

R19

II B.TECH II SEM

SUPPLEMENTARY EXAMINATIONS

APRIL 2024

Subject Code: **19BCC4TH01** Title: **COMPLEX VARIABLES, PROBABILITY AND STATISTICS**

Max.Marks:60.

Time: 3 Hours

Program: B.Tech.

Branch:CE,EEE

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) If $f(z)=u+iv$ is an analytic function of $z=x+iy$ and $u+v=(x+y)(2-4xy+x^2+y^2)$, **Construct** u, v and the analytic function $f(z)$.
- II) **Prove** that the function $f(z)=\begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & \text{if } z \neq 0 \\ 0 & \text{if } z=0 \end{cases}$ satisfies the Cauchy-Riemann equations at the origin but $f'(0)$ does not exist.

OR

- B) I) **Construct** the conjugate harmonic of $v(r, \theta)=r^2 \cos 2\theta - r \cos \theta + 2$. Show that v is harmonic.
- II) Given the function $w=z^3$ where $w=u(x, y)+iv(x, y)$. Show that u and v satisfy the Cauchy-Riemann equations. **Prove** that the families of curves $u=c_1$ and $v=c_2$ are orthogonal to each other. Where c_1 and c_2 are constants

2. A) I) **Evaluate** $\int_C \frac{(2z+1)^2}{4z^3+z} dz$ where C is the circle $|z|=1$ using residue theorem.

II) **Prove** that $\int_0^\infty \frac{1}{x^6+1} dx = \frac{\pi}{3}$

OR

- B) I) **Determine** the Laurent's series expansion of the function $\frac{z^2-1}{(z+2)(z+3)}$ valid in the annular region $2<|z|<3$.

II) **Evaluate** $\int_C \frac{e^z}{(z+2)(z+1)^2} dz$ where C is $|z|=3$

3. A) I) A hospital is known for coronary artery bypass grafting. Let X be the number of such surgeries done on a given day. The following table gives the probability distribution of the random variable X :

$X=x$	0	1	2	3	4	5
$p(x)$	0.02	0.05	0.10	0.15	0.18	0.50

Determine

- (i) $P(X \leq 2)$ (ii) $P(2 < X < 5)$ (iii) $P(X \geq 2)$ (iv) $P(1 \leq X \leq 4)$

II) Let X be an exponential random variable with parameter λ . **Determine** mean and variance of X .

OR

- i) B) I) **A** and **B** play 12 games of chess of which 6 are won by **A**, 4 are won by **B**, and 2 end in a draw. They agree to play a tournament consisting of 3 games.

Determine the probability that

- (a) **A** wins all the three games,
(b) Two games end in a draw
(c) **A** and **B** win alternately

- i) II) A manufacturing firm employs three analytical plans for the design and development of a particular product. For cost reasons, all three are used at varying times. In fact, plans 1, 2, and 3 are used for 30%, 20% and 50% of the products, respectively. The defect rate is different for the three procedures as follows:

$$P(D/P_1)=0.01, P(D/P_2)=0.03, P(D/P_3)=0.02$$

Where $P(D/P_j)$ is the probability of a defective product, given plan j . If a random product was observed and found to be defective, which plan was most likely used and thus responsible?

4. A) I) Suppose that X is a random variable with mean μ and variance σ^2 . Let $X_1, X_2, X_3, \dots, X_n$ be a random sample of size n from the population represented by X . **Prove** that the sample mean \bar{x} and sample variance S^2 are unbiased estimators of μ and σ^2 respectively. Also find the standard error of the sample mean.

II) X_1, X_2 , and X_3 is a random sample of size 3 from a population with mean value μ and variance σ^2 , T_1, T_2, T_3 are the estimators used to estimate mean value μ , where $T_1 = X_1 + X_2 - X_3, T_2 = 2X_1 + 3X_3 - 4X_2$, and $T_3 = (\lambda X_1 + X_2 + X_3)/3$

- (i) Are T_1 and T_2 unbiased estimators?
(ii) **Determine** the value of λ such that T_3 is unbiased estimator for μ .
(iii) With this value of λ is T_3 a consistent estimator?
(iv) Which is the best estimator?

OR

- B) I) A manufacturing engineer decided to check the efficiency of a new technician hired by the company. She records the time taken by the technician to complete 100 randomly selected jobs and found that in this sample of 100, the average time taken per job was 10 hours with a standard deviation of two hours. **Determine** a 95% confidence interval for μ , the average time taken by a technician to complete one job.
- II) Discuss the terms (i) estimate, (ii) consistent estimate, (iii) unbiased estimate, of a parameter. **Prove** that sample mean is both consistent and unbiased estimate of the population mean.
5. A) I) Write the procedure for testing of Hypothesis.
- II) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data include an unbiased die?.
- OR
- B) I) The mean weight obtained from a random sample of size 100 is 64 gms. The S.D of the weight distribution of the population is 3 gms. Test the statement that the mean weight of the population is 67 gms at 5% level of significance. Also set up 99% confidence limits of the mean weight of the population.
- II) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

$x:$	0	1	2	3	4
$f:$	419	352	154	56	19

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22/4/24

Subject Code: **19BCE4TH04**

II.B.TECH -II Semester Supple Examinations, April-2024

FLUID MECHANICS AND HYDRAULIC MACHINERY

Time: 3 Hours

Max.Marks:60.

