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B.Tech I Year I Semester (R18) Supplementary Examinations February 2021

MATHEMATICS - I

(Common to ALL)

Time: 3 hours

Max. Marks: 60

PART-A**(Compulsory Questions)**

1. Answer the following; (5 X 2 = 10 Marks)

(a) If $A = \begin{bmatrix} 3 & a & b \\ -2 & 2 & 4 \\ 7 & 4 & 5 \end{bmatrix}$ is symmetric, then find a, b values? 2M

(b) Find the Rank of $A = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$. 2M

(c) If $\vec{f} = xy^2\vec{i} + 2x^2yz\vec{j} - 3yz^2\vec{k}$ find $\text{div. } \vec{f}$ at (1, -1, 1). 2M

(d) Define CURL of a Vector 2M

(e) Find Fourier coefficient b_n when $f(x) = e^x$ in $[-\pi, \pi]$. 2M

PART- B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I2. (a) Define the rank of the Matrix. 2M

(b) Show that the matrix $A = \begin{bmatrix} 1 & -2 & 2 \\ 1 & -2 & 3 \\ 0 & -1 & 2 \end{bmatrix}$ satisfies its characteristic equation. 8M

OR

3. Find the Eigen values and corresponding Eigen vectors of the matrix $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$. 10M

UNIT - II

4. (a) State and verify the Roller's theorem then $f(x) = \log\left[\frac{x^2 + ab}{x(a+b)}\right]$ in $[a, b]$. 5M

(b) Verify lagrange's mean value theorem for $f(x) = x^3 - x^2 - 5x + 3$ in $[0, 4]$. 5M

OR

5. (a) Prove that $\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$. 5M

(b) Prove that $\int_0^1 \frac{x}{\sqrt{1-x^5}} dx = \frac{1}{5} B\left(\frac{2}{5}, \frac{1}{2}\right)$. 5M

UNIT - III

6. (a) Find the stationary points of $u(x, y) = \sin x \cdot \sin y \cdot \sin(x + y)$ where $0 < x < \pi, 0 < y < \pi$ and find the maximum of u. 5M

(b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2; (x > 0, y > 0)$ 5M

OR

7. (a) Find the directional derivative of $f(x, y, z) = 2xy + z^2$ at $(1, -1, 3)$ in the direction of $\vec{i} + 2\vec{j} + 3\vec{k}$. 5M
- (b) Find the shortest and longest distance from the point $(3, 1, -1)$ to the sphere $x^2 + y^2 + z^2 = 4$. 5M

UNIT - IV

8. Show that the series $1 + r + r^2 + r^3 + \dots \infty$
 i) Converges if $|r| < 1$ ii) Diverges if $r \geq 1$ and iii) Oscillates if $r \leq -1$. 10M

OR

9. Test for convergence the series
 i) $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \dots \infty$ ii) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n} + \sqrt{n+1}}$. 10M

UNIT - V

10. (a) Find the half range sine series expansion of $f(x) = x^2$ when $0 < x < 4$. 5M
- (b) Find the half range cosine series expansion of $f(x) = (2 - x)$ in $0 \leq x \leq 2$. 5M

OR

11. Find the Fourier series to represent the function $f(x) = x^2$ for $-\pi < x < \pi$ and hence show that 10M

(i) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$ (ii) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}$
 (iii) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots = \frac{\pi^2}{8}$.

Code: 18HS0801

R18

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year I Semester (R18) Supplementary Examinations Feb/Mar 2021

Chemistry

(Common to ECE & CSE)

Time: 3 hours

Max. Marks: 60

PART-A

(Compulsory Questions)

1. Answer the following; (5 X 2 = 10 Marks)

- | | |
|--|----|
| (a) Write schrodinger wave equation. | 2M |
| (b) What is meant by Anodic inhibitors? | 2M |
| (c) Write the structure of EDTA. | 2M |
| (d) Define conducting polymers. | 2M |
| (e) What are the limitations of Beer-Lambert's law ? | 2M |

PART- B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

2. Explain the energy level diagrams of oxygen and fluorine with magnetic behavior. 10M

OR

3. Explain the following 10M

- (a) Pi - molecular orbitals of butadiene (b) Molecular geometries

UNIT - II

4. (a) Define Free energy. 5M

(b) Write a note on solubility product. 5M

OR

5. Explain various factors influencing the rate of corrosion ? 10M

UNIT - III

6. (a) What is Priming and Foaming? 5M

(b) Explain sludge and Scale formation in boilers ? 5M

OR

7. Describe the Ion exchange process for demineralization of water ?what are the advantages and disadvantages of ion exchange process ? 10M

UNIT - IV

8. Briefly outline the various methods of moulding process. 10M

OR

9. (a) Define addition and Elimination reactions. 5M

(b) Explain the addition and elimination reactions with examples. 5M

UNIT - V

10. Explain principle and instrumentation of UV-visible spectroscopy 10M

OR

11. Explain principle, instrumentation and its applications of Fluorescence spectroscopy 10M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year I Semester (R18) Supplementary Examinations Feb/March 2021

