practical uses. | K1 | CO5 | 7M |
| | | ii) Explain how the following flow problems are analysed. i) Series pipe connection (ii) parallel pipe connection and iii) Equivalent pipe connection. | K1 | CO5 | 7M |
| | OR | | | | |
| | b | I) A plate 300mmx 100mm is immersed in a liquid of density 998 kg/m ³ and kinematic viscosity 1×10^{-6} m ² /s. The water is moving with a velocity of 15.0 m/s parallel to it. Calculate | K4 | CO5 | 14M |
| (i) Drag force on that portion of the plate over which the boundary layer is laminar. (ii) Total drag force on both sides of plate | | | | | |

Subject Code: R20CE2103

II B.Tech. - I Semester Regular Examinations, February-2022

STRENGTH OF MATERIALS-I

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks |
|-----------------|---|-----|----|-------|
| Unit-I | | | | |
| 1 | Deduce the relation between the Modulus of Elasticity and Modulus of Rigidity from fundamentals. | 2 | 1 | 6M |
| | a The Modulus of rigidity for a material is $0.51 \times 10^5 \text{ N/mm}^2$. A 10 mm diameter rod of the material was subjected to an axial pull of 10 kN and the change in diameter was observed to be $3 \times 10^{-3} \text{ mm}$. Calculate Poisson's ratio and the modulus of elasticity. | 3,4 | 1 | 8M |
| | OR | | | |
| | b Briefly explain about types of stresses? | 1 | 1 | 4M |
| | b bar of length 200 mm tapers uniformly from 40 mm dia. to 35mm dia. Calculate the change in its length due to an axial pull of 100kN, if $E = 200\text{GPa}$. Derive the formula used in the calculations. | 4 | 1 | 10M |
| Unit-II | | | | |
| 2 | a Deduce the relation between Shear force and intensity of loading. | 2 | 2 | 4M |
| | A cantilever of length 7m carries a gradually varying load, zero at the free end to 5KN/m at the fixed end. Draw the S.F and B.M diagrams for the cantilever. | 3 | 2 | 10M |
| | OR | | | |
| | b Define shear force and bending moment ? | 1 | 2 | 4M |
| | An overhanging beam is shown in Fig.1. Draw the S.F and B.M diagrams. | 4 | 2 | 10M |
| | <p>Fig.1</p> | | | |
| Unit-III | | | | |
| 3 | a Define section modulus. Obtain section modulus for rectangular section. | 2 | 3 | 5M |
| | An I – section beam 350mm × 250mm has a web thickness of 12mm and flange thickness of 20mm. It carries a shear force of 120KN. Sketch the shear stress distribution across the section. | 3 | 3 | 9M |
| | OR | | | |
| | b Write about shear stresses? | 2 | 3 | 4M |
| | Sketch the bending stress distribution across the cross section of a rectangular beam section $230 \times 400 \text{ m}$ subjected to 60 KN-m moment. | 3 | 3 | 10M |

| 4 | Unit-IV | | | | |
|---|---|--|---|----|----|
| | a | Derive the expression for the slope and deflection of a cantilever beam of length L, carrying a point load W at the free end by double integration method. | 2 | 4 | 7M |
| | | A simply supported 6m rolled steel joist carries a U.D.L of 10 KN/m length. Determine slope and deflection at a distance of 3m from one end of the beam. | 3 | 4 | 7M |
| | OR | | | | |
| | b | What is moment area method? Explain the two Mohr's theorems, as applicable to the slope and deflection of a beam. | 2 | 4 | 7M |
| | A cantilever of 4m span length carries a load 40 KN at its free end. If the deflection at the free end is not to exceed 8mm, what must be the moment of inertia of the Cantilever section? | 3 | 4 | 7M | |
| 5 | Unit-V | | | | |
| | a | A thin spherical shell of 1.8m diameter is 10mm thick. It is filled with a liquid so that the internal pressure is 1N/mm ² . Find the increase in diameter and capacity of the shell. Take $E = 2 \times 10^5 \text{ N/mm}^2$, $\mu = 0.3$ | 3 | 5 | 7M |
| | | Derive the Lames equations from the fundamentals in a thick cylindrical shell for the given radii (r1 and r2) and internal fluid pressure p. | 2 | 5 | 7M |
| | OR | | | | |
| | b | A thin cylindrical shell of 1 m diameter is subjected to an internal pressure of 1 N/mm ² . Calculate the suitable thickness of the shell, if the tensile strength of the plate is 400 N/mm ² and factor of safety is 4. | 3 | 5 | 7M |
| | A thick spherical shell of 100 mm internal diameter is subjected to an internal fluid pressure of 30 N/mm ² . If the permissible tensile stress is 80 N/mm ² , find the thickness of the shell. | 4 | 5 | 7M | |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CE2104

II B.Tech. - I Semester Regular Examinations, February-2022
SURVEYING AND GEOMATICS
(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks | | | | | | | | | | | | | | | | | |
|-----------------|--|----------|-----|-------|----|----------|----------|----|----------|----------|----|---------|---------|----|----------|----------|----|----------|----------|----|-----|
| Unit-I | | | | | | | | | | | | | | | | | | | | | |
| 1 | a A 20 m chain was found to be 15 cm too long after chaining a distance of 1600 m. It was found to be 30 cm too long at the end of day's work after chaining a total distance of 3200 m. Determine the correct distance if the chain was correct before the commencement of the work. | K2 | CO1 | 7M | | | | | | | | | | | | | | | | | |
| | State the reasons for incorrect length of Chain? | K1 | CO3 | 7M | | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | | |
| | b List the instruments for Direct measurement of Distances? Give the broad classification of Surveying? | K3 | CO1 | 7M | | | | | | | | | | | | | | | | | |
| Unit-II | | | | | | | | | | | | | | | | | | | | | |
| 2 | a Differentiate between 'Permanent' and temporary' adjustments of level. Discuss the effects of curvature and refraction in leveling. Find the correction due to each and the combined correction. | K3 | CO2 | 7M | | | | | | | | | | | | | | | | | |
| | b The vertical angles to vanes fixed at 0.5m and 3.5m above the foot of the staff held vertically at a point were - 0° 30' and + 1° 12' respectively. Find the horizontal distance and the reduced level of the point, if the level of the instrument axis is 125.380meters above datum. | K1 | CO2 | 14M | | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | | |
| Unit-III | | | | | | | | | | | | | | | | | | | | | |
| 3 | a The vertical angles to vanes fixed at 0.5m and 3.5m above the foot of the staff held vertically at a point were - 0° 30' and + 1° 12' respectively. Find the horizontal distance and the reduced level of the point, if the level of the instrument axis is 125.380meters above datum. | K2 | CO1 | 14M | | | | | | | | | | | | | | | | | |
| | OR | | | | | | | | | | | | | | | | | | | | |
| | b The following fore and back bearings were observed in traversing with a compass <table style="margin-left: 20px; border: none;"> <tr> <td>Line</td> <td>F.B</td> <td>B.B</td> </tr> <tr> <td>AB</td> <td>S45°00'E</td> <td>N45°00'W</td> </tr> <tr> <td>BC</td> <td>N60°30'E</td> <td>S60°30'W</td> </tr> <tr> <td>CD</td> <td>N5°30'E</td> <td>S5°30'W</td> </tr> <tr> <td>DE</td> <td>N65°30'W</td> <td>S65°30'E</td> </tr> <tr> <td>EA</td> <td>S40°00'W</td> <td>N40°00'E</td> </tr> </table> Compute the included angles of the traverse Explain the procedure of running a traverse by the method of included angles. | Line | F.B | B.B | AB | S45°00'E | N45°00'W | BC | N60°30'E | S60°30'W | CD | N5°30'E | S5°30'W | DE | N65°30'W | S65°30'E | EA | S40°00'W | N40°00'E | K2 | CO1 |
| Line | F.B | B.B | | | | | | | | | | | | | | | | | | | |
| AB | S45°00'E | N45°00'W | | | | | | | | | | | | | | | | | | | |
| BC | N60°30'E | S60°30'W | | | | | | | | | | | | | | | | | | | |
| CD | N5°30'E | S5°30'W | | | | | | | | | | | | | | | | | | | |
| DE | N65°30'W | S65°30'E | | | | | | | | | | | | | | | | | | | |
| EA | S40°00'W | N40°00'E | | | | | | | | | | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | | |
| | | K3 | CO3 | 7M | | | | | | | | | | | | | | | | | |