Branch:CE

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) Explain the phenomenon of surface tension on the top surface of liquids. What are the examples of surface tension. [06]
- II) An inverted differential manometer is connected to two pipes A and B which convey water. The centreline of pipe B is 50 cm below the centreline of pipe A. Pipe B is to the right side of pipe A. The oil level in the left limb is 40 cm above the centreline of pipe A and that in the right limb is 60 cm above the centreline of pipe B. The fluid in the manometer is oil of specific gravity 0.85. Find the pressure difference between A and B. [06]
- OR
- B) I) In a stream of glycerine in motion, at a certain point the velocity gradient is 0.25 m/s/m. The mass density of the fluid is 1300 kg/m³ and kinematic viscosity is 6.0 X 10⁻⁴ m²/s. Calculate the shear stress at the point. [05]
- II) Describe the differential manometer with neat sketch. [07]
2. A) I) Explain (i) Irrotational Flow (ii) Streak line. [04]
- II) A trapezoidal channel 2 m wide at the bottom and 1 m deep has side slopes of 1:1. Determine the total pressure on the channel. [03]
- III) Explain how the boundary layer separation takes place when the fluid moves over a curved surface. [05]
- OR
- B) I) Derive the continuity equation for a three-dimensional flow in cartesian coordinates. [06]
- II) In a two-dimensional incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that the velocity potential exists and determine its form. Also, find the stream function. [06]
3. A) I) A 450 mm diameter pipe carries water under a head of 15 m with a velocity of 3.0 m/s. If the axis of pipe turns through 30°. Find the magnitude and direction of the resultant force at the bend. [06]
- II) Define the compound pipe and equivalent pipe. Derive the expression for diameter of equivalent pipes. [06]
- OR
- B) I) State Bernoulli's theorem. Mention the assumptions made. How is it modified while applying in practice? [06]
- II) A pipeline carrying oil of specific gravity 0.87, changes in diameter from 150 mm diameter at a position A to 450 mm diameter at a position B, which is 5 m at a higher level. If the pressures A and B are 9.81 N/cm² and 6.4 N/cm² respectively and the discharge is 200 litres/s, determine the loss of head and direction of flow. [06]

4. A) I) Stating the assumptions underlying it, derive the dynamic equation for gradually varied flow. [07]

II) A very wide rectangular channel carries a discharge of 8 cumecs per m width. The channel has a bed slope of 0.004 and Manning's roughness coefficient 0.015. Find the distance to a section where water depth is 0.8 m using direct step method employing single step. [05]

OR

- B) I) Obtain the condition for maximum velocity of flow through circular channels. [06]

II) A hydraulic jump occurs in a rectangular channel and the depths of flow before and after the jump are 1.5 and 5. Calculate the critical depth and energy lost in the hydraulic jump. [06]

5. A) I) A centrifugal pump runs at 600 rpm and delivers 6000 L/min against a head of 6 m. The impeller has an outer diameter of 20 cm and a width of 5 cm at the outlet. If the backward curved vane at the outlet makes an angle of 45° , determine the manometric efficiency. What is the specific speed of the pump? [06]

II) Name and explain the different types of hydraulic similarities that must exist between the model and prototype. [06]

OR

- B) I) What is the importance of a draft tube in a Francis turbine? Discuss different types of draft tubes. [06]

II) A thin plate is moving in still atmospheric air at a velocity of 6 m/s. The length of the plate is 0.5 m and width 0.4 m. Calculate the thickness of boundary layer at the end of the plate. Take density of air as 1.25 kg/m^3 and kinematic viscosity is 0.15 stokes. [06]



Subject Code: **R19BEE4TH02**

II.B.TECH -II Semester Supple Examinations, April-2024

PROBLEM SOLVING USING PYTHON

Time: 3 Hours

Max.Marks:60.

Branch:EEE

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) Explain about Hardware Architecture of Computer with neat sketch?
II) Interpret different types of Operating systems.
OR
B) I) Explain the concept of an algorithm with an example.
II) Summarize the concept of Software.
2. A) I) Explain about all the symbols in RAPTOR with examples.
II) Draw a Flowchart for prime number generation in RAPTOR?
OR
B) I) Describe functions and sub charts in RAPTOR
II) Draw a Flowchart for fibonacci series in RAPTOR
3. A) I) What are operators in Python? Describe specifically about identity and membership operator?
II) Write a recursive function named factorial, which reads an argument as number and returns the factorial value of that number.
OR
B) I) Explain math function and discuss how to import math module with example.
II) What is function? Explain different types of parameter passing in functions.
4. A) I) Differentiate mutable and immutable data structure with example.
II) Write a python program to read integer numbers from a text file and display the result using file operations.
OR
B) I) Explain about different operations in Dictionaries.
II) List and explain string operations in python.
5. A) I) Develop Mouse Events using Turtle Graphics.
II) Define Polymorphism and give example program for polymorphism using method overriding.
OR
B) I) Outline the turtle bar chart using turtle.
II) Explain exception handling mechanism with example.

Subject Code: 19BME4OE12

II B.Tech II Semester Supple Examinations, April-2024

OPERATIONS RESEARCH

Time: 3 Hours

Max.Marks:60.

Branch: ME.

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 12 =60M)

1. A) Using Simplex method solve the LPP. 12M

$$\text{Maximize } Z = x_1 + x_2 + 3x_3$$

$$\text{Subjected to } 3x_1 + 2x_2 + x_3 \leq 3$$

$$2x_1 + x_2 + 2x_3 \leq 2$$

$$x_1, x_2, x_3 \geq 0$$

OR

- B) Use penalty (or Big-M) method to 12M

$$\text{Maximize } z = 3x_1 - x_2$$

$$\text{Subject to the constraints } 2x_1 + x_2 \geq 2;$$

$$x_1 + 3x_2 \leq 3;$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

2. A) Find the transportation cost for the following by using row-minima method. 12M

	A	B	C	D	E	F	G	Supply
A	5	6	4	3	7	5	4	7000
B	9	4	3	4	3	2	1	4000
C	8	4	2	5	4	8	3	10000
Demand	1500	2000	4500	4000	2500	3500	3000	

OR

- B) Consider the problem of assigning five operators to five machines. The assignment costs are given in below table. 12M

	M1	M2	M3	M4	M5
A	7	7	-	4	8
B	9	6	4	5	6
C	11	5	7	-	5
D	9	4	8	9	4
E	8	7	9	11	11

Operator A cannot be assigned to machine M3 and operator C cannot be assigned to machine M4. Find the optimum assignment schedule.