Thermal and Fluid Engineering

(EEE)

Time: 3 hours

Max. Marks: 60

PART-A

(Compulsory Questions)

1. Answer the following; (5 X 2 = 10 Marks)
- | | | |
|-----|---|----|
| (a) | Explain Hydroelectric power | 2M |
| (b) | Explain cyclic process | 2M |
| (c) | What are the Boiler accessories | 2M |
| (d) | What are the assumptions of Bernoulli's Equation? | 2M |
| (e) | What is meant by hydraulic gradient line? | 2M |

PART- B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

2. What the different type feed water treatments in thermal power plant and explain any one. 10M

OR

3. Explain the factor to be considered for selection of site for hydroelectric power plant. 10M

UNIT - II

4. What is meant by thermodynamics equilibrium? Explains its types briefly. 10M

OR

5. Derive the relation between c_p & c_v 10M

UNIT - III

6. Explain any one water tube Boiler with neat sketch 10M

OR

7. Explain the terms with neat sketch. 10M

(i) Economizer, (ii) Air preheater, (iii) Convective super heater

UNIT - IV

8. (a) Define the following fluid properties: Density, weight density, specific volume and specific gravity of a fluid. 5M

- (b) An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9 m × 0.9 m and an inclined plane having an angle of inclination 20°. The weight of the square plate is 392.4 N and it slides down the plane with a uniform velocity of 0.2 m/s. Find the dynamic viscosity of the oil. 5M

OR

9. (a) What is Euler's equation of motion? How will you obtain Bernoulli's equation from it? 5M

- (b) Explain how a U tube manometer is used to measure both positive and negative pressures 5M

UNIT - V

10. (a) Derive equation for loss of head due to sudden enlargement 5M

- (b) A horizontal pipe carries water at rate of 0.04m³/s. its diameter is 300mm reduced to 150mm. calculate the pressure loss across contraction. Take co-efficient of contraction as 0.62 5M

OR

11. (a) Explain the pipes in series and derive equation for total loss of head in pipe 5M

- (b) The rate of flow of water through a pipe of length 2000m and diameter 1m is 2m³/sec. at the end of the pipe a nozzle of outside diameter 300mm is fitted. Find the power transmitted through the nozzle. If the head of water at inlet of the pipe is 200m and coefficient of friction for pipe is 0.01. 5M

Time: 3 hours

Max. Marks: 60

(Answer All Five Units, 5 x 12 = 60 Marks)**UNIT - I**

1. The vertex of a hyperbola is 60 mm from its focus. Draw the curve, if the eccentricity is $3/2$. 12M
Draw a normal and a tangent at a point on the curve, 75 mm from the directrix.

OR

2. Draw the hypocycloid of a circle of 50mm diameter which rolls inside another circle of 100 mm diameter for one revolution. Draw tangent and normal at any point on the curve. 12M

UNIT - II

3. A line AB of 100mm length is inclined at an angle of 30 degree to HP and 45 degree to VP. 12M
The point A is 15mm above HP and 20mm in front of VP. Draw the projections of the line.

OR

4. Draw the projections of a straight line AB of 70 mm long, in the following positions: 12M
a) parallel to both HP and VP and 20 mm from each.
b) Parallel to and 20 mm above the HP and on VP
c) Parallel to and 30 mm in front of VP and on HP

UNIT - III

5. A cone of diameter 50 mm and axis 60 mm has its generator in the VP and the axis is parallel 12M
to the HP. Draw its projections.

OR

6. A square pyramid, base 40 mm side and axis 70 mm long, is freely suspended from one of the 12M
corners of its base. Draw its projections, when the axis as a vertical plane makes an angle of 45° with the VP.

UNIT - IV

7. A hexagonal prism of side of base 30 mm and length of axis 75 mm, is resting on its base on 12M
HP. It is cut by a section plane inclined 35 degree to HP and passing through top corner. Draw the front and sectional top views of the solid and true shape of the section.

OR

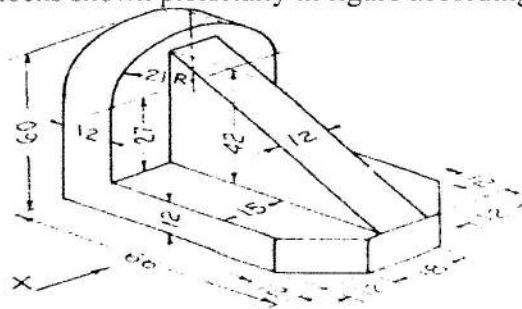
8. A cone of base 50 mm diameter and height 65 mm rests with its base on HP. A section plane 12M
perpendicular to VP and inclined at 30 degree to HP bisects the axis of the cone. Draw the development of the lateral surface of the truncated cone.

UNIT - V

9. Draw the isometric projection of a pentagonal prism of base side 35 mm and axis 60mm. The 12M
prism rests on its base on the HP with an edge of the base parallel to the VP.