| Unit-IV | | | | | |
|---------|----|---|----|-----|-----|
| 4 | a | A compound railway curve ABC is to have the radius of arc AB 600meters and that BC 400 meters. The intersection point V of the straights is located, and the intersection angle is observed to be $35^{\circ} 6'$. If the arc AB is to have a length of 200meters. Calculate the tangent distances VA and VC. | K4 | CO4 | 14M |
| | OR | | | | |
| | b | Explain the different between tangential and stadia tacheometry. | K4 | CO4 | 7M |
| | | How will you determine the stadia constants? | K4 | CO4 | 7M |
| Unit-V | | | | | |
| 5 | | Discuss the basic concepts of photogrammetric surveying. | K2 | CO5 | 7M |
| | a | A and B are two camera stations 200 m apart. Stereo-pairs were taken with optical axis at right angles to the camera base line. In the photograph exposed at A, a point P was found to be 20 mm to the right and 8 mm above the cross lines. The same point was 32 mm to the left and 12 mm above the cross lines in the photograph taken from B. If the focal length of the camera lens was 180 mm, find the coordinates of P with respect to origin at A. | K3 | CO5 | 7M |
| | OR | | | | |
| | b | Describe aero-triangulation and its principles | K2 | CO5 | 7M |
| | | The scale of an aerial photograph is 1cm= 160m and the size of the photograph is 20cmx20cm. If the longitudinal lap is 65% and side lap is 35%, determine the number of photographs required to cover an area of 233sq.km | K3 | CO5 | 7M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CE2105

II B.Tech. - I Semester Regular Examinations, February-2022

CONCRETE TECHNOLOGY

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks |
|---|-----------|---|----|-------|
| Unit-I | | | | |
| 1 | a | Explain the manufacturing of Portland cement by dry process, | | |
| | | Explain in detail the heat of hydration of Bougue's compounds | | |
| | OR | | | |
| | b | Explain about Normal consistency test with sketch | | |
| Explain about Soundness test test with sketch | | | | |
| Unit-II | | | | |
| 2 | a | Define Specific gravity, Bulk density and Moisture content of the aggregates. | | |
| | | Explain procedure for determination of workability of concrete using Vee Bee Consistometer test with neat diagram. | | |
| | OR | | | |
| | b | Explain about grading of aggregates? Write the types of grading with sketch | | |
| Unit-III | | | | |
| 3 | a | Write the effect of mineral admixtures on fresh and hardened concrete | | |
| | | What is Fly ash? Write the types of flyash' and its importance to improve the concrete workability | | |
| | OR | | | |
| | b | Write the effect of mineral admixtures on strength and durability of concrete | | |
| Write the difference between Retarders and Accelerators | | | | |
| Unit-IV | | | | |
| 4 | a | Explain with neat diagram non-destructive testing of concrete using Pulse Velocity Method. | | |
| | | Write the Factor's affecting modulus of elasticity | | |
| | OR | | | |
| | b | Discuss about the Effect of height/diameter ratio on compressive strength | | |
| What is Sulphate attack and write one method of controlling Sulphate attack | | | | |
| Unit-V | | | | |
| 5 | a | Design mix proportions with the following data using IS code method. Characteristic compressive strength of concrete 30 Mpa. 20mm Maximum size of round aggregate. Moderate degree of workability. Specific gravity of concrete 3.15. specific gravity of coarse and fine aggregates 2.65. Zone III sand. Good quality control. | | |
| | OR | | | |
| | b | Explain different methods producing light weight concrete. What are its advantages and disadvantages? | | |
| Discuss about Fibre reinforced concrete | | | | |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20EE2102

II B.Tech. - I Semester Regular Examinations, February-2022
ELECTRICAL CIRCUIT ANALYSIS-II
(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

| Q.No | Questions | KL | CO | Mark |
|-----------------|--|----|----|-------|
| Unit-I | | | | |
| 1 | i) What are the advantages of three phase systems? | K2 | 1 | [7M] |
| | ii) A balanced star connected load of $(5+j4)$ Ohm per phase is connected to a three phase, 400V, 50 HZ supply. Find the line current, power factor, real and reactive power and complex power? | K3 | 1 | [7M] |
| | OR | | | |
| b | Derive the relations between line and phase quantities of a balanced three phase star and delta connected system? | K2 | 1 | [14M] |
| Unit-II | | | | |
| 2 | a A three phase, 4 wire, 400V, ABC system supplies a star load with $Z_A=100 \angle 30^\circ$ Ohm, $Z_B=50 \angle -45^\circ$ Ohm, and $Z_C=100 \angle 0^\circ$ Ohm. Find the line currents, neutral current and load power. | K2 | 2 | [14M] |
| | OR | | | |
| b | A delta connected load has $45 \angle 0^\circ$ Ohm, $10 \angle -60^\circ$ Ohm and $20 \angle 45^\circ$ Ohm between R_Y , Y_B and B_R phases. If the supply is 100V, three phase, 50 HZ system. Find the phase currents, line currents and line voltages. Also find the total power consumed. | K3 | 2 | [14M] |
| Unit-III | | | | |
| 3 | a A series RL circuit with $R=100$ Ohm, $L=1$ H has a sinusoidal voltage source $200 \sin(500t+\Phi)$ applied at time when $\Phi=0$. i) Find the expression for current ii) At what value of Φ must the switch be closed so that the current directly enter steady state. | K3 | 3 | [14M] |
| | OR | | | |
| b | Derive the expression for $i(t)$ for the series RC circuit with DC excitation? | K2 | 3 | [14M] |
| Unit-IV | | | | |
| 4 | i) Explain the impedance and admittance parameters? | K1 | 4 | [7M] |
| | ii) Derive the expression of h parameters in terms of Y parameters? | K3 | 4 | [7M] |
| OR | | | | |
| b | Calculate Z and Y parameters of the circuit shown in Fig. <div style="text-align: center; margin-top: 10px;"> </div> | K3 | 4 | [14M] |