3. A) What is sequencing problem? Explain the following terms in context of sequence problems: 12M

- i) Total elapsed time
- ii) Idle time
- iii) no passing rule
- iv) processing order.

OR

B) I) Six jobs go first over Machine-I and then over Machine-II. The orders of completion of jobs have no significance. The following gives the machine times in hours for six jobs and the two machines.

Job	1	2	3	4	5	6
Machine I	5	9	4	7	8	6
Machine II	7	4	8	3	9	5

Find the Optimal total time and the idle times of the machine.

4. A) I) Explain characteristics of queuing system.

6M

II) Arrivals at a telephone booth are considered to be Poisson at an average time of 8 min between our arrival and the next. The length of the phone call is distributed exponentially, with a mean of 4 min. Determine (a) Expected fraction of the day that the phone will be in use. (b) Expected number of units in the queue. Expected waiting time in the queue. (c) Expected number of units in the system.

6M

OR

B) I) Explain applications of dynamic programming.

6M

II) State and explain Bellman's principal of optimality in dynamic programming.

6M

5. A) I) A computer contains 10000 resistors. When any resistor fails it is replaced. The cost of replacing individual resistor is 1Re and if all the resistors are replaced at the same time the cost of resistor would be 35paise. The percentage surviving at the end of the year is given below. What is the best policy to adopt?

6M

Month	0	1	2	3	4	5	6
Percentage Surviving	10	9	9	7	3	1	0

II) Explain replacement of items that deteriorate with time.

6M

OR

B) I) Solve the following game using dominance principle.

6M

		Player B			
Player A		1	2	3	4
	I	19	6	7	5
	II	7	3	14	6
	III	12	8	18	4
	IV	8	7	13	-1

II) Write the assumptions made in game theory.

6M

Subject Code: **19BME4TH01**

KINEMATICS OF MACHINERY

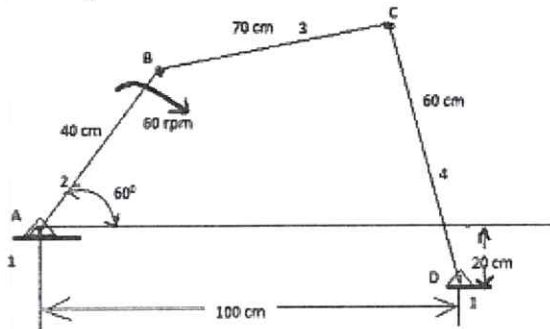
Time: 3 Hours

Program: B.Tech.

Branch: ME.

Max.Marks:60.

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 12 =60M)

Q.No	Questions	Marks
Unit - I		
1	i) Explain the different types of constrained motion with neat sketches?	[6M]
	ii) Define Degrees of freedom and demonstrate the Kutzbach criterion for planar mechanisms	[6M]
	OR	
	i) Elaborate 'Mechanism' and 'Machine'. How it is different from structure?	[6M]
2	ii) What is meant by Inversions of a mechanism and Analyze the various single slider crank chain?	[6M]
	Unit - II	
	i) Distinguish between Exact and approximate straight-line mechanism. List out the each type of mechanisms	[6M]
	ii) Explain about Chebicheff mechanism and Pantograph?	[6M]
3	OR	
	Write short notes on A. Davis Steering gear or Ackermans steering gear mechanism. B. Single or double Hooke's Joint C. Universal coupling	[12M]
Unit - III		
3	i) How Coriolis component of acceleration occurs. Write the equation of the magnitude of the Coriolis component of acceleration and label the terms	[6M]
	ii) The crank AB of a four-bar mechanism shown in Fig:1 rotates at 60 rpm clockwise. Determine the relative angular velocities of the coupler to the crank and the lever to the coupler. Find also the rubbing velocities at the surface of pins 25 mm radius at the joints B and C.	[6M]
		

OR			
	b	i) What is instantaneous centre of rotation? State Kennedy's theorem	[6M]
		ii) In a four bar mechanism ABCD, link AD is fixed and the crank AB rotates at 10 rad/s clockwise. Lengths of the links are AB = 60 mm; BC = CD = 70 mm; DA = 120 mm. When angle DAB = 60° and both B and C lie on the same side of AD, find angular velocities and angular acceleration of BC and CD	[6M]
Unit - IV			
4	1.	i) Explain with different types of follower motion?	[6M]
	a	ii) Define the following terms as applied to cam with a neat sketch: A. Base circle, (B) Pitch circle, (C) Pressure angle, and (D) Stroke of the follower	[6M]
	OR		
	b	i) Draw the profile of a cam operating a roller reciprocating follower and with the following data: Minimum radius of cam = 25 mm; lift = 30 mm; Roller diameter = 15 mm. The cam lifts the follower for 120° with SHM, followed by a dwell period of 30°. Then the follower lowers down during 150° of cam rotation with uniform acceleration and retardation followed by a dwell period. If the cam rotates at a uniform speed of 150 RPM. Calculate the maximum velocity and acceleration of follower during the descent period.	[12M]
Unit - V			
5	2.	i) Explain the Law of gearing and obtain expression for condition for constant velocity ratio for transmission of motion?	[6M]
	3.	ii) A pair of 20° full involute spur gears having 40 and 60 teeth of module 4 mm are in mesh. The smaller gear rotates at 1440 rpm. Find (A) sliding velocity at engagement and disengagement of the pair of teeth, and (B) contact ratio	[6M]
	OR		
	b	In an epicyclic gear train, an arm carries two gears A and B having 45 and 54 teeth respectively. If the arm rotates at 200 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, Determine the speed of gear B. If the gear A instead of being fixed makes 400 r.p.m. in the clockwise direction, what will be the speed of gear B?	[12M]

II B.TECH -II Semester Supple Examinations, April-2024

APPLIED THERMODYNAMICS

Time: 3 Hours

Max.Marks:60.