OR

10. Draw three views of the blocks shown pictorially in figure according to first angle projection 12M



Code: 18HS0803

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B.Tech II Year I Semester (R18) Supplementary Examinations Feb /Mar 2021

Biology for Engineers

(CE, EEE & ME)

Time: 3 Hours

Max. Marks: 60

PART-A

(Compulsory Questions)

1. Answer the following; (5 X 2 = 10 Marks)

- | | |
|---|----|
| (a) Define taxonomy. | 2M |
| (b) What is gene mapping? | 2M |
| (c) List the two types of lipids and their functions? | 2M |
| (d) Distinguish between DNA and RNA. | 2M |
| (e) What is sterilization? | 2M |

PART- B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

2. What are Model organisms? Give brief notes and any three model organisms 10M

OR

3. Write the differences between Plant cell and Animal cell. 10M

UNIT - II

4. (a) Describe Complementary Gene Interaction. 5M

(b) Give an account on Duplicate Gene Interaction. 5M

OR

5. Give an account on Down's syndrome. 10M

UNIT - III

6. (a) RNA catalysis. 5M

(b) Kinetic parameters related too biology. 5M

OR

7. Explain about mechanism in Enzymes. 10M

UNIT - IV

8. Explain the functions & structure of Proteins in detail. 10M

OR

9. (a) Explain coding and decoding genetic information transfer. 5M

(b) R-DNA duplication. 5M

UNIT - V

10. (a) Explain ATP as energy currency 5M

(b) Describe Photosynthesis in detail. 5M

OR

11. Give an account on energy yielding and energy consuming reactions. 10M

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B.Tech II Year I Semester (R18) Supplementary Examinations Feb / Mar 2021

Data Structures & Algorithms

(ECE)

Time: 3 hours

Max.Marks: 60

PART-A**(Compulsory Questions)**

1. Answer the following: (5 X 2 = 10 Marks)
- | | | |
|-----|--|----|
| (a) | Define data structure. Mention any two applications of data structures | 2M |
| (b) | Write the postfix and prefix notations for the following expression: $A/B * C - D * E + F / G$ | 2M |
| (c) | State the properties of a Binary Tree | 2M |
| (d) | What is binary Searching? | 2M |
| (e) | What is difference between quick sort and heap sort? | 2M |

PART- B**(Answer all five units, 5 x 10 =50 Marks)****UNIT - I**

- | | | |
|----|---|----|
| 2. | (a) What is array? Explain different types of arrays. | 5M |
| | (b) Explain about array operations | 5M |

OR

- | | | |
|----|----------------------------------|-----|
| 3. | Explain about single linked list | 10M |
|----|----------------------------------|-----|

UNIT - II

- | | | |
|----|--|-----|
| 4. | Explain how queues can be implemented using arrays | 10M |
|----|--|-----|

OR

- | | | |
|----|---|-----|
| 5. | Write a program to perform basic operations on stack. | 10M |
|----|---|-----|

UNIT - III

- | | | |
|----|--|-----|
| 6. | Define Binary Tree. Explain node structure and Representation of binary Tree | 10M |
|----|--|-----|

OR

- | | | |
|----|---|-----|
| 7. | Construct a binary search tree from the given values. Consider the first value as the root value. Values: 45, 23, 29, 85, 92, 7, 11, 35, 49, 51 | 10M |
|----|---|-----|

UNIT - IV

- | | | |
|----|---|-----|
| 8. | Explain the two graph traversals techniques | 10M |
|----|---|-----|

OR

- | | | |
|----|---|-----|
| 9. | What is collision? List various collision resolution techniques. Explain any two collision resolution techniques. | 10M |
|----|---|-----|

UNIT - V

- | | | |
|-----|---|-----|
| 10. | What is meant by sorting? Write an algorithm for insertion sort and illustrate with an example. | 10M |
|-----|---|-----|

OR

- | | | |
|-----|--|-----|
| 11. | Define Quick sort and explain it with Example. | 10M |
|-----|--|-----|

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B.Tech II Year I Semester (R18) Supplementary Examinations Feb / Mar 2021
MATHEMATICS-III
 (ECE)

Time: 3 Hours

Max. Marks: 60

PART - A**(Compulsory Questions)**

Answer the following: (5 X 2 = 10 Marks)

1. (a) Write the formula to find the root of an equation by Regula - Falsi method. 2M
- (b) Use Euler's method to find $y'(0.1)$ given $y' = (x^2 + xy^2)e^{-x}$, $y(0) = 1$. 2M
- (c) State Convolution theorem. 2M
- (d) Define Fourier sine and cosine transforms. 2M
- (e) Solve $xp + yq = 3z$. 2M

PART - B**(Answer all five units, 5 x 10 = 50 Marks)****UNIT - I**

2. Find a positive root of $x^3 - x - 1 = 0$ correct to two decimal places by Bisection method. 10M

OR

3. (a) Use Newton's Backward interpolation formula to find $f(32)$ given $f(25) = 0.2707$, $f(30) = 0.3027$, $f(35) = 0.3386$, $f(40) = 0.3794$. 5M