Unit-V

| | | | | | |
|----------|-----------|--|----|---|-------|
| 5 | a | i) Synthesize the Foster I form of a given impedance function $Z(s) = \frac{S(S^2+4)}{(S^2+1)(S^2+16)}$ | K3 | 4 | [7M] |
| | | ii) Synthesize the Cauer II form of a given impedance function $Z(s) = \frac{12S^3+45}{3S^4+10S^2+2}$ | K3 | 4 | [7M] |
| | OR | | | | |
| | b | Realise the Foster forms I & II of the impedance function $Z(s) = \frac{(S+1)(S+3)}{S(S+2)}$ | K3 | 5 | [14M] |

Subject Code: R20EE2103

II B.Tech. - I Semester Regular Examinations, February-2022

ELECTRICAL MACHINES-I

(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks | | |
|-----------------|---|--|----|-------|---|----|
| Unit-I | | | | | | |
| 1 | a | Draw the magnetic field circuit of a DC generator with neat diagram? | | | | |
| | | K2 | 1 | 7M | | |
| | | Explain the principle of operation of separately excited DC generator? | | | | |
| | | K2 | 1 | 7M | | |
| OR | | | | | | |
| | Develop the equivalent circuit of armature of a DC machine? | | | K3 | 1 | 7M |
| | b | A 4 pole DC generator has 1200 armature conductors and generates 240V on open circuit when running at a speed of 550 r.p.m. The diameter of the pole shoe circle is 0.38m and the ratio of pole arc to pole pitch is 0.9 while the length of the shoes is 0.3m. Find the mean flux density in the air gap. Assume the lap connected armature winding? | | | | |
| | | K3 | 1 | 7M | | |
| Unit-II | | | | | | |
| 2 | a | Derive the expressions and discuss the differences between gross torque and shaft torque of a DC motor? | | | | |
| | | K2 | 2 | 7M | | |
| | | Draw and explain the power stage diagram of a DC motor? | | | | |
| | | K2 | 2 | 7M | | |
| OR | | | | | | |
| | Derive the power equation of DC series motor? | | | K3 | 2 | 7M |
| | b | A 4 pole, 250V, wave connected shunt motor gives 14kW when running at 900 r.p.m and drawing armature and field currents of 56A and 1.2A respectively. It has 560 number of conductors. Its armature resistance is 0.4 ohms. By assuming a drop of 1V per brush, calculate total torque, useful torque, useful flux per pole, rotational loss and efficiency? | | | | |
| | | K3 | 2 | 7M | | |
| Unit-III | | | | | | |
| 3 | a | Draw the circuit and explain the operation of rheostatic speed control of DC shunt motor? | | | | |
| | | K2 | 3 | 7M | | |
| | | A 450V series motor runs at 570 r.p.m taking a current of 46A. Determine the speed and the percentage change in torque if the load is reduced so that the motor is taking 34A. Total resistance of the armature and field circuits is 0.82 ohms. Assume flux and field current to be proportional. | | | | |
| | | K3 | 3 | 7M | | |
| OR | | | | | | |
| | b | Explain the functions of no volt release coil and over load release coil of a three point starter with neat diagram? | | | | |
| | | K2 | 3 | 7M | | |
| | | Discuss the losses method to pre determine the efficiency of a DC machine? | | | | |
| | | K2 | 3 | 7M | | |
| Unit-IV | | | | | | |
| 4 | a | What is meant by no-load current in a transformer? Explain its components. | | | | |
| | | K2 | 4 | 7M | | |
| | | A single phase 3.3kV/400V transformer has primary winding resistance 0.8 ohms, secondary winding resistance 0.014 ohms, primary winding leakage reactance 3.89 ohms and secondary winding leakage reactance 0.055 ohms. The secondary is connected to a coil having a resistance of 5.8 ohms and | | | | |
| | | K3 | 4 | 7M | | |

| | | | | |
|---|--|----|---|----|
| | inductive reactance of 3.8 ohms. Find the secondary terminal voltage and the power consumed by the coil? | | | |
| | OR | | | |
| b | Explain the existence of leakage reactance in the single phase transformer with diagram? | K2 | 4 | 7M |
| | Discuss the advantages, limitations and applications of single winding transformer? | K2 | 4 | 7M |
| | Unit-V | | | |
| | Draw and explain the construction of a three phase transformer? | K2 | 5 | 7M |
| a | Discuss in detail about the application of open delta system in the transformers? | K2 | 5 | 7M |
| | OR | | | |
| 5 | Explain the operation of delta-delta connection transformer with phasor diagram? | K2 | 5 | 7M |
| b | Discuss the advantages and applications of Scott connection of the transformer? | K2 | 5 | 7M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome **M:** Marks

Subject Code: R20EE2104

II B.Tech. - I Semester Regular Examinations, February-2022

ELECTROMAGNETIC FIELDS

(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks |
|---------------|--|----|----|-------|
| Unit-I | | | | |
| 1 | a Derive expression for electric potential required to displace a point charge in an electrostatic field. | K1 | 1 | 7M |
| | b Two point charges $Q_1 = -4 \mu\text{C}$ located at (2,-1,3) and $Q_2 = 5 \mu\text{C}$ is located at (0,4,-2). Find the potential at (1,0,1). Assume Zero potential at infinity. | K2 | 1 | 7M |
| | OR | | | |
| | b Derive expression for electric field intensity due to an electric dipole. | K1 | 1 | 7M |
| 2 | a If $E = (-8xy a_x - 4x^2 a_y + a_z)$ V/m. Find the work done to move a charge of 6C along a straight line from A(1,8,5) to B(2,18,6). | K2 | 1 | 7M |
| | Unit-II | | | |
| | a State Gauss's law. Explain any two applications of Gauss's law in detail | K2 | 2 | 7M |
| | a Derive an expression for equation of continuity of current | K1 | 2 | 7M |
| 3 | OR | | | |
| | b Derive Laplace and Poisson's equation. | K1 | 2 | 14M |
| | Unit-III | | | |
| | a Derive expression for Magnetic field intensity(H) on a straight current carrying conductor by applying Biot-Savart's law. | K1 | 3 | 7M |
| 4 | a State Ampere's circuital law and explain any two applications of Ampere's Circuital law | K2 | 3 | 7M |
| | OR | | | |
| | b Define Magnetic flux, Magnetic flux line and Magnetic flux density and state the relation between Magnetic flux and Magnetic flux density. | K1 | 3 | 7M |
| | b Obtain the expression for magnetic field intensity due to infinite long straight carrying a steady current I. | K2 | 3 | 7M |
| 5 | Unit-IV | | | |
| | a Derive Lorentz force equation and explain its significance | K1 | 4 | 7M |
| | a Obtain the expression for torque on a current loop placed in a magnetic field | K2 | 4 | 7M |
| | OR | | | |
| 5 | b Explain the concept self and mutual inductances. | K1 | 4 | 7M |
| | b Derive the expression for energy stored and density in a magnetic field. | K2 | 4 | 7M |
| | Unit-V | | | |
| | a Write the Maxwell's equations both in point and integral forms for time varying fields. | K2 | 5 | 14M |
| 5 | OR | | | |
| | b State and explain Faraday's laws of electromagnetic induction | K1 | 5 | 7M |
| | b State the Poynting Theorem and derive the necessary expressions | K2 | 5 | 7M |