Branch: ME.

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 12 =60M)

Q.No.	Questions	Marks
1	Unit-I	
	a Discuss about, (i) Time loss factor , (ii) Heat loss factor.	[6M]
	b Explain how Wet Sump Lubrication System is different from Mist Lubrication system?	[6M]
	OR	
	a Define Volumetric efficiency and discuss the impact of various factors affecting the volumetric efficiency.	[6M]
	b Compare theoretical and actual valve timing diagrams of Four stroke	[6M]
2	Unit-II	
	a What is abnormal combustion? Explain phenomenon of knock in SI Engine?	[6M]
	b Compare knocking in SI engine and CI engine.	[6M]
	OR	
	a What are the different types of combustion chambers used in SI engine? Explain them briefly.	[6M]
	b Discuss briefly about stages of Combustion in CI Engines.	[6M]
3	Unit-III	
	a Draw the Heat balance sheet and explain about various elements need to consider to analyse various heat losses against total input power supplied.	[6M]
	b A single cylinder engine operating at 2000 rpm develops a torque of 8 N-m. The indicated power of the engine is 2.0 kW. Find loss due to friction as the percentage of brake power.	[6M]
	OR	
	b In a test of a four-cylinder, four-stroke petrol engine of 75 mm bore and 100 mm stroke, the following results were obtained at full throttle at a constant speed and with fixed setting of the fuel supply of 0.082 kg/min. bp with all cylinders working = 15.24 kW bp with cylinder number 1 cut-off = 10.45 kW bp with cylinder number 2 cut-off = 10.38 kW bp with cylinder number 3 cut-off = 10.23 kW bp with cylinder number 4 cut-off = 10.45 kW. Estimate the indicated power of the engine under these conditions. If the calorific value of the fuel is 44MJ/kg, find indicated thermal efficiency of the engine. Compare this with the air standard efficiency, the clearance volume of one cylinder being 115cc.	[12M]

4	Unit-IV		
	a	Give the detailed classification of Air-compressors and explain about working principle of single stage reciprocating air compressor with neat sketch.	[6M]
		Differentiate between rotary and reciprocating compressors.	[6M]
	OR		
	b	Deduce the expression to calculate work done when compression follows adiabatic process for a single stage reciprocating air compressor.	[6M]
		With a neat sketch explain the working of vane blower compressor.	[6M]
5	Unit-V		
	a	Demonstrate the working principle of centrifugal compressor with neat sketch.	[6M]
	b	Show that the degree of reaction is 50% for the symmetrical blade axial flow air compressor.	[6M]
	OR		
	a	Demonstrate the phenomenon of surging, chocking and stalling in a axial flow compressor.	[6M]
	b	Differentiate between centrifugal compressor and axial flow compressor.	[6M]

Subject Code: **19BEC4TH01**

Title: **ELECTRONIC CIRCUIT ANALYSIS**

Max.Marks:60.

Time: 3 Hours

Program: B.Tech.

Branch: ECE

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) Derive the expression for the high frequency parameters in terms of low frequency parameters of a BJT.[6M] II) Draw the Hybrid- π model for a common emitter transistor. At room temperature 300K at $I_C=10\text{mA}$ and $V_{CE}=8\text{V}$, $h_{ie}=500$, $h_{oe}=2 \times 10^{-4} \mu\text{s}$, $h_{fe}=100$ and $h_{re}=10^{-4}$. At the same operating point $f_T=50\text{MHz}$ and $c_{ob}=3\text{PF}$. Calculate the values of hybrid- π parameters.[6M]

OR

- B) I) Derive the expression for the CE current gain with resistive load at high frequencies.[6M] II) Find A_i , R_i , R_o and A_v in a single stage CE amplifier $R_s=1 \text{ K}\Omega$, $R_1=50 \text{ K}\Omega$, $R_2=2 \text{ K}\Omega$, $R_C=1 \text{ K}\Omega$, $R_L=1.2 \text{ K}\Omega$, $h_{fe}=50$ and $h_{ie}=1.1 \text{ K}\Omega$. [6M]

2. A) I) Draw the equivalent circuits of RC coupled amplifier for Mid-band, Low frequency range, high frequency range and derive the expressions for current gain and voltage gain. [12M]

OR

- B) I) With the help of a neat circuit diagram, describe the working of a bootstrapping [6M]

- II) Derive the expression for input resistance of a Darlington pair circuit [6M]

3. A) I) Derive the expression for voltage gain, input resistance, output resistance of the current shunt feedback amplifier? [6M]

- II) Draw the circuit of a voltage series feedback amplifier and derive the expressions for R_{if} and R_{of} [6M]

OR

- B) I) With neat block diagram Derive the expression for overall gain of a negative feedback circuit. [6M]

- II) An amplifier requires an input signal of 60mV to produce a certain output with a negative feedback to get the same output the required signal is 0.5V. The voltage gain with feedback is 90. Find the open loop gain and feedback factor. [6M]

4. A) I) Derive the expression for frequency of oscillation of BJT- RC phase-shift oscillator with necessary explanation. [6M]

- II) Derive the expression frequency of oscillation and condition for sustained oscillations of a Colpitts oscillator. [6M]