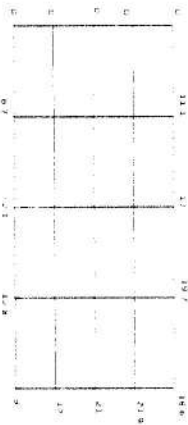
- (b) Compute $\int_1^2 x^2 \log x dx$ by Simpson's $\frac{1}{3}$ rule by taking 10 sub divisions. 5M

UNIT - II

4. Using Runge - Kutta method of 4th order, find $y(0.1)$, $y(0.2)$ and $y(0.3)$ given that $\frac{dy}{dx} = 1 + xy$, $y(0) = 2$. 10M

OR

5. Solve the Laplace Equation $u_{xx} + u_{yy} = 0$ given that. 10M

**UNIT - III**

6. (a) Find the Laplace transform of $f(t) = \frac{1 - \cos at}{t}$. 5M
- (b) Find the Laplace transform of $f(t) = te^{2t} \sin 3t$. 5M

OR

7. Using Laplace transform method to solve $y'' - 3y' + 2y = 4t + e^{2t}$ where $y(0) = 1$, $y'(0) = 1$. 10M

UNIT - IV

8. (a) Prove that $F[x^r f(x)] = (-1)^r \frac{d^r}{dp^r} [F(p)]$. 5M

- (b) Prove that $F[x f(x)] = -\frac{d}{dp} [F(p)]$. 5M

OR

9. Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}$, $a > 0$ and hence deduce the integrals (i) $\int_0^{\infty} \frac{p \sin px}{a^2 + p^2} dp$ (ii) $\int_0^{\infty} \frac{\cos px}{a^2 + p^2} dp$ 10M

UNIT - V

10. (a) Solve $(x^2 - y^2 - z^2)p + 2xyq = 2xz$. 5M
- (b) Solve $r - 4s + 4t = e^{2x}$. 5M

OR

11. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. It is set vibrating by giving each point a velocity $kx(l - x)$. Find the displacement of the string at any distance x from one end at any time t . 10M

Code:18EE0202

SIDDHARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY, PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester (R18) Supplementary Examinations Feb/Mar 2021
ELECTRICAL CIRCUITS II

(EEE)

Time: 3 hours

Max.Marks: 60

PART-A

(Compulsory Questions)

Answer the following: (5 X 2 = 10 Marks)

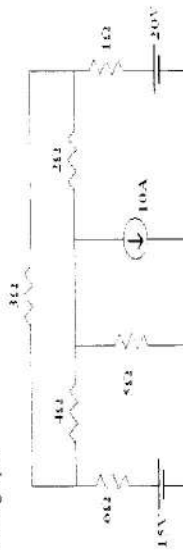
- What are the different methods are used to solve the unbalanced systems?
- What is the transient response of RL series circuit with dc excitation?
- Define directed graph
- What is the condition for symmetry in Z and Y parameters?
- What is the laplace transform of unit step signal

PART-B

(Answer all five units, 5 x 10 =50 Marks)

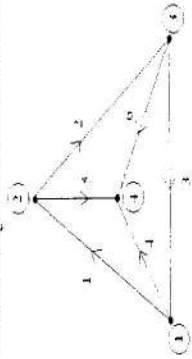
UNIT - I

- Derive the relationship between Phase and Line voltages, currents in delta connected load. 10M
- OR
A three phase balance delta connected load of $(4+j8)\Omega$ is connected across a 400V, 3 ϕ balanced supply. Determine the phase currents and line currents. And also power drawn by the load. Assume RYB phase sequence. 5M
- OR
Derive the transient response of an RLC circuit with AC excitation. 10M
- OR
A series RL circuit with $R=30\Omega$ and $L=15H$ has a constant voltage $V=60V$ applied at $t=0$. Determine the current I , the voltage across the resistor and across the inductor. 10M
- For the network shown in figure given below, find the tie set matrix by constructing network graph. 10M



OR

- In the network graph shown in figure, determine cut set matrix and write the relation between node voltages and branch voltages. Choose 4, 5 & 6 are twigs. 10M



UNIT - IV

Derive the expressions for Z-parameters in terms of ABCD parameters.

OR

Derive the expressions for h-parameters of a two port network?

UNIT - V

The unit impulse response of a circuit is

$$v_o(t) = 10,000e^{-70t} \cos(240t + \theta) u(t) \text{ V Where } \tan\theta = \frac{7}{34}$$

(A) Find the transfer function of the circuit. (B) Find the unit step response of the circuit.

OR

Using the initial value theorem, find the initial value of the signal corresponding to the

$$\text{Laplace transform. } Y(S) = \frac{5+1}{s(5s+2)}$$

- 10M
- 10M
- 10M
- 10M

Time: 5 hours

Max.Marks: 60

PART-A

(Compulsory Questions)

Answer the following: (5 X 2 = 10 Marks)

- State Bayes theorem.
- A fair coin is tossed six times. Find the Probability of getting four heads
- Write the formulas for correlation, rank correlation
- Define null hypothesis. Alternative hypothesis.
- Write the formula for Student's t-test for difference of means

PART-B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

- In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. (a) What is the probability that mathematics is being studied? (b) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? (c) a boy

OR

- Two dice are thrown. Let X assign to each point (a,b) in S the maximum of its numbers i.e. $X(a,b) = \max(a,b)$. Find the probability distribution. X is a random variable with $X(s) = \{1, 2, 3, 4, 5, 6\}$. Also find the mean and variance of the distribution.