Subject Code: R20EE2105

II B.Tech. - I Semester Regular Examinations, February-2022

ANALOG ELECTRONICS

(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks |
|---|---|----|----|-------|
| Unit-I | | | | |
| 1 | a Draw the circuit diagram of Trans conductance amplifier and explain its operation | 2 | 1 | 7M |
| | Write short notes on Characteristics of negative feedback amplifiers | 2 | 1 | 7M |
| | OR | | | |
| | b Draw the General Block Diagram of Feed Back Amplifier and explain its operation | 3 | 1 | 7M |
| | Explain the concept of Positive Feed Back amplifier along with diagram | 3 | 1 | 7M |
| Unit-II | | | | |
| 2 | a Draw and explain the Square response of RC High pass filter along with output wave forms | 2 | 2 | 7M |
| | Explain the concept of Two level clipping circuits along with diagrams | 2 | 2 | 7M |
| | OR | | | |
| | b Draw and explain the RC network as a differentiator along with wave forms | 4 | 2 | 7M |
| Draw the circuit diagram of Emitter coupled clipper and explain its operation | 7M | | | |
| Unit-III | | | | |
| 3 | a Draw the circuit diagram of Instrumentation amplifier and explain its operation | 1 | 3 | 7M |
| | List out different Ideal Characteristics of OP-Amps in detail | 1 | 3 | 7M |
| | OR | | | |
| | b Draw the circuit diagram of Anti-log amplifier and explain its operation | 2 | 3 | 7M |
| | Write short notes on Non-inverting amplifier analysis in detail | 2 | 3 | 7M |
| Unit-IV | | | | |
| 4 | a Draw the circuit diagram of monostable multivibrator by using 555 Timer and explain its operation | 4 | 4 | 7M |
| | Explain the concept of Quasi Stable State | 4 | 4 | 7M |
| | OR | | | |
| | b Draw the Functional diagram of 555 timer and explain its operation | 3 | 4 | 7M |
| | Explain the Concept of Triggering in detail | 3 | 4 | 7M |
| Unit-V | | | | |
| 5 | a Explain the following terms in detail i) HPF (ii)BPF | 5 | 5 | 7M |
| | Draw and explain the Successive approximation ADC analysis in detail | 5 | 5 | 7M |
| | OR | | | |
| | b Draw the circuit diagram of Inverted R-2R DAC and explain its operation | 2 | 5 | 7M |
| | Write short notes on Dual slope ADC analysis in detail | 2 | 5 | 7M |

Subject Code: R20ME2102

II B.Tech. - I Semester Regular Examinations, February-2022

FLUID MECHANICS AND HYDRAULIC MACHINERY

(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks |
|-----------------|---|----|----|-------|
| Unit-I | | | | |
| 1 | i) Differentiate between: A) Absolute pressure and gauge pressure B) Piezometer and simple manometer | K3 | 1 | 7M |
| | ii) The right limb of a simple U – tube manometer containing mercury is open to the atmosphere, while the left limb is connected to a pipe in which a fluid of sp.gr.0.9 is flowing. The centre of pipe is 12cm below the level of mercury in the right limb. Estimate the pressure of fluid in the pipe, if the difference of mercury level in the two limbs is 20 cm. | K3 | 1 | 7M |
| | OR | | | |
| | i) Compare the Pascal's law and the Hydrostatic law? | K4 | 1 | 6M |
| b | ii) Define viscosity. A plate having an area of 0.7 m ² is sliding down the inclined plane at 45° to the horizontal with a velocity of 0.45 m/s. there is a cushion of fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 300N. | K3 | 1 | 8 M |
| | Unit-II | | | |
| 2 | i) Define and distinguish between: A) (I) uniform flow and non- uniform flow (II) laminar and turbulent flow B) stream lines, path lines, streak lines and stream tube | K2 | 2 | 7M |
| | ii) State the momentum equation. How will you apply momentum equation for determining the force exerted by a floating liquid on a pipe bend? | K4 | 2 | 7M |
| | OR | | | |
| b | Derive Euler's Equation of Motion? How will you obtain Bernoulli's equation from it? | K4 | 2 | 14M |
| Unit-III | | | | |
| 3 | i) Two water carrying circular pipes are connected in parallel. The length L ₁ , diameter d ₁ , and friction factor f ₁ for the first pipe are 200m, 0.5m and 0.025m respectively, while L ₂ =100m, d ₂ =1.0m and f ₂ =0.02. What is the velocity ratio V ₂ /V ₁ . | K3 | 2 | 7M |
| | ii) What is a Venturimeter? Derive an expression for the discharge through a Venturimeter. | K4 | 2 | 7M |
| | OR | | | |
| b | i) Explain the procedure for solving problem by buckingham's π theorem | K3 | 3 | 14M |
| Unit-IV | | | | |
| 4 | i) By means of a neat sketch, explain the governing mechanism of Francis Turbine. | K2 | 4 | 7M |
| | ii) A Pelton wheel has a mean bucket speed of 10 meters per second with a jet of water flowing at the rate of 700 litres/s under a head of 30 meters. The buckets deflect the jet through an angle of 160°. Calculate the power given | K3 | 4 | 7M |

| | | | | | |
|---|---|---|----|---|-----|
| | | by water to the runner and hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. | | | |
| | | OR | | | |
| | | i) Differentiate between Francis turbine and Kaplan turbine. | K2 | 4 | 7M |
| | b | ii) A Nozzle of 50mm diameter delivers a stream of water at 20m/s perpendicular to a plate that moves away from the jet at 5m/s. Find the force on the plate, the work done and the efficiency of jet. | K2 | 4 | 7M |
| | | Unit-V | | | |
| | | i) Draw and discuss the characteristic curves of centrifugal pump. | K2 | 5 | 7M |
| | a | ii) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000rpm works against total head of 40m. The velocity of flow through the impeller is constant and equal to 2.5m/s. the vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 500mm and width at outlet is 50mm, Calculate (i) Vane angle at inlet (ii) Work done by impeller on water per second and (iii) Manometric efficiency | K3 | 5 | 7M |
| 5 | | OR | | | |
| | b | i) Define the centrifugal pump. Explain the working of a single stage centrifugal pump with a neat sketch | K2 | 5 | 14M |