OR



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- B) I) Derive the expression frequency of oscillation and condition for sustained oscillations of a Hartley oscillator.[6M]
- II) Derive the expression for frequency of oscillations of Wein bridge oscillators with BJT.[6M]
5. A) I) Draw the Class-A Power Amplifier and explain operation in detail with necessary equations. Also derive the expression for maximum conversion efficiency[6M]
- II) Show that the conversion efficiency of a transformer coupled power amplifier is 50%. [6M]

OR

- B) I) Describe the operation of Class B Push pull amplifier and show how even harmonics are eliminated.[12M]

Code: 19BEC4TH02

II B. Tech II Semester Supplementary Examinations, April-2024
SWITCHING THEORY AND LOGIC DESIGN

Time: 3 Hours

(ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All questions carry equal marks (5 X 12= 60M)

Q.NO		Questions	Marks
Unit-I			
1	A	i. Convert the given Gray code number to equivalent binary 001001011110010.	[6M]
		ii.Convert (A0F9.0EBA98.0DC) ₁₆ to decimal, binary, octal.	[6M]
	OR		
	B	i. Encode the message bits (1110) ₂ into 7-bit even parity hamming code.	[6M]
		ii. What is Excess-3 Code? Perform BCD Addition on the following. 01100111 + 01010011	[6M]
Unit-II			
2	A	i. What are the universal gates? Explain Two-level digital circuit implementations using NOR gates.	[6M]
		ii.Convert the following expression into sum of products and product of sums. X'+X(X+Y')(Y+Z')	[6M]
	OR		
	B	i. Implement the following Boolean function with NAND gates only. F(X, Y, Z) = $\sum m$ (1, 2, 3, 4, 5, 7)	[6M]
		ii. Simplify the following function using K-Map method F(A,B,C,D)= $\Sigma(0,1,2,3,4,6,9,10)+d(7,11,12,13,15)$	[6M]
Unit-III			
3	A	i.What is decoder? How does a 7 segment decoder work? Explain	[6M]
		ii. : Realize the function f(A,B,C,D)= π (1,4,6,10,14)+d(0,8,11,15) using 8:1 MUX	[6M]
	OR		
	B	i.Explain realization of Boolean functions using decoders and multiplexers.	[6M]
		ii. Design a code converter that converts a decimal digit from the 8,4,-2,-1 code to BCD.	[6M]
Unit-IV			
4	A	i. Classify sequential circuits and explain synchronous and asynchronous sequential circuits.	[6M]
		ii. What is race around condition? How does it get eliminated in a Master-slave JK flip-flop?	[6M]
	OR		
	B	i.Illustrate buffer register and control buffer register with a neat block diagram	[6M]
		ii.Explain the realization of SR flip-flop, JK flip-flop using D flip-flop.	[6M]

Unit-V			
5	A	i.Implement the following Boolean functions using PLA. $X = \sum m(0,1,6,7)$, $Y = \sum m(1,2,4,6)$	[6M]
		ii.Design and implement Full adder with PLA	[6M]
	OR		
	B	i.Implement the logic function 'F' using ROM. $F = A'BC' + A'BC + AB'C + ABC$	[6M]
		ii. Derive the PLA programming table for the combinational circuit that squares a 3 bit number.	[6M]

II.B.TECH -II Semester Supple Examinations, April-2024

RANDOM VARIABLES & STOCHASTIC PROCESSES

Time: 3 Hours

Max.Marks:60.

Branch: ECE

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) Define conditional probability distribution function and write the properties. (6 M)
 II) A random variable X has pdf $f_X(x) = k(1 + x^2)$, for $0 \leq x \leq 1$. Find the constant k and distribution function of random variable (6 M)
 OR
 B) I) Define Gaussian random variable, X . Draw the PDF of X for two different values of σ , i.e., σ_1 and σ_2 , assuming $\sigma_1 < \sigma_2$. What is your observation? (6 M)
 II) Define probability density function of a random variable and show that the area under probability density function is unity. (6 M)
2. A) I) Define the following: (i) Skew (ii) Coefficient of skewness (iii) n^{th} central moment (6 M)
 II) Derive the variance of y if $y = ax + b$, where a and b are real constants. (6 M)
 OR
 B) I) State and prove the properties of variance of a random variable. (6 M)
 II) State and prove the Chebychev's inequality theorem (6 M)
3. A) I) Explain central limit theorem with equal and unequal distributions. (6 M)
 II) Explain how $E[X]$, $E[Y]$, $E[X^2]$ and $E[Y^2]$ are computed using joint probability density function of two random variables X and Y (6 M)
 OR
 B) I) Determine the marginal density functions $f_X(x)$ and $f_Y(y)$ (6 M)
 II) Define joint characteristic function. Explain how the joint moments are obtained from joint characteristic function. (6 M)
4. A) I) State and prove all the properties of cross-correlation functions. (6 M)
 II) Derive the relation between auto-correlation function and auto-covariance function of a random process. (6 M)
 OR
 B) I) What is ergodicity? Explain the concept of mean-ergodicity and autocorrelation-ergodicity with an example. (6 M)
 II) Define the following:
 a) First order stationarity b) Second order stationarity
 c) N^{th} order stationarity d) Wide-sense stationarity
5. A) I) List the properties of
 a. Power spectral density of a random process, $x(t)$
 b. Cross power spectral densities of random processes $x(t)$ and $y(t)$ (6 M+6 M)
 II) Derive the relationship between cross-power spectral density and cross correlation function
 OR
 B) I) Compute the average power of the process having power spectral density $6\omega^2/1 + \omega^4$
 II) Derive the expression for cross power density spectrum and write its properties (6M+6M)

Code: 19BEC4TH05

II B. Tech II Semester Supplementary Examinations, April-2024
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES

Time: 3 Hours

Branch:ECE

Max. Marks: 60

Note: Answer All FIVE Questions.