UNIT - II

- Derive mean and variance of Binomial distribution.
- 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) one is defective (ii) $P(1 < X < 4)$

OR

- Derive mean and variance of Normal distribution.

UNIT - III

- (a) Find the median to the following data

Class intervals	40-50	50-60	60-70	70-80	80-90
frequency	5	12	23	8	2

- (b) Find arithmetic mean to the following data

X	1	2	3	4	5
F	5	8	10	12	6

OR

- (a) Find arithmetic mean to the following data using step deviation method

Marks	10-20	20-30	30-40	40-50	50-60
frequency	5	8	25	22	10

- (b) Find the median to the following data

X	5	8	11	14	17	20	23
F	2	8	12	20	10	6	3

UNIT - IV

- (a) A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased? (5M)
- In two large populations, there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations. (5M)

OR

- (a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. (5M)
- The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches. (5M)

UNIT - V

- The nicotine in milligrams of two samples of tobacco were found to be as follows. (10M)

Sample A	24	27	26	23	25	---
Sample B	29	30	30	31	24	36

Can it be said that the two samples have come from the same normal population.

OR

- A random sample of 10 boys had the following I.Q.'s : 70,120,110,101,88,83,95,98,107 and 100 (10M)
- Do these data support the assumption of a population mean I.Q of 100? (10M)
- Find a reasonable range in which most of the mean I.Q values of samples of 10 boys lie.

Code: 18EC0401

SIDDHARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B. Tech II Year I Semester (R18) Supplementary Examinations Feb/Mar 2021
ELECTRONIC DEVICES
(ECE)

R18

10 (a) Draw the circuit diagram of n-channel JFET CD amplifier with external load RL and derive the expressions for voltage gain AV. 5M

(b) Explain the concept of n-channel JFET with Drain characteristics. 5M

OR

11 Explain IC fabrication steps of CMOS process with neat diagrams. 10M

Time: 3 hours

Max.Marks: 60

PART-A

(Compulsory Questions)

Answer the following: (5 X 2 = 10 Marks)

1. (a) Define static and dynamic resistance of P-N diode. 2M
- (b) Define ripple factor. 2M
- (c) What do you mean by early effect? 2M
- (d) Draw the approximate h-parameter model diagram for CE amplifier. 2M
- (e) Why we call FET as a Voltage Controlled Device. 2M

PART-B

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

2. Explain P-N junction diode formation and Derive an expression for Transition and Diffusion capacitance of a diode. 10M

OR

3. (a) Explain the concept of positive clipper and negative clamper. 5M
- (b) The leakage current through Germanium diode is $I_0 = 25 \mu\text{A}$, if the forward bias of $V_f = 0.2 \text{ V}$. Calculate the static resistance. 5M

UNIT - II

4. For a full wave rectifier with shunt capacitance filter derive expression for ripple factor and Calculate the value of capacitance to use in a capacitor filter connected to a full wave rectifier operating at a standard aircraft power frequency of 400 Hz, if the ripple factor is 10% for a load of 500 Ω . 10M

OR

5. Define the breakdown mechanisms of Zener diode and Explain the concept of Zener diode act as voltage regulator. 10M

UNIT - III

6. (a) Explain the operation of CC Configuration of BJT and its input and output characteristics briefly. 7M
- (b) The emitter current I_E in a transistor is 3mA. If the leakage current ICBO is $5 \mu\text{A}$ and $\alpha = 0.98$, calculate the collector and base current. 3M

OR

7. (a) Define Stability factor and Derive the stability factor for Self biasing method. 7M
- (b) What are the advantages of Self bias over other biasing techniques? 3M

UNIT - IV

8. Compare CE, CC and CB amplifiers in terms of voltage gain, current gain, input and output impedances. 10M

OR

9. (a) Derive the expressions for A_v , A_{v_s} , R_i , R_o for common emitter amplifier with unbypassed R_E . 5M
- (b) For CE amplifier circuit $R_S = 1 \text{ K}\Omega$, $R_1 = 50 \text{ K}\Omega$, $R_2 = 2 \text{ K}\Omega$, $R_C = 1 \text{ K}\Omega$, $R_L = 1.2 \text{ K}\Omega$. Construct small signal equivalent model and Calculate A_v , A_{v_s} , R_i and R_o . 5M

UNIT - V

Electromagnetic Field
(EEE)