Subject Code: R20ME2103

II B.Tech. - I Semester Regular Examinations, February-2022

METROLOGY AND INSTRUMENTATION

(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks | |
|-----------------|---|---|-----|-------|-----|
| Unit-I | | | | | |
| 1 | a | Discuss the factors affecting accuracy of a measuring system. | K2 | Co1 | 7M |
| | | Explain types of fits with neat sketches. | K5 | Co1 | 7M |
| | OR | | | | |
| | b | Explain Hole basis System? Why it is Preferred. | K5 | Co1 | 7M |
| | Discuss about unilateral and bilateral tolerance systems. | K3 | Co1 | 7M | |
| Unit-II | | | | | |
| 2 | a | Explain the working of sine bar with a neat sketch. | K5 | Co2 | 7M |
| | | Discuss about the common instrumental errors in linear measurement. | K3 | Co2 | 7M |
| | OR | | | | |
| | b | What are slip gauges? Explain how the calibration of the slip is gauges and micrometre's done. | K6 | Co2 | 14M |
| Unit-III | | | | | |
| 3 | a | What is Taylors principle? Discuss how dimensional inspection of parts is done using Go and No Go Gauges. | K1 | Co3 | 7M |
| | | Explain the working of Tool makers Microscope with a neat sketch. | K3 | Co3 | 7M |
| | OR | | | | |
| | b | Discuss about ring and position gauges. | K1 | Co3 | 7M |
| | What is Surface finish? Explain about any one method to find surface finish of the surface. | K3 | Co3 | 7M | |
| Unit-IV | | | | | |
| 4 | a | Define the terms range, sensitivity and hysteresis. | K1 | Co4 | 7M |
| | | Explain the Principle and working of LVDT with a neat sketch. | K3 | Co4 | 7M |
| | OR | | | | |
| | b | Define the terms reliability, repeatability and linearity. | K1 | Co4 | 7M |
| | What are the advantages and applications of LVDT? | K3 | Co4 | 7M | |
| Unit-V | | | | | |
| 5 | a | Illustrate how do Bourdon Tube Pressure Gauges Work? Explain | K4 | Co5 | 7M |
| | | Differentiate Thermistor and thermo couple. | K2 | Co5 | 7M |
| | OR | | | | |
| | b | What are the different principles used for the measurement of pressure? | K5 | Co5 | 7M |
| | Discuss about bourdon pressure gauges and diaphragm gauges. | K3 | Co5 | 7M | |

Subject Code: R20ME2104

II B.Tech. - I Semester Regular Examinations, February-2022

THERMODYNAMICS

(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| Q.No | Questions | K L | CO | Marks |
|-----------------|---|-----|----|-------|
| Unit-I | | | | |
| 1 | a i) Explain why the heat and work as path functions. | K2 | 1 | 7M |
| | ii) Explain the working of constant volume gas thermometer | K2 | 1 | 7M |
| | OR | | | |
| | b i) Explain the method of establishing the "absolute temperature scale?" | K4 | 1 | 7M |
| | ii) A balloon is filled with air (200 kPa and 300K) such that it becomes as sphere of diameter 1m. It is then gradually heated till the pressure rises to 500 kPa. Determine the amount of work done during the process, assuming that the pressure inside the balloon is proportional to the diameter of the balloon. | K4 | 1 | 7M |
| Unit-II | | | | |
| 2 | a i) A system composed of 2 kg of the above fluid expands in a frictionless piston and cylinder machine from an initial state of 1 MPa, 100°C to a final temperature of 30°C. If there is no heat transfer, find the network for the process | K4 | 2 | 7M |
| | ii) Derive the steady flow energy equation and apply in to a Heat exchanger. | K3 | 2 | 7M |
| | OR | | | |
| | b i) Explain and derive Steady Flow Energy Equation. | K3 | 2 | 7M |
| | ii) What are the limitations of first law of thermodynamics? Write any three corollaries of First law of thermodynamics. | K3 | 2 | 7M |
| Unit-III | | | | |
| 3 | a i) What do you understand by entropy principle and explain Clasius inequality | K3 | 3 | 7M |
| | ii) Explain Second Law of Thermodynamics. Prove that violation of Kelvin Plank statement leads to violation of Clausius statement. | K3 | 3 | 7M |
| | OR | | | |
| | b i) A fluid contained in a cylinder receives 150 kJ of mechanical energy by means of a paddle wheel, together with 50 kJ in the form of heat. At the same time, the piston in the cylinder moves in such a way that the pressure remains constant at 200 kN/m ² during the fluid expansion from 2 m ³ to 5 m ³ . What is the change in internal energy and in enthalpy. | K4 | 3 | 7M |
| | ii) Explain the working of cannot cycle and derive the expression for its thermal efficiency. | K3 | 3 | 7M |
| Unit-IV | | | | |
| 4 | a i) A mixture of hydrogen (H ₂) and oxygen (O ₂) is to be made so that the ratio of H ₂ to O ₂ is 2:1 by volume respectively. Calculate i) the mass of O2 required, ii) volume of the container. | K4 | 4 | 7M |
| | ii) Derive the expressions for the internal energy and specific heats for mixtures of ideal gases. | K4 | 4 | 7M |

| | | | | | |
|---------------|-----------|---|-----------|----------|-------------|
| OR | | | | | |
| | b | Discuss about triple point, critical temperature and critical pressure with respect to phase change of water when it is heated from ice from and at -10°C to steam at 250°C with the help of P-V, T-S, h-S and P-T diagrams | K4 | 4 | 14 M |
| Unit-V | | | | | |
| 5 | a | i) What do you understand by dry bulb temperature and wet bulb temperatures? When do the DBT, WBT and DPT become equal? | K3 | 5 | 7M |
| | | ii) Explain the working of Bell Coleman cycle. | K4 | 5 | 7M |
| | OR | | | | |
| | b | With a neat sketch explain the working of simple Otto cycle and derive the expression for its thermal efficiency. Discuss the methods to improve the thermal efficiency | K4 | 5 | 14 M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome **M:**Marks

Subject Code: R20ME2105

II B.Tech. - I Semester Regular Examinations, February-2022

MECHANICS OF SOLIDS

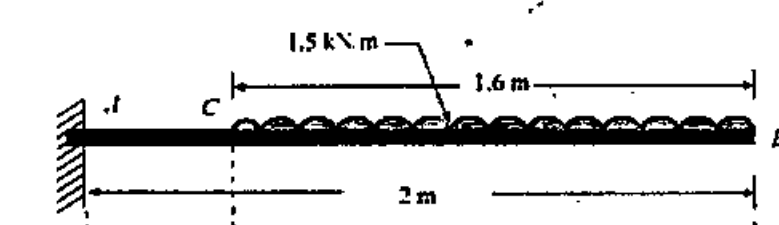
(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks |
|-----------------|---|----|----|-------|
| Unit-I | | | | |
| 1 | a i) Define Bulk modulus. Calculate the change in volume of a cubical block of side 120 mm subjected to a hydrostatic pressure of 70 MPa. Take Poisson's ratio 0.28 and young's modulus 200 GPa. | 2 | 1 | 7M |
| | ii) Derive the expression for strain energy stored in a body when the impact load is applied? | 2 | 1 | 7M |
| | OR | | | |
| | b i) Define strain energy and complimentary strain energy. Derive an expression for strain energy in a body subjected to axial stress. | 1 | 1 | 7M |
| | ii) Derive the relationship between young's modulus and modulus of rigidity | 3 | 1 | 7M |
| Unit-II | | | | |
| 2 | a i) A cantilever beam AB, 2 m long carries a uniformly distributed load of 1.5 kN/m over a length of 1.6 m from the free end. Draw shear force and bending moment diagrams for the beam. | 3 | 2 | 7M |
| |  <p style="text-align: center;">Fig 2</p> | | | |
| | ii) Establish relation between load, shear force and bending moment | 3 | 2 | 7M |
| OR | | | | |
| | b Construct shear force diagram and bending moment diagrams for a beam ABE, $3L/2$ m long, which is supported at A and B, 'L' m long. The beam carries a concentrated load of $2W$ at $L/4$ distance from left support A, and point load $W/2$ at E. It also carries an upward point load of W at a distance of $L/4$ from support B. | 3 | 2 | 14M |
| Unit-III | | | | |
| 3 | a i) A rectangular beam 300 mm deep is simply supported over a span of 4 meters. What uniformly distributed load the beam may carry, if the bending stress is not to exceed 120 MPa. Take $I = 225 \times 10^6 \text{ mm}^4$. | 4 | 3 | 7M |
| | ii) Explain the following: A) Shear force and bending moment in a beam. B) Hogging and sagging moments. C) Point of contra flexure. | 1 | 3 | 7M |
| | OR | | | |
| | b Determine and draw the shear stress variation along the depth of an I section beam having a uniform thickness of 10 mm, for the web and flanges. The total height of the section is 200 mm and overall width of each flange is 100 mm. The shear force is 250 kN. | 3 | 3 | 14M |