All questions carry equal marks (5 X 12= 60M)

Q.NO		Questions	Marks
Unit-I			
1	A	Explain Coulomb's Law and Gauss Law?	[6M]
		A circular disk of radius 'a' is uniformly charged with charge density ρ_s C/m ² . The disk lies on z = 0 plane with its axis along the z-axis. Determine the electric field intensity E at a point P(0,0,h).	[6M]
	OR		
	B	If a force $F = 2a_x + a_y + a_z$ N is acting on the charge of 10C, find the electric field intensity, its magnitude and direction.	[6M]
		Explain about force on charged particle and current element due to magnetic field.	[6M]
Unit-II			
2	A	Derive the expression for Maxwell equations in differential and integral form.	[6M]
		Find the magnetic field strength, H at the center of a square conducting loop of side '2a' in z=0 plane if the loop is carrying a current, I, in anti-clockwise direction.	[6M]
	OR		
	B	Brief explain about Faraday's law and transformer emf?	[6M]
		State and explain Maxwell's equation in point form for general time varying fields.	[6M]
Unit-III			
3	A	Discuss about Poynting theorem. Write the significance of it.	[6M]
		Derive the relation between E and H in uniform plane wave.	[6M]
	OR		
	B	If $\mu_r = 1$, $\epsilon_r = 9$, for the medium in which a wave with a frequency $f = 300$ MHz is propagating, determine the propagation constant and intrinsic impedance of the medium when $\sigma = 0$.	[6M]
		Derive reflection coefficient and transmission coefficient of E & H fields when Uniform plane wave propagating from rarer dielectric to denser dielectric medium in normal incidence.	[6M]

	Unit-IV		
4	A	Define Brewster angle? Obtain the expression for Brewster angle?	[6M]
		Define reflection and transmission coefficient for normal incidence and write the formulae for E?	[6M]
	OR		
	B	Derive the expression for reflection coefficient when an EM wave normally incident on dielectric-dielectric interface.	[6M]
		Describe the concept of Reflection of an EM wave by a perfect dielectric at oblique incidence.	[6M]
	Unit-V		
5	A	Illustrate the relation between group velocity and phase velocity of transmission lines?	[6M]
		A short – circuited Coaxial transmission line has $Z_0=60\Omega$ and $\alpha =j8.5/m$. Calculate the input impedance if the length of the line is a) $\lambda/4$ b) $\lambda/8$	[6M]
	OR		
	B	Derive the expression for propagation constant of infinite transmission line.	[6M]
		A lossy transmission line has $R=3.5\Omega/m$, $L=2\mu H/m$, $C=120pF/m$, and $G=0$ at 400MHz, determine α , β , Z_0 .	[6M]

NEC ENGINEERING COLLEGE

(AUTONOMOUS)

II B.Tech II Semester supplementary Examinations, April 2023

Sub Code: 19BCI4TH01

DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

(CSE & IT)

Max. Marks: 60

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.	Questions	KL	CO	Marks
1	UNIT-I			
	a Express Database System Structure with neat diagram?	K	2	12
	OR			
	b Compare the DBMS & File System and Explain applications of DBMS?	K	1	12
2	UNIT-II			
	a Illustrate the conceptual Design with ER Model?	K	4	12
	OR			
	b Explain Integrity constraints and Enforcing Integrity constraints over relations?	K	4	12
3	UNIT-III			
	a Explain Aggregative operators with example?	K	2	12
	OR			
	b Explain different joins with example	K	1	12
4	UNIT-IV			
	a Explain First, Second & Third Normal Forms?	K	1	12
	OR			
	b Explain properties of Decomposition?	K	2	12
5	UNIT-V			
	a Explain ACID properties with example?	K	4	12
	OR			
	b Explain B+ Tree index structure?	K	4	12

II.B.TECH -II Semester Supple Examinations, April-2024

FORMAL LANGUAGES AND AUTOMATA THEORY

Time: 3 Hours

Max.Marks:60.

Branch: CSE,IT

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) Describe the formal notation for NFA with epsilon closure and the uses of ϵ - closure. 6M

II) Convert the following Moore machine into an equivalent Mealy machine. [6M]

$Mo = (\{q_0, q_1, q_2, q_3\}, \{a, b\}, \{0, 1\}, \delta, \lambda, q_0)$ where, λ and δ are given below.

Σ	a	B	λ
Q			
q_0	q_1	q_3	1
q_1	q_3	q_1	0
q_2	q_0	q_3	0
q_3	q_3	q_2	1

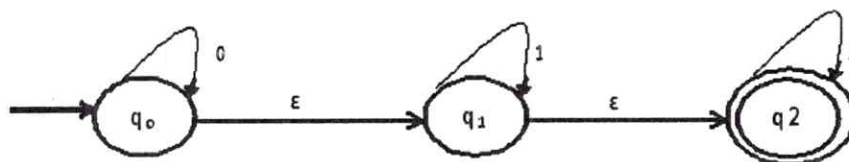
Fig: Transition and output for Moore Machine

6M

OR

B) I) Define Finite Automaton? Explain about the model of Finite Automaton. 6M

II) Construct an equivalent NFA without ϵ for the below automaton? 6M



2. A) I) Construct the regular expression for finite automata given transition function $\{\delta(q_1, 1) = q_1, \delta(q_1, 0) = q_2, \delta(q_2, 0) = q_2, \delta(q_2, 1) = q_1\}$ q_1 is start state and q_2 is final state over string $\{0, 1\}$. 6M