Time: 3 hours

Max. Marks: 60

PART-A**(Compulsory Questions)**

1. Answer the following: (5 X 2 = 10 Marks)
- | | | |
|-----|--|----|
| (a) | What is the relation between electric flux density and electric field intensity? | 2M |
| (b) | State gauss's law, write its applications and limitations? | 2M |
| (c) | Define Dielectric Strength? | 2M |
| (d) | State Ampere's circuital law? | 2M |
| (e) | Define pointing vector? | 2M |

PART- B**(Answer all five units, 5 x 10 =50 Marks)****UNIT - I**

2. A circle, centred at the origin with radius of 2 units, lies in the xy plane. Determine the unit vector in rectangular components that lies in the xy plane, is tangent to the circle at $(\sqrt{3}, 1, 0)$, and is in the general direction of increasing values of y. 10M

OR

3. Express in cylindrical components: (a) the vector from C(3,2,-7) to D(-1,-4,2); (b) a unit vector at D directed toward C; (c) a unit vector at D directed toward the origin. 10M

UNIT - II

4. Four positive point charges 10-12 coulomb each are situated in X-Y plane at points (0, 0), (0, 1) (1, 1) and (1, 0) m. Find the electric field and potential at $(3/4, 3/4)$ and (1, 1)? 10M

OR

5. Four point charges each of $10\mu\text{C}$ are placed in free space at the points (1, 0, 0), (-1, 0, 0), (0, 1,0) and (0, -1, 0) m respectively. Determine the force on a point charge of $30\mu\text{C}$ located at a point (0, 0, 1) m? 10M

UNIT - III

6. Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field? 10M

OR

7. At the boundary between glass $\epsilon_r=4$ and air, the lines of electric field make an angle of 40° with normal to the boundary. If electric flux density in the air is $0.25\mu\text{C}/\text{m}^2$. Determine the orientation and magnitude of electric flux density in the glass? 10M

UNIT - IV

8. a) State and explain ampere's circuital law? 5M
b) Derive the expression for the force between two current carrying wires? 5M

OR

9. a) Explain relationship between magnetic torque and moment? 5M
b) Derive an expression for the force between two current carrying wires? 5M

UNIT - V

10. Explain faradays law of electromagnetic induction and there from derive maxwell's equation in differential and integral form? 10M

OR

11. What is displacement current? Explain physical significance of displacement current? 10M

Introduction to Solid Mechanics
(CIVIL)

Time: 3 hours

Max. Marks: 60

PART-A**(Compulsory Questions)**

1. Answer the following; (5 X 2 = 10 Marks)
- | | | |
|-----|---|----|
| (a) | What is thermal Stress? | 2M |
| (b) | Mention the types of supports. | 2M |
| (c) | What is meant by Neutral axis of the beam? | 2M |
| (d) | What are the assumptions made in torsion equation? | 2M |
| (e) | What is the relation between slope, deflection and radius of curvature of a beam? | 2M |

PART- B**(Answer all five units, 5 x 10 =50 Marks)****UNIT - I**

2. A steel bar 50 mm wide, 12 mm thick and 300 mm long is subjected to an axial pull of 84 kN. Find the changes in the length, width, thickness and the volume of the bar. 10M

OR

3. The modulus of rigidity for a material is $0.51 \times 10^8 \text{ N/mm}^2$. A 10 mm diameter rod of a material was subjected to an axial pull of 10 kN and the changes in diameter was observed to be $3 \times 10^{-3} \text{ mm}$. Calculate Poisson's ratio, E and K. 10M

UNIT - II

4. Draw shear force and bending moment diagram for simply supported beam subjected to Eccentric point load. 10M

OR

5. Derive the bending equation $M/I = f/y = E/R$, write all the assumptions made 10M

UNIT - III

6. A solid shaft of 200 mm diameter has the same cross sectional area as that of a hollow shaft of the same material with inside diameter of 150 mm. Find the ratio of the power transmitted by the hollow shaft by the same speed. 10M

OR

7. Prove that the maximum shear stress in a circular section of a beam is $4/3$ times the average shear stress 10M

UNIT - IV

8. Derive the expression for slope and deflection of a simply supported beam carrying a point load at Centre using Moment area method 10M

OR

9. Derive the expression for slope and deflection of a cantilever beam carrying a point load at the free end by Moment Area method. 10M

UNIT - V

10. Compare the Euler crippling loads of two columns-one of solid circular section and the second of hollow circular section of internal diameter 70% of the external diameter if they are of the same material, same length, same area, and same end conditions. 10M

OR

11. Derive an Euler's load expression for the column with one end fixed and the other end hinged. 10M

Computer Organization & Architecture
(CSE)

Time: 3 hours

Max. Marks: 60

PART-A**(Compulsory Questions)**

1. Answer the following; (5 X 2 = 10 Marks)
- | | |
|---|----|
| (a) Discuss the usage of MAR and MDR in computer organization | 2M |
| (b) What is Ripple carry Adder? | 2M |
| (c) What is a Control function? | 2M |
| (d) What is meant by virtual memory? | 2M |
| (e) Explain about multiprocessor. | 2M |