| Unit-IV | | | | | |
|---------|-----------|--|---|---|------|
| 4 | a | i) How can you find slope and deflection in beams using moment area method? | 2 | 4 | 7M |
| | | ii) A cantilever of length 3 m is carrying a UDL of 10 kN/m over a length of 2 m from fixed end. Find the maximum slope and deflection. Assume $EI = 4 \times 10^{12} \text{ Nmm}^2$ | 3 | 4 | 7M |
| | OR | | | | |
| | b | i) A cantilever beam is 2 m long and has a flexural rigidity of 25MN-m^2 . It carries a point load of 3 kN at mid length and a u.d.l of 2 kN/m along its entire length. Calculate the deflection and slope at the free end by Macaulay's method. | 3 | 4 | 10 M |
| | | ii) Write down Mohr's theorems for slope and deflection of beams. | 2 | 4 | 4 M |
| Unit-V | | | | | |
| 5 | a | Derive the stresses in thin cylindrical vessel with neat sketches | 3 | 5 | 14 M |
| | OR | | | | |
| | b | i) Calculate minimum wall thickness of a thin cylinder 1 m in diameter if it is to withstand an internal pressure of 2 N/mm^2 and hoop stress not to exceed 40 N/mm^2 . Also find change in diameter. $E = 210 \text{ GPa}$; Poisson's ratio = 0.3. | 3 | 5 | 7M |
| | | ii) A thick metallic cylindrical shell of 150 mm internal diameter is required to withstand an internal pressure of 8 N/mm^2 . Find the necessary thickness of the shell, if the permissible tensile stress in the section is 20 N/mm^2 . | 3 | 5 | 7M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20EC2102

II B.Tech. - I Semester Regular Examinations, February-2022
ELECTRONIC DEVICES AND CIRCUITS
(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
 All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | K L | CO | Marks |
|-----------------|--|-----|----|-------|
| Unit-I | | | | |
| 1 | Derive expression for the diode current equation | 2 | 1 | 7M |
| | a Explain the semiconductors, insulators and metals classification using energy band | 2 | 1 | 7M |
| | OR | | | |
| | b Explain the terms Transition Capacitance and Diffusion Capacitance in detail | 3 | 1 | 7M |
| | Draw and explain the V-I Characteristics of PN junction diode both Forward and revers Biasing | 3 | 1 | 7M |
| Unit-II | | | | |
| 2 | Explain the operation of varactor diode with neat diagram | 2 | 2 | 7M |
| | a With circuit and necessary waveforms explain the operation of bridge rectifier | 2 | 2 | 7M |
| | OR | | | |
| | b Explain the construction and working of Photodiode | 5 | 2 | 7M |
| | Derive the expression for ripple for the circuit FWR with inductor filter | 5 | 2 | 7M |
| Unit-III | | | | |
| 3 | From the transistor current components, deduce the current equation of transistor | 3 | 3 | 7M |
| | a Explain input and output characteristics of common emitter configuration | 3 | 3 | 7M |
| | OR | | | |
| | b Derive and explain the Relation among α , β , and γ | 4 | 3 | 7M |
| | Write short notes on photo transistor in detail | 4 | 3 | 7M |
| Unit-IV | | | | |
| 4 | Differentiate bias stabilization and compensation techniques | 5 | 4 | 7M |
| | a In a Self-bias circuit containing $R_1=50K\Omega$, $R_2=25K\Omega$, $R_e=1K\Omega$, $R_C=3K\Omega$, $\beta=90$, $V_{CC}=12V$, $V_{BE}=0.7V$. Find the operating point, S, S', and S'' | 5 | 4 | 7M |
| | OR | | | |
| | b What is thermal runaway? Derive relevant expressions to obtain thermal stability | 5 | 4 | 7M |
| | In a silicon transistor with a fixed bias, $V_{cc}=9V$, $R_c=3k\Omega$, $R_B=8k\Omega$, $\beta=50$, $V_{BE}=0.7V$. Find the operating point and stability factor | 5 | 4 | 7M |
| Unit-V | | | | |
| 5 | Draw and Explain the construction and working of Enhancement MOSFET | 4 | 5 | 7M |
| | a List out few Comparison between JFET and MOSFET. | 4 | 5 | 7M |
| | OR | | | |
| | b Draw and Explain the construction and working of SCR | 4 | 5 | 7M |
| | Write short notes on UJT | 4 | 5 | 7M |

Subject Code: R20EC2103

II B.Tech. - I Semester Regular Examinations, February-2022

SIGNALS AND SYSTEMS

(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
 All Questions Carry Equal Marks (5 X 14 = 70M)

| QNo | Questions | KL | CO | Marks |
|-----------------|--|----|----|-------|
| Unit-I | | | | |
| 1 | a) Find whether the following signal is periodic. If periodic determine the fundamental period. $x(t) = \cos\left(\frac{\pi}{3}t\right) + \sin\left(\frac{\pi}{4}t\right)$ | 1 | 1 | 7M |
| | ii) Recognize the power and RMS value of the signal $x(t) = A\cos(\Omega_0 t + \theta)$ | 1 | 1 | 7M |
| | OR | | | |
| | i) Draw the waveforms represented by the following step function $f_1(t) = 2u(t-1)$ $f_2(t) = -2u(t-2)$ $f(t) = f_1(t) + f_2(t)$ $f(t) = f_1(t) - f_2(t)$. | 5 | 1 | 7M |
| | ii) State and explain the sampling theorem and the effect of aliasing in detail. | 2 | 1 | 7M |
| Unit-II | | | | |
| 2 | a) Formulate the trigonometric Fourier series over the interval (-1, 1) for the signal $x(t) = t^2$ | 6 | 2 | 14M |
| | OR | | | |
| | I) Express the exponential Fourier series for the signal $f(t) = e^{-t}, 0 \leq t \leq 0.5$ and also plot the magnitude and phase spectrum. | 2 | 2 | 14M |
| Unit-III | | | | |
| 3 | I) Describe the Fourier Transform of Rectangular pulse. Sketch the signal. | 2 | 3 | 7M |
| | ii) Estimate the Fourier Transform of $x(t) = 1 - e^{-t} \cos \omega_0 t$. | 2 | 3 | 7M |
| | OR | | | |
| | I) Predict the Fourier transform of $x(t) = e^{j\omega t^2}$ and hence find the Fourier transform of the functions $\cos(at^2), \sin(at^2)$. | 2 | 3 | 14M |
| Unit-IV | | | | |
| 4 | I) Calculate the Laplace Transform and ROC of the signal $x(t) = e^{-3t}u(t) + e^{-2t}u(t)$ | 4 | 4 | 7M |
| | ii) Illustrate Convolution property of Laplace transform. | 4 | 4 | 7M |
| | OR | | | |
| | I) Deduce the initial value of $X(Z) = Z+2 / (Z+1)(Z+3)$ | 5 | 4 | 7M |
| | ii) Formulate the Z transform and prepare the pole zero plot with ROC for each of the following signals. $x(n) = (0.5)^n u(n) - (1/3)^n u(n)$. | 6 | 4 | 7M |