II) Construct a NFA equivalent to the regular expression $10(0+11)0^*1^?$ 6M

OR

B) I) Explain about the Closure Properties of Regular sets. 6M

II) Explain Moore and Mealy Machines with suitable example. 6M

3. A) I) Find a grammar equivalent to $S \rightarrow AB/AC$, $A \rightarrow Aa/bAa/a$, $B \rightarrow bbA/aB/AB$, $C \rightarrow aCa/aD$, $D \rightarrow aD/bC$ with no useless symbols and put it into CNF. 6M

II) Write in detail the Chomsky hierarchy of formal languages 6M

OR

- B) I) Define Ambiguous Grammar? Check whether the grammar is Ambiguous or not?
 $S \rightarrow aAB$; $A \rightarrow bC/cd$; $C \rightarrow cd$; $B \rightarrow c/d$ 6M

II) Define Context Free Grammar. State and Explain the closure properties of CFG. 6M

4. A) I) Construct a pushdown automaton which accepts the language of words over the alphabet $\{a,b\}$ containing more a's than b's 6M

II) $L = \{anbn \mid n \geq 1\}$. Give the graphical representation for PDA obtained. Show the instantaneous description of the PDA on the input string *aaaabbbb* 6M

OR

B) Explain in detail Language accepted by PDA with an example. 12M

5. A) I) Explain with neat diagram the working of Turing machine and the types of Turing machines. 6M

II) Design Turing machine to accept all set of palindromes over $\{0, 1\}^*$. And also write the transition diagram and Instantaneous description on the string 10101 6M

OR

B) I) Construct a Turing Machine for language $L = \{0^n1^n2^n \mid n \geq 1\}$. 6M

II) Write short notes on NP complete and NP hard problems. Explain with suitable examples. 6M

Subject Code: 19BCSTH03

II.B.TECH -II Semester Supple Examinations, April-2024
DESIGN AND ANALYSIS OF ALGORITHMS
(CSE)

Time: 3 hours

Max Marks: 60

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks

(5 X 12 =60M)

1. A) I) What are the Asymptotic notations? And give its properties. 6M
 II) Compare time complexity with space complexity? 6M

OR

 B) I) Explain the properties of an algorithm with an example. 6M
 II) Differentiate between Big oh and omega notation with example. 6M

2. A) I) Write and explain recursive binary search algorithm. 6M
 II) Discuss the merge sort algorithm to the list $L = \{2, 12, 18, 3, 34, 27, 56, 4, 8, 3, 10\}$ with its time complexity. 6M

OR

 B) I) Show that the average case time complexity of quick sort algorithm is $O(n \log_e n)$ 6M
 II) Discuss Strassen's matrix multiplication in detail. 6M

3. A) I) Explain the general principle of Greedy method and also list the applications of Greedy method 6M
 II) Determine an optimal solution to the Knapsack instance $n=3, m=20, (P_1, P_2, P_3) = (25, 24, 15)$ and $(W_1, W_2, W_3) = (18, 15, 10)$. 6M

OR

 B) I) Discuss Prim's algorithm with an example. 6M
 II) Generate the actions of shortest paths for the given graph from vertex 1 to all remaining vertices $1 \rightarrow 2 = 20, 2 \rightarrow 1 = 2, 1 \rightarrow 3 = 15, 2 \rightarrow 5 = 10, 2 \rightarrow 6 = 30, 3 \rightarrow 6 = 10, 3 \rightarrow 4 = 4, 5 \rightarrow 4 = 15, 6 \rightarrow 4 = 4, 6 \rightarrow 5 = 10$. 6M

4. A) I) What is the principle difference between the divide and conquer technique and dynamic programming technique? 6M
 II) Apply dynamic programming to find the optimal order of multiplying 3 matrices $A_{5 \times 25}, B_{25 \times 10}, C_{10 \times 15}$. 6M

OR

 B) I) Explain the Travelling sales man problem. 6M
 II) Solve the following instance of 0/1 Knapsack problem using Dynamic programming $n = 3; (W_1, W_2, W_3) = (3, 5, 7); (P_1, P_2, P_3) = (3, 7, 12); M = 4$. 6M

5. A) I) Explain FIFO Branch and Bound solution. 6M
 II) Give the solution to the 8-queens problem using backtracking. 6M

OR

 B) I) Write the backtracking algorithm for the sum of subsets problem using the state space tree corresponding to $m=35, w=(20, 18, 15, 12, 10, 7, 5)$. 6M
 II) What are the differences between FIFO and LC branch and bound solutions? 6M



Narasaraopeta Engineering College (Autonomous)

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Subject Code: 19BCS4TH04

II B.TECH II Semester Supple Examinations, April-2024

SOFTWARE ENGINEERING

Time: 3 hours

(CSE)

Max Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 =60M)

-
1. A) I) Explain about object oriented and component based development. [6M]
II) Discuss about classical waterfall model with example. [6M]
OR
B) I) Explain the elements of software process and characteristics of software process. [6M]
II) Describe about spiral model with example. [6M]
2. A) I) Explain about functional and non-functional requirements. [6M]
II) Discuss about data flow diagram and data dictionary. [6M]
OR
B) I) Illustrate about Requirements elicitation-fact finding techniques. [6M]
II) Discuss about review and inspection in Requirement validation. [6M]
3. A) I) Explain about information hiding and functional decomposition. [6M]
II) Discuss about function oriented design and object oriented design. [6M]
OR
B) I) Discuss about coupling and cohesion in Modular Design. [6M]
II) Explain about review and refine data flow diagram in Structured Design Methodology [6M]
4. A) I) Describe about max cohesion and min coupling with example. [6M]
II) Explain about control flow based testing and path testing with example. [6M]
OR
B) I) Explain about equivalence class partitioning with example. [6M]
II) Discuss about boundary value analysis with example. [6M]
5. A) I) Explain about lines of code and functional point analysis. [6M]
II) Discuss about COCOMO cost models and analytical estimation. [6M]
OR
B) I) Discuss about software quality concept and Software Quality Factors. [6M]
II) Explain SQA activities and SQA plan in Software Quality Assurance. [6M]