PART- B**(Answer all five units, 5 x 10 =50 Marks)****UNIT - I**

2. Explain about Instruction set architecture of a CPU with neat diagram? 10M

OR

3. Write in detail about Addressing Modes and its types? 10M

UNIT - II

4. Draw the H/W Flowchart and write H/W Algorithm for Booth Multiplication for signed numbers with a suitable example? 10M

OR

5. Explain in detail about Floating point numbers, its operations and implementing it. 10M

UNIT - III

6. Explain about the applications of Logic Micro Operations? 10M

OR

7. Explain about Address Sequencing with neat diagram? 10M

UNIT - IV

8. What is DMA? Draw the block diagram for DMA controller and explain about DMA transfer in a computer 10M

OR

9. Explain about Cache Memory mapping functions with Page Replacement Algorithms. 10M

UNIT - V

10. Explain about throughput and speed up of pipelining? 10M

OR

11. a) Write about multistage network with neat sketch? 5M
b) Write about hyper cube network with neat sketch? 5M

Code: 18EC0403

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester (R18) Supplementary Examinations Feb/Mar 2021
SIGNALS & SYSTEMS
(ECE)

R18

Time: 3 hours

Max Marks: 60

PART-A

(Compulsory Questions)

1. Answer the following: (5 X 2 = 10 Marks)

- (a) Define & Draw the unit step function 2M
- (b) State Parseval's Theorem? 2M
- (c) What is band pass filter? 2M
- (d) What are the properties of Convolution? 2M
- (e) Write the of Laplace transform of $x(t) = e^{j2t} u(t)$? 2M

PART-B

(Answer all five units, 5 x 10 = 50 Marks)

UNIT - I

2. Check whether the systems are time invariant or not:

- a) $y(t) = x(-4t)$
- b) $y(t) = e^{-2}x(t)$
- c) $y(n) = x(n) + nx(n - 3)$
- d) $y(n) = x^2(n - 2)$
- e) $y(n) = \sin[x(n)]$

OR

3. Define various elementary signals of CT and DT signals. Indicate them graphically 10M

UNIT - II

4. (a) Find the Fourier transform of the signal $x(t) = e^{-at} \sin(t)$ 5M

(b) Compute the Fourier transform of the signal $x(t) = \begin{cases} 1 + \cos \pi t & |t| < 1 \\ 0 & |t| > 1 \end{cases}$ 5M

OR

5. What is meant by Fourier Series? Explain the conditions under which any periodic waveform can be expressed using Fourier series. 10M

UNIT - III

6. Explain the transfer function of LTI systems and explain the filter characteristics of linear system 10M

OR

7. (a) A system produces an output $y(t) = e^{-t} u(t)$ for an input of $x(t) = e^{-2t} u(t)$. Determine the impulse response and frequency response of the system. 5M

(b) A system produces an output $y(t) = e^{-2t} u(t)$ for an input of $x(t) = e^{-t} u(t)$. Determine the impulse response and frequency response of the system. 5M

UNIT - IV

8. Explain the cross correlation and their properties in energy signals and power signals 10M

OR

9. (a) List the graphical procedure to perform convolution 10M

UNIT - V

10. (a) What is meant by ROC? List the properties of ROC in Z transform 5M

(b) List the Advantages and limitation of Z transform. 5M

OR

11. (a) Find the inverse Laplace transform of the following 5M

(b) $X(s) = \frac{s^2 + 6s + 7}{s^2 + 3s + 2}$; $\text{Re}(s) > -1$

$X(s) = \frac{s^3 + 2s^2 + 6}{s^2 + 3s}$; $\text{Re}(s) > 0$ 5M

Code: 18CE0151

SIDDHARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY, PUTTUR

R18

(AUTONOMOUS)
B.Tech II Year I Semester (R18) Supplementary Examinations Feb/Mar 2021

Strength of Materials
(Mechanical Engineering)

Time: 3 hours

Max.Marks: 60

PART - A

(Compulsory Questions)

Answer the following: (5 X 2 = 10 Marks)

- (a) State Hook's law 2M
(b) Define shear force and bending moment 2M
(c) Write the assumption in the theory of simple bending. 2M
(d) What are the methods for finding out the slope and deflection at a section? 2M
(e) What is meant by Wire winding of thin cylinder 2M

PART - B

(Answer all five units, 5 x 10 = 50 Marks)

UNIT - I

- (a) Explain briefly about the stress strain diagram for mild steel. 5M
(b) A wooden tie is 60 mm wide, 120 mm deep and 1.5 m long. It is subjected to an axial pull of 30 kN. The stretch of member is found to be 0.0625 mm. Find the modulus of elasticity for the material. 5M

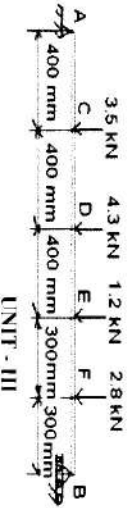
OR

- (a) Establish the relationship between the modulus of elasticity and modulus of rigidity. 5M
(b) A bar of 25mm diameter is subjected to a pull of 50 kN. The measured extension on gauge length of 200 mm is 0.1mm and change in diameter is 0.004 mm. calculate:
(i) Young's modulus 5M
(ii) Poisson's Ratio and (iii) bulk modulus 5M
- (a) Sketch the different types of beams, types of supports and types of loads indicating their names. 5M
(b) A cantilever of length 3 m carries a uniformly distributed load of 1.5 kN/m run over a length of 2 m from the free end. 5M

UNIT - II

- (a) Explain the different types of load acting on beam 5M
(b) Draw the shearing force and bending moment diagrams for the beam shown in figure. 5M

OR



UNIT - III

- (a) A timber beam of rectangular section is to support a load of 25kN uniformly distributed over a span of 4 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 8 N/mm², find the dimensions of the cross section. 10M

OR

- (a) Derive the formula for shear stress at a section. 10M

UNIT - IV

- (a) A cantilever of length 4 m carries a uniformly distributed load 3 kN/m over a length of 1.5 m from the free end and a point load of 2.5 kN at the free end. Find the slope and deflection at the free end if $E = 2.1 \times 10^5 \text{ N/mm}^2$ and $I = 6.667 \times 10^7 \text{ mm}^4$. 10M

OR

- (a) Explain the terms 'torsional rigidity' and 'Polar modulus'. 5M
(b) Find the Maximum shear stress induced in a solid circular shaft of diameter 150 mm when the shaft transmits 150 kW power at 180 rpm. 5M

UNIT - V

- (a) Differentiate between a thin cylinder and thick cylinder 5M
(b) A cylindrical pipe of diameter 1.5 m and thickness 15 mm is subjected to an internal fluid pressure of 1.2 N/mm². Determine the longitudinal stress developed in the pipe, and circumferential stress developed in the pipe. 5M

OR

- Derive an expression for the radial and hoop stresses (Lamé's equation) for a thick cylinder. 10M

Code: 18CF0114

SIDDHARTH INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

3. Tech. II Year I Semester (R18) Regular Examinations Feb-Mar 2021
HYDRAULIC ENGINEERING
(CIVIL ENGINEERING)

Time: 3 hours

Max. Marks: 60

PART - A

(Compulsory Questions)

Answer the following. (5 X 2 = 10 Marks)

- Define specific energy
- Write any four characteristics of surface profiles
- State the angular momentum principle
- What is cavitation in case of turbines
- Give any two uses of dimensional analysis.

PART - B

(Answer all five units, 5 x 10 = 50 Marks)

UNIT - I

- Prove that for a channel of circular section, the depth of flow $d=0.81D$ for maximum velocity. 10M

OR

- Determine the expression for the most economical trapezoidal section in terms of side slope. 5M

- Find the discharge through a circular pipe of diameter 3 m, if the depth of water in the pipe is 1m and the pipe is laid at the slope of 1 in 1000. Take $C=70$ 5M

UNIT - II

- Derive the Dynamic equation of gradually varied flow. State all the assumptions made in 10M

OR

- What is hydraulic jump and derive the expression for depth of hydraulic jump. 5M

- A hydraulic jump forms at the downstream end of spillway carrying $17.93 \text{ m}^3/\text{s}$ discharge. If depth before jump is 0.80 m, determine the depth after the jump and energy loss. 5M

UNIT - III

- Derive the condition for force on the inclined plate moving in the direction of the jet 5M

- A jet of water of diameter 50mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30° . The force exerted in the direction of jet is 1417.5N. Determine the rate of flow of water. 5M

OR

- A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45 degrees to the axis of the jet. Calculate the normal pressure on the plate. 10M

- When the plate is stationary and
(ii) When the plate is moving with a velocity of 15 m/s and away from the jet. Also determine the power and efficiency of the jet when the plate is moving.

UNIT - IV

- The three-jet Pelton turbine is required to generate 1000 kW under a net head of 400 m. The blade angle at outlet is 15 degrees and the reduction in the relative velocity while passing over the blade is 5%. If the overall efficiency of the wheel is 80%, $C_v=0.98$ and speed ratio $=0.46$, then find (i) The diameter of jet (ii) Total flow in m^3/sec and the force exerted by a jet on the buckets. 10M

OR

- (a) Define the term unit power, unit speed and unit discharge with reference to a hydraulic turbine. 5M

- (b) What is specific speed? derive the equation for specific speed. 5M

UNIT - V

- What is centrifugal pump? Explain the parts of centrifugal pump with neat sketch. 5M

- (b) Define and explain Reynolds number, Froude number and Mach number. 5M

OR

- A centrifugal pump discharges $0.15 \text{ m}^3/\text{sec}$ of water against a head of 12.5 m, the speed of impeller being 600 r.p.m. The outer and inner diameter of impeller are 500 mm and 250 mm respectively and the vanes are bent back at 35° to the tangent at exist. If the area of flow remains 0.07 m^2 from inlet to outlet, calculate (i) Manometric efficiency of pump (ii) Vane angle at inlet (iii) Loss of head at inlet to impeller when the discharge is reduced by 40% without changing the speed. 10M