Unit-V

| | | | | | |
|----------|-----------|---|----------|----------|------------|
| 5 | a | i) Examine whether the following system is time invariant or not $Y(n)=x(2n)$ | 1 | 5 | 7M |
| | | ii) Compute whether the following system is linear or non-linear $Y(n)=x^2(n)$ | 3 | 5 | 7M |
| | OR | | | | |
| | b | i) A Continuous time system has the input-output relation given by $y(t)=t x(t-1)$. Analyze whether the system is (i) Stable (ii) Memory less (iii)Casual | 4 | 5 | 14M |



Narasaraopeta Engineering College (Autonomous)

Korappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R20EC2104

II B.Tech. - I Semester Regular Examinations, February-2022

SWITCHING THEORY AND LOGIC DESIGN

(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | K L | CO | Mark: |
|-----------------|--|-----|----|-------|
| Unit-I | | | | |
| 1 | a Write the following binary numbers in signed 1's complement form and signed 2's complement form using 16 bit registers. (i) +1001010 (ii) -11110000 (iii) -11001100.1 (iv) +100000011.111 | 2 | 1 | 7M |
| | Explain different methods used to represent negative numbers in binary system | 2 | 1 | 7M |
| OR | | | | |
| b | Given the 8-bit data word 10111001, generate the 12-bit composite word for the Hamming code that corrects and detects signals error | 2 | 1 | 7M |
| | Represent (199) ₁₀ in the following code: (i) Binary (ii) BCD (iii) Octal (iv) Hexadecimal | 2 | 1 | 7M |
| Unit-II | | | | |
| a | Obtain the complement of the following Boolean expressions. (i) $AB+A(B+C)+B'(B+D)$ (ii) $A+B+A'B'C$ | 3 | 2 | 7M |
| | Reduce the expression using K-map $\Sigma m(0,1,4,5,7,9,11,15)+d(10,14)$ | 3 | 2 | 7M |
| OR | | | | |
| b | Simplify the following Boolean function using K-Map method in POS form. $F=\Pi(2,3,4,6,9,11,12,13)$ | 3 | 2 | 7M |
| | Simplify the following Boolean function using Tabulation method. $Y(A,B,C,D) = \Sigma(1,3,5,8,9,11,15)$ | 3 | 2 | 7M |
| Unit-III | | | | |
| a | Design a 4 bit carry look ahead adder circuit and explain its operation | 1 | 3 | 7M |
| | Explain how a decoder can be converted into a de-multiplexer with relevant block diagrams and truth tables | 1 | 3 | 7M |
| OR | | | | |
| b | Realize the Boolean function $F= \Sigma(1,2,5,7)$ using (i) 8x1 multiplexer (ii) 4x1 multiplexer | 1 | 3 | 7M |
| | Explain the priority encoder with a neat logic diagram | 1 | 3 | 7M |
| Unit-IV | | | | |
| a | Design a decade counter using RS flip flops | 4 | 4 | 7M |
| | Draw and explain the operation of universal shift register. | 4 | 4 | 7M |
| OR | | | | |
| b | Draw the logic diagram of RS flip flop and explain its operation | 4 | 4 | 7M |
| | Design a 4 bit ring counter using D flip-flops and explain its operation with the help of bit pattern | 4 | 4 | 7M |

| Unit-V | | | | | |
|--------|---|--|---|----|----|
| a | Design a BCD to Excess-3 code converter and implement using suitable PLA. | 5 | 5 | 7M | |
| | Explain the merits & demerits of PROM | 5 | 5 | 7M | |
| OR | | | | | |
| 5 | b | Implement the following Boolean functions using a PAL that has four sections with three product terms each. $F1(A, B, C, D) = \sum (2, 12, 13)$ and $F2(A, B, C, D) = \sum (7, 8, 9, 10, 11, 12, 13, 14, 15)$ | 2 | 5 | 8M |
| | | Compare PROM, PLA and PAL | 2 | 5 | 6M |

Subject Code: R20EC2105

II B.Tech. - I Semester Regular Examinations, February-2022

LINEAR CONTROL SYSTEMS

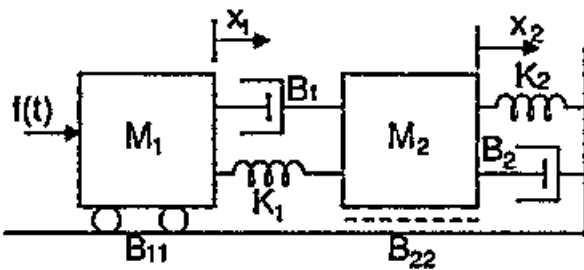
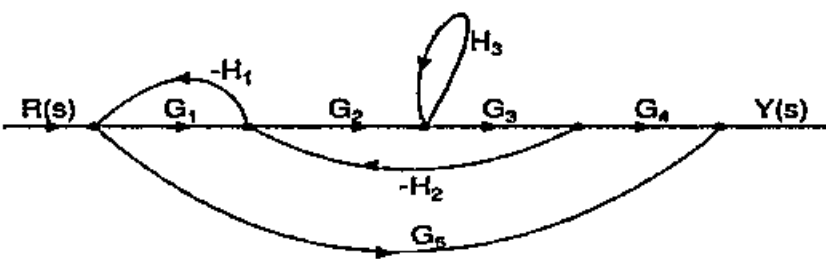
(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks | |
|--|--|---|----|----------------|----------------|
| Unit-I | | | | | |
| 1. | a) | Explain open loop and closed loop control system with example. | | | III 1 7M |
| | | Derive the transfer function for the mechanical system shown in Figure - 1. | | | III 1 7M |
|  <p style="text-align: center;">Figure - 1</p> | | | | | |
| OR | | | | | |
| b) | What do you mean by the sensitivity of the control system and discuss the effect of feedback on sensitivity? | | | III 1 7M | |
| | For the signal flow graph shown below Figure-2, determine the transfer function. | | | III 1 7M | |
|  | | | | | |
| Unit-II | | | | | |
| 2. | a) | Derive an expression for the step response of a critically damped second order system? | | | II 2 7M |
| | | The input to a closed loop system with open loop transfer function $G(S) = \frac{K(S+3)}{S}$ consists of a step function and a ramp function as, $r(t) = 2 u(t) + t$. Determine the value of K such that the steady state error for the system is $e_{ss} = 0.1$. Determine the static error coefficients also. | | | III 2 7M |
| OR | | | | | |
| b) | Draw the time response of second order system and represent the time domain specifications on it. | | | II 2 7M | |
| | Define the steady state error and error constants of different types of inputs. | | | I 2 7M | |