II B.Tech II Semester Supple. Examinations, April-2024

Sub Code: 19BCC4OE09

DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	KL	CO	Marks
1	Explain the difference between logical and physical data independence. Discuss their importance.	2	1	6M
	a List and explain some popular applications of database systems and role of databases in those applications.	2	1	6M
	(OR)			
	b Draw and describe the layered architecture of a DBMS.	2	1	6M
	Explain about different levels of abstractions.	2	1	6M
2	Construct an ER diagram for banking enterprise.	2	2	6M
	a What are the integrity constraints over relations? Explain briefly with suitable examples.	2	2	6M
	(OR)			
	b What is an ER diagram? Draw an ER diagrams for the entity set, relationship set and a ternary relationship set?	2	2	6M
	Define relation schema, relational database schema, domain, and relation degree with examples.	2	2	6M
3	Explain the Division operator of Relational algebra with a suitable example.	2	3	6M
	a How would you use the operators IN, EXISTS, UNIQUE, ANY and ALL in writing nested queries? Why are they useful? Explain with an example.	2	3	6M
	(OR)			
	b Discuss GROUPBY and HAVING clauses with an example. And also give the constraints related to their usage.	2	3	6M
	What is a Trigger? And what are its three parts? Explain the differences between Triggers and Integrity constraints.	2	3	6M
4	Explain the steps followed for schema refinement in database design?	2	4	6M
	a What is normalization? Explain 1NF, 2NF and 3NF with suitable example?	2	4	6M
	(OR)			
	b Define BCNF. How does BCNF differ from 3NF? Explain with an example.	2	4	6M
	Explain the properties of Decomposition.	2	4	6M
5	Write about the anomalies that can be caused by concurrent access to same data object.	2	5	6M
	a Explain the Two-Phase Locking protocol and its variants.	2	5	6M
	(OR)			
	b Explain the terms transaction, schedule, complete schedule, and serial schedule with examples	2	5	6M
	What are the benefits of using dynamic indexing? Explain in detail B+ tree file organization.	2	5	6M



Subject Code: 19BCS4OE12

II.B.TECH -II Semester Supple Examinations, April-2024
WEB DEVELOPMENT USING MEAN STACK TECHNOLOGY

Time: 3 hours

(CSE)

Max Marks: 60

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks

(5 X 12 =60M)

-
- | | |
|---|-----|
| 1. A) I) Discuss about Angular Components and Templates. | 6M |
| II) Explain Dependency Injection with example program. | 6M |
| OR | |
| B) I) Discuss Angular Architecture. | 6M |
| II) Illustrate different types of Data Binding with an example. | 6M |
| | |
| 2. A) I) Discuss Http Client Programming. | 6M |
| II) What are the CLI Commands and explain them. | 6M |
| OR | |
| B) I) Discuss Routing and Navigation in Angular8. | 6M |
| II) Apply angular material module to create a toolbar in an angular app. | 6M |
| | |
| 3. A) I) Summarize about Node.js Modules. | 6M |
| II) Discuss the process of installation of angular material module. | 6M |
| OR | |
| B) I) Why Node.js? Discuss Node.js Web Server. | 6M |
| II) Explain about Node package manager in detail. | 6M |
| | |
| 4. A) I) Write how to create an Express.js Server with code. | 12M |
| OR | |
| B) I) Write about Node.js File System. | 6M |
| II) Explain about Express.js Web App. | 6M |
| | |
| 5. A) I) Demonstrate the process of accessing MongoDB in Node.js with code. | 6M |
| II) Discuss Connecting and Creating Database in MongoDB with code. | 6M |
| OR | |
| B) I) Discuss the following with code | 12M |
| a) Insert documents | |
| b) Update documents | |
| C) Deleting documents | |

Subject Code: 19BCE4OE11

II B.Tech II Semester Supple Examinations, April-2024

PUBLIC HEALTH ENGINEERING

Time: 3 Hours

Max.Marks:60.

Branch:CE

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 12 =60M)

1. A) I) write about collection, conveyance and disposal methods of refuse in detailed
II) Explain the term "Recycling and Reuse" of domestic waste
OR
B) I) describe the functioning of a Gobar gas plant in detailed.
II) Mention the most significant property of the city refuse which guides the adoption of the landfill & composting method of refuse disposal.
2. A) I) write about Basic principles of health full housing
II) Define and explain lighting and conditioning in the household system.
OR
B) I) what do you mean by Infiltration? Explain Natural Ventilation induced by wind.
II) What are the requirements of comfort-Air conditioning and explain?
3. A) I) What type of disease is malaria? What is prevention of malaria?
II) What are the mosquito characteristics? Explain in detailed.
OR
B) I) Trace the mode of transmission of malaria to human beings.
II) What is the best anti-malarial method to counter its outbreak? Describe how this is carried out.
4. A) I) What are the different food borne diseases explain in detailed.
II) write about bacterial treatment of kitchen utensils in detailed
OR
B) I) Explain about dairy barn sanitation in detailed.
II) What is pasteurization and write the pasteurization methods explain.
5. A) I) what is the effects of pollutants on human health, vegetation and climate.
II) What do you understand by the terms (i) smog (ii) acid rain & (iii) air zoning as used in air pollution
OR
B) I) What measures should be taken to control the pollution problem.
II) Name the diseases associated with the physiological effects of air pollution.