| Unit-III | | | | | |
|--|----|--|-----|----|----|
| 3. | a) | Test the stability of the system with the following characteristic equation by Routh's test $s^6 + 2s^5 + 8s^4 + 20s^2 + 16s + 16 = 0$. | III | 3 | 7M |
| | | How do you determine the angle of departure of root locus branch from an open loop pole, using angle criterion? | II | 3 | 7M |
| | OR | | | | |
| | b) | Consider a system with characteristic equation $a_0 10s^3 + a_1 s^2 + a_2 s + a_3 = 0$; given all coefficients are positive. Derive a sufficient condition for stability. | II | 3 | 7M |
| Draw the root locus. Find the range of values of K for which the system is stable. Find all the closed loop poles corresponding to a damping ratio of 0.7. | | III | 3 | 7M | |
| Unit-IV | | | | | |
| 4. | a) | With the help of suitable figure explain frequency domain specifications? | II | 4 | 7M |
| | | Draw the Nyquist plot for a given transfer function $G(s) = \frac{3}{S(1+5S)(1+2S)}$. | III | 4 | 7M |
| | OR | | | | |
| | b) | Derive the correlation between time domain and frequency domain specifications. | II | 5 | 7M |
| Draw the bode plot for the transfer function given by $\frac{5(S+2)}{S(S+10)}$. | | III | 5 | 7M | |
| Unit-V | | | | | |
| 5. | a) | Derive the expression for the transfer function of a lead compensator. | II | 5 | 7M |
| | | Explain the concepts of state, state variables and state model. | I | 5 | 7M |
| | OR | | | | |
| | b) | Derive the expression for the transfer function of lag compensator. | III | 5 | 7M |
| Determine the state model of the system characterized by the differential equation $(S^4 + 8s^3 + 2s^2 + 4s + 3) Y(s) = 10 U(s)$. | | III | 5 | 7M | |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks



Subject Code: R20CI2101

II B.Tech. - I Semester Regular Examinations, February-2022
COMPUTER ORGANIZATION
(CSE,IT)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | K1 | CO | Marks | |
|-----------------|--|---|-----|-------|-----|
| Unit-I | | | | | |
| 1 | a | Implement the binary adder-subtractor. | K2 | CO1 | 7M |
| | | Explain and analyse all arithmetic and shift micro operations? | K2 | CO1 | 7M |
| | OR | | | | |
| | b | Explain the working of arithmetic logic shift unit using addition operation. | K2 | CO1 | 7M |
| | Implement the binary adder. | K2 | CO1 | 7M | |
| Unit-II | | | | | |
| 2 | a | Explain the stored program concept. | K2 | CO2 | 7M |
| | | Explain the direct and indirect addressing of a computer. | K2 | CO2 | 7M |
| | OR | | | | |
| | b | Explain the flowchart of the instruction cycle. | K2 | CO2 | 14M |
| Unit-III | | | | | |
| 3 | a | Suppose a CPU is supporting one address and two address instruction only. Op-code size is 8 bit and each address size is 2 bits, find? Maximum number of two address instructions | K2 | CO3 | 7M |
| | | Maximum number of one address instructions | K2 | CO3 | 7M |
| | OR | | | | |
| | b | Explain microprogram sequencer for a control memory | K2 | CO3 | 7M |
| | Explain the microprogramming concept for the design of control unit. | K2 | CO3 | 7M | |
| Unit-IV | | | | | |
| 4 | a | Consider the following multiplier pattern and identify the number of arithmetic operations w.r.t Booths algorithms: 11111 01111 01110 1101 | K2 | CO4 | 7M |
| | | Discuss Booths multiplication algorithm with a suitable example. | K2 | CO4 | 7M |
| | OR | | | | |
| | b | A CPU has 32-bit memory address and 256 KB cache memory. The cache is organized as a 4-way set associative cache with cache clock size 16 bytes. What is the size (in bits) of the tag field per cache block? | K2 | CO4 | 7M |
| | Explain any two mapping techniques of cache memory | K2 | CO4 | 7M | |
| Unit-V | | | | | |
| 5 | a | Explain the mode of data transfer in between I/O devices and CPU. | K2 | CO6 | 7M |
| | | Explain the three methods in Direct memory access (DMA). | K2 | CO6 | 7M |
| | OR | | | | |
| | b | Explain the working of DMA controller. | K2 | CO6 | 7M |
| | Discuss in detail the functioning of interrupt priority. | K2 | CO6 | 7M | |

Subject Code: R20AI2101

II B.Tech. - I Semester Regular Examinations, February-2022

DATA SCIENCE

(AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

| QNo | Questions | KL | CO | Marks | |
|-----------------|--|--|--|-------|-----|
| Unit-I | | | | | |
| 1 | a | What is data science process and its significance? | K1 | CO1 | 7M |
| | | Why to use NumPy? What is ndarray in NumPy? Explain | K2 | CO1 | 7M |
| | OR | | | | |
| | b | What are the roles and responsibilities of a data scientist? | K1 | CO1 | 7M |
| | How indexing and slicing is done in NumPy? | K1 | CO1 | 7M | |
| Unit-II | | | | | |
| 2 | a | What are pandas in data science why they are required? | K3 | CO1 | 7M |
| | | Discuss about the different types of Data Structures in Pandas? | K3 | CO1 | 7M |
| | OR | | | | |
| | b | Explain in detail about the File Hierarchy in Pandas | K2 | CO1 | 14M |
| Unit-III | | | | | |
| 3 | a | i) What is data storage file format? | K3 | CO2 | 7M |
| | | II) What are the different storage formats? | | | |
| | | How do I connect HTML to web API? | K3 | CO2 | 7M |
| | OR | | | | |
| | b | What are some common data formats used in data science? | K3 | CO2 | 7M |
| | | What are the ways to read the different types of data files in python? | K3 | CO2 | 7M |
| Unit-IV | | | | | |
| 4 | a | What are data wrangling techniques? | K2 | CO3 | 7M |
| | | How do I remove duplicates from a list without changing the order? | | | |
| | OR | | | | |
| | | b | Difference between data wrangling vs cleaning? | K2 | CO3 |
| | | What are the techniques used for data reshaping? | K2 | CO3 | 7M |
| Unit-V | | | | | |
| 5 | a | What are common data aggregation techniques? | K3 | CO5 | 7M |
| | | What are GROUP BY and aggregate functions in the database? | | | |
| | OR | | | | |
| | | b | What is the GroupBy function and aggregation? | K3 | CO5 |
| | | How to group list of dictionaries in Python? | K3 | CO5 | 7M |

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks