R19

II B.TECH II SEM

SUPPLEMENTARY EXAMINATIONS

APRIL 2025

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda(P.O), Narasaraopet – 522601, Gunturn District, A.P.

Subject Code:**19BCC4OE09**

II B.Tech II Semester Supple Examinations, April-2025
DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours Max.Marks:60. Branch: ECE

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

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1. A) I) Discuss about the purpose of Database Systems?
   II) Define Instance and Schema? List different data models and explain?
   OR
   B) I) Discuss about Database users and Administrators?
   II) List the components of Storage Manager and Query processor and explain them .

2. A) I) Assess the characteristics that distinguish the strong entity with weak entity with suitable example.
   II) Discuss about key constraints for Ternary Relationships?
   OR
   B) I) Assess the significance of TCL commands with suitable example
   II) Draw ER diagram for Ternary Relationship set with suitable example?

3. A) I) How can we compare using null values? Explain with suitable example.
   II) Explain in detail about nested queries.
   OR
   B) I). Explain various Data types used in SQL
   II) Explain SQL Relational Set Operators

4. A) I) What is Normalization? Explain the need for normalization.
   II) Explain serializability in transaction management
   OR
   B) I) Compare and contrast between 1NF,2NF and 3NF
   II) Describe the ACID Properties of a transaction.

5. A) I) What is concurrency control? How is it implemented in DBMS?
   OR
   B) I) Explain different types of indexing techniques

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Supple. Examinations, April-2025

Sub Code: 19BCE4OE11

PUBLIC HEALTH ENGINEERING

Time: 3 hours (CE) 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	Mention the most significant property of the city refuse which guides the adoption of the following method of refuse disposal. (i) incineration (ii) landfill (iii) composting	[12M]
		OR	
	b	Discuss the quality and characteristics of refuse.	[12M]
		Unit-II	
2	a	Enumerate the Basic principles of healthfull housing.	[12M]
		OR	
	b	Explain the systems of ventilation in detail.	[12M]
		Unit-III	
3	a)	Trace the mode of transmission of malaria to human beings. What is the best anti-malarial method to counter its outbreak? Describe how this is carried out.	[12M]
		OR	
	b)	Discuss the control measures of malaria disease?	[12M]
		Unit-IV	
4	a)	What are the different food borne diseases and explain the methods of pasteurization?	[12M]
		OR	
	b)	Discuss the bacterial treatment of kitchen utensils in detail.	[12M]
		Unit-V	
5	a	What are the different types Pollutants and their sources. Explain their effects on human health, vegetation and climate.	[12M]
		OR	
	b	Explain the sources of noise pollution and discuss its affects. Also mention the control measures of noise pollution.	[12M]

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: **19BME4OE12**

II B.Tech II Semester Supple. Examinations, April-2025

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	i	Explain the different phases of OR?	[4M]
		ii	Using simplex method solve the LPP Max $Z = X_1+X_2+3X_3$ subject to the constraints $3X_1+2X_2+X3 \leq 3$, $2X_1+X_2+2X_3 \leq 2$, $X_1, X_2, X_3 \geq 0$	[8M]
			OR	
	B	i	Use Big-M method to solve Minimize Z = 4X1+X2, subject to constraints4X1+3X2 ≥ 6, 3X1+X2 =3, X1+2X2 ≤ 3, X1, X2 ≥ 0.	[6M]
2	A	i	A dairy plant has five milk tankers I, II, III, IV & V. These milk tankers are to be used on five delivery routes A, B, C, D, and E. The distances (in kms) between dairy plant and the delivery routes are given in the following distance matrix	[12M]

	I	II	III	IV	V
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How the milk tankers should be assigned to the chilling centres so as to minimize the distance travelled?

OR

	B	i	Solve the following Transportation problem	[12M]

		Destinations					Availability
		D1	D2	D3	D4	D5	
Origins	O1	9	12	9	6	9	5
	O2	7	3	7	7	5	4
	O3	6	5	9	11	3	2
	O4	6	8	11	2	2	9
Requirements		4	4	6	2	4	20

3	A	i	Following table shows the machine time (in hours) for 5 jobs to be processed on 2 different machines:	[12M]

JOB	Machine 1	Machine 2
1	13	3
2	2	5
3	1	3
4	4	6
5	5	7

OR

	B	i	The following details are available regarding a project:	[12M]

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Determine the critical path, the critical activities and the project completion time.

4	A	i	Trains arrive at the yard every 12 minutes and the service time is 35 minutes. If the capacity of the yard is limited to 4 trains find: (a) Probability that the yard is empty. (b) The average number of trains in the system. (c) Average number of trains in the queue.	[6M]
		ii	The arrival rate of customers at a banking counter follows Poisson distribution with a mean of 45 per hr. The service rate of the counter clerk follows exponential distribution with a mean of 60 per hr. a) What is the probability of having zero customers in the system? b) What is the probability of having five customers in the system? c) Find L_s, L_q, W_s, and W_q.	[6M]

OR

	B	i	Explain the Bellman's Principle of optimality.	[6M]
		ii	Solve the following linear programming problem by Dynamic programming approach. Maximise $Z = 2x_1 + 5x_2$ S.T. $2x_1 + x_2 \leq 43$, $2x_2 \leq 46$, and $x_1, x_2 \geq 0$.	[6M]
5	A	i	Find the saddle point for the game	

		Player B		
		I	II	III
Player A	I	-3	14	-3
	II	-4	-5	-4
	III	-5	16	-7

		ii	Solve the following game whose payoff matrix is B: 7, 4 / A: 5, 6	[6M]
			OR	
	B	i	The cost of a machine is Rs.6100 and its scrap value is only Rs.100. The maintenance costs are found to be Year: 1, 2, 3, 4, 5, 6, 7, 8 Maintenance Cost (in Rs): 100, 250, 400, 600, 900, 1250, 1600, 2000 When should the machine be replaced?	[12M]
		ii	The running costs per year and resale values of a certain equipment whose purchase price is Rs. 6500/- At what year is the replacement due optimally? Year: 1, 2, 3, 4, 5, 6, 7, 8 Running Cost: 1400, 1500, 1700, 2000, 2400, 2800, 3300, 3900 Resale value: 4000, 3000, 2200, 1700, 1300, 1000, 1000, 1000	[6M]

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: **19BCC4TH01**

II B.Tech - II Semester Supple Examinations, April-2025
COMPLEX VARIABLES, PROBABILITY AND STATISTICS

Time: 3 Hours | Max.Marks:60. | Branch:CE & EEE

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

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1. A) I) Prove that the function sinh z is analytic and find its derivative.

   II) Find the conjugate harmonic of $v(r, \theta) = r^2 \cos 2\theta - r \cos \theta + 2$. Show that v is harmonic.

   OR

   B) I) Determine the analytic function w = u + iv, if $v = \log(x^2 + y^2) + x - 2y$.

   II) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though C.R. equations are satisfied thereof.

2. A) I) Evaluate $\int_C (z^2 + 3z + 2)\,dz$ where C is the arc of the cycloid $x = a(1 + \sin\theta)$, $y = a(1 - \cos\theta)$ between the points (0, 0) and $(\pi a, 2a)$.

   II) Expand sin z in a Taylor's series about z = 0 and determine the region of convergence.

   OR

   B) I) Evaluate, using Cauchy's integral formula $\int_C \frac{\cos \pi z}{z^2 - 1}\,dz$ around a rectangle with vertices $2 \pm i, -2 \pm i$.

   II) Prove that $\int_0^\infty \sin x^2\,dx = \int_0^\infty \cos x^2\,dx = \frac{1}{2}\sqrt{\frac{\pi}{2}}$.

3. A) I) A box A contains 2 white and 4 black balls. Another box B contains 5 white and 7 black balls. A ball is transferred from the box A to the box B. Then a ball is drawn from the box B. Find the probability that it is white.

   II) Assume that on the average one telephone number out of fifteen called between 2 P.M. and 3 P.M. on week-days is busy. What is the probability that if 6 randomly selected telephone numbers are called (i) not more than three, (ii) at least three of them will be busy?

   OR

   B) I) A has one share in a lottery in which there is 1 prize and 2 blanks; B has three shares a lottery in which there are 3 prizes and 6 blanks; compare the probability of A's success to that of B's success.

   II) Data was collected over a period of 10 years, showing number of deaths from horse kicks in each of the 200 army corps. The distribution of deaths was as follows:

No. of deaths:	0	1	2	3	4	Total
Frequency:	109	65	22	3	1	200

Fit a Poisson distribution to the data and calculate the theoretical frequencies.

4. A) I) In a city A 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant ?

II) A machine is producing bolts of which a certain fraction is defective. A random sample of 400 is taken from a large batch and is found to contain 30 defective bolts. Does this indicate that the proportion of defectives is larger than that claimed by the manufacturer where the manufacturer claims only 5% of his product are defective. Find 95% confidence limits of the proportion of defective bolts in batch.

OR

B) I) 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 indicate an unbiased die?

II) 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.

5. A) I) The 9 items of a sample have the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5?

II) A set of five similar coins is tossed 320 times and the result is

No. of Heads:	0	1	2	3	4	5
Frequency:	6	27	72	112	71	32

Test the hypothesis that the data follow a binomial distribution.

OR

B) I) Intelligence test of two group of boys and girls give the following results:

Girls	Mean = 84	S.D = 10	N = 121
Boys	Mean = 81	S.D. = 12	N = 81

(a) Is the difference in mean scores significant?

(b) Is the difference between the standard deviations significant?

II) Show that 95% confidence limits for the mean μ of the population are $\bar{x} \pm \frac{\sigma_s}{\sqrt{n}} t_{0.05}$. Deduce that for a random sample of 16 values with mean 41.5 inches and the sum of the squares of the deviations from the mean 135 inches^2 and drawn from a normal population 95% confidence limits for the mean of the population are 39.9 and 43.1 inches.

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: **19BCE4TH06**

II B.Tech - II Semester Supple Examinations-April-2025

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)

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1. A) I) Define a) mass density b) specific weight c) specific volume d) specific gravity e) Dynamic viscosity f) Kinematic viscosity. **[06]**

II) A single-column manometer is connected to a pipe containing oil of a specific gravity of 0.8. The ratio of the reservoir area to the limb is 100. The liquid level in the reservoir is 300mm below the centre of the pipe containing oil, and the level of liquid in the right limb is 500mm above the liquid level in the reservoir. Determine the pressure of the liquid in the pipe. The liquid in the reservoir and right limb is mercury, with a specific gravity of 13.6. **[06]**

OR

B) I) A certain liquid has a dynamic viscosity of 0.073poise and a specific gravity of 0.87. Compute the kinematic viscosity of the liquid in stokes and also in m^2/s. **[05]**

II) An inverted differential manometer is connected to two pipes, A and B, which convey water. The centreline of pipe B is 50cm below the centreline of pipe A. Pipe B is to the right side of pipe A. The oil level in the left limb is 40cm above the centreline of pipe A, and that in the right limb is 60cm above the centreline of pipe B. The fluid in the manometer is oil of a specific gravity of 0.85. Find the pressure difference between A and B. **[07]**

2. A) I) A triangular gate which has a base of 1.5m and an altitude of 2m lies in a vertical plane. The vertex of the gate is 1m below the surface of a tank, which contains oil with a specific gravity of 0.8. Find the force exerted by the oil on the gate and the position of the centre of pressure. **[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]**

OR

B) I) Describe the characteristics of laminar and turbulent boundary layers. **[06]**

II) Obtain the expression for the continuity equation in three dimensions. **[06]**

3. A) I) State and derive Bernoulli's theorem, mentioning clearly the assumptions underlying it.

II) A pipe of 100mm in diameter and length of 2500m connects two reservoirs, having a difference of water level of 25m. Determine the discharge through the pipe. If an additional pipe with a diameter of 100mm and a length of 1500m is attached to the last of 1200m of the existing pipe, find an increase in discharge. Take $f = 0.015$ and neglect minor losses. **[06+06]**

OR

B) I) A 450mm diameter pipe carries water under a head of 15m with a velocity of 3.0m/s. If the axis of the pipe turns through 30^0, find the magnitude and direction of the resultant force at the bend. **[06]**

II) A pipeline, 300mm in diameter and 3200m long, is used to pump 50kg per second of oil whose density is 950kg/m^3 and whose kinematic viscosity is 2.1 stokes. The centre of the pipeline at the upper end is 40m above than that at the lower end. The discharge at the upper end is atmospheric. Find the pressure at the lower end and draw the hydraulic gradient line and total energy line diagram. **[06]**

4. A) I) Derive the correlation between roughness factor 'f' and Manning's coefficient 'n' in open channel flow. **[06+06]**

II) Explain the phenomenon of water hammer. List the four factors affecting the water hammer.

OR

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

II) Derive chezy's equation. **[06]**

5. A) I) What are the characteristic curves of a hydraulic turbine? How are they useful to practical Engineers? **[04]**

II) State and explain Buckingham's pi theorem. Give one example **[08]**

OR

B) I) A double-acting reciprocating pump with a piston area of 0.1m and a stroke of 0.30m long. The pump is discharging 2.4 m^3 of water per minute at 45 rpm through a height of 10 m. Find the slip of the pump and the power required to drive the pump. **[06]**

II) For small models and (small) prototypes of surface ships and overflow structures, the actions of gravity, viscosity and surface tension may be of equal significance. For dynamic similarity between model and prototype, what relation must exist between viscosity, surface tension and model scale? **[06]**

Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda(P.O), Narasaraopet – 522601, Gunturn District, A.P.

Subject Code: **R19BEE4TH02**

II B.Tech - II Semester Supple Examinations, April -2025

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)

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1. A) I) Describe about algorithm and write algorithm for sum of two integers. [6M]
   II) Illustrate the hardware architecture. [6M]

   OR

   B) I) Explain the data representation in computer with an example. [6M]
   II) Classify the types of computers and explain. [6M]

2. A) I) Draw the flowchart to find the maximum of three numbers. [6M]
   II) Discuss about flow chart symbols used in operators. [6M]

   OR

   B) I) Draw the flowchart to perform linear search on a given list of integers. [6M]
   II) Explain the importance of functions and subcharts.[6M]

3. A) I) Write a python program to reverse a given integer number. [6M]
   II) Explain different string functions with an example. [6M]

   OR

   B) I) What is recursion? Write a python program to calculate factorial of given number using recursion. [6M]
   II) Illustrate about different math functions. [6M]

4. A) I) Explain insert and replacing operations on List with an example. [6M]

   II) Design a Python Script to generate the frequency count of words in a text file? [6M]

   OR

   B) I) Differentiate List and tuples. [6M]
   II) Explain dictionary operations with an example. [6M]

5. A) I) Explain multiple inheritance with an example. [6M]
   II) Illustrate the concept of exception handling. [6M]

   OR

   B) I) Write a program to describe about abstract classes. [6M]
   II) Explain key press events with example. [6M]

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BME4TH01**

II B.Tech - II Semester Supple Examinations, April-2025

KINEMATICS OF MACHINERY

Time: 3 Hours | Max.Marks:60. | Branch: ME.

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

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1. A) I) Explain different types of constrained motions.
   II) Define Kinematic pair. Explain about their classification.

   OR

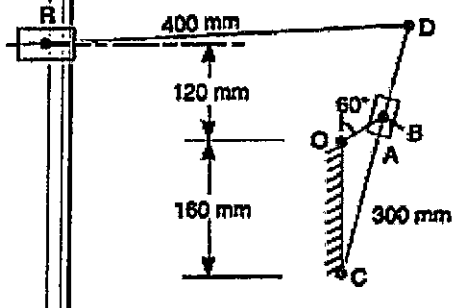
   B) Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of time taken in forward and return stroke for these mechanisms.

2. A) I) Enumerate straight line mechanisms. Why are they classified into exact and approximate straight-line mechanisms?
   II) Give a neat sketch of the straight-line motion 'Hart mechanism.' Prove that it produces an exact straight-line motion.

   OR

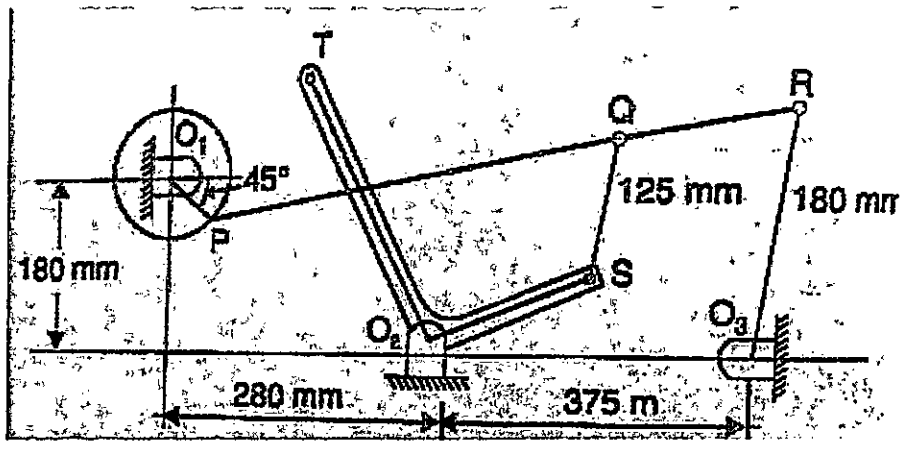
   B) I) What is the condition for correct steering? Sketch and show the two main types of steering gears and discuss their relative advantages.
   II) Sketch a polar velocity diagram of a Hooke's joint and mark its salient features.

3. A) In a quick return mechanism, as shown in Fig., the driving crank OA is 60 mm long and rotates at a uniform speed of 200 r.p.m. in a clockwise direction. For the position shown, find 1. velocity of the ram R ; 2. acceleration of the ram R, and 3. acceleration of the sliding block A along the slotted bar CD.



   OR

   B) In the mechanism shown in Fig. the crank O_1P rotates at 50 rad/s. The dimensions of the links are O_1P = 80 mm, PR = 650 mm, QR = 200 mm, O_3R = 180 mm, O_2T = 350 mm, O_2S = 175 mm and QS = 125 mm. Find the velocity of the point T on the bell crank lever by Instantaneous centre method.



4. A) I) Classify with neat sketches the cam follower according to their shape, location and motion. State also their advantages, if any, with respect to other followers

II) Sketch neatly the displacement, velocity and acceleration curves of a cycloidal motion follower. Why is it superior over other motion curves?

OR

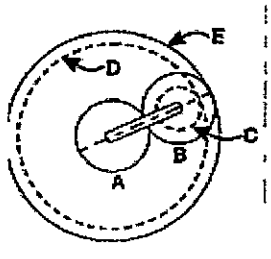
B) Derive expressions for displacement, velocity and acceleration for a tangent cam operating a radial translating roller follower when the contact is on circular nose

5. A) I) State and derive the law of gearing.

II) A pinion having 20 involute teeth of module pitch 6 mm rotates at 200 r.p.m. and transmits 1.5 kW to a gear wheel having 50 teeth. The addendum on both the wheels is 1/4 of the circular pitch. The angle of obliquity is 20°. Find (*a*) the length of the path of approach ; (*b*) the length of the arc of approach;(*c*) the normal force between the teeth at an instant where there is only pair of teeth in contact.

OR

B) The figure shows an epicyclic gear train. Pinion A has 15 teeth and is rigidly fixed to the motor shaft. The wheel B has 20 teeth and gears with A and also with the annular fixed wheel E. Pinion C has 15 teeth and is integral with B (B, C being a compound gear wheel). Gear C meshes with annular wheel D, which is keyed to the machine shaft. The arm rotates about the same shaft on which A is fixed and carries the compound wheel B, C. If the motor runs at 1000 r.p.m., find the speed of the machine shaft. Find the torque exerted on the machine shaft, if the motor develops a torque of 100 N-m.



NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: **19BME4TH04**

II B.Tech - II Semester Supple Examinations, April -2025

APPLIED THERMODYNAMICS

Time: 3 Hours Max.Marks:60. Branch: ME.

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

1	AI.	I. Discuss the major losses in the actual engine and explain the losses with rubbing friction	6M
	II	II.What is the different losses in air standard cycle, and explain the Exhaust blow-down losses.	6M
		(OR)	
	B	I. Explain the fuel injection system used in IC engine and the parts in detail	6M
		II.Explain the cooling of IC engine and the systems used with latest development	6M
2	A	I. Discuss the difference between theoretical and actual valve timing diagram of a diesel engine.	6M
		II.With the help of a neat sketch explain the working of Air Cooling system of IC engine.	6M
		(OR)	
	B	With the help of a neat sketch explain the engine lubrication system.	12M
3	A	I. Explain the combustion phenomena of IC Engine	6M
		II.Draw the Stages of Combustion of SI Engine using neat diagrams	6M
		(OR)	
	B	A test on a single-cylinder, four-stroke oil engine having a bore of 15 cm and stroke 30 cm gave the following results; speed 300 rpm; brake torque 200 Nm; indicated mean effective pressure 7 bar; fuel consumption 2.4 kg/h; cooling water flow 5 kg/min; cooling water temperature rise 35^{0}C; air-fuel ratio 22; exhaust gas temperature 410^{0}C; barometer pressure 1 bar; room temperature 20^{0}C. The fuel has a calorific value of 42 MJ/kg and contains 15% by weight of hydrogen. Take latent heat of vaporization as 2250 kJ/kg. Determine: (i) The indicated thermal efficiency. Draw up a heat balance in terms of kJ/min. Take C_p for dry exhaust gas = 1 kJ/kgK and super-heated steam C_p = 2.1 kJ/kgK; R = 0.287 kJ/kgK.	12M
4	A.	I. Explain the classifications of Compressors	6M
		II. Derive the work done for a single stage air compressor with and clearance volume	6M
		(OR)	
	B	I.A single stage single acting reciprocating air compressor takes in 17 m3/min at suction conditions of 100 KPa and 25^{0}C. The delivery pressure is 700 KPa. The clearance volume is 6% of swept volume. The compression and expansion follows the law $PV^{1.3}$ = C. The speed of the compressor is 600 rpm. Stroke to bore ratio is 1. Find the power required to drive the compressor and cylinder dimensions	6M
		II.Explain the working of roots blower with neat sketch	6M
5	A	I.With help of a neat sketch explain the construction and working of an axial flow compressor.	6M
		II.Draw the velocity triangles for the centrifugal compressor and derive the equation for the estimation of power required to compress the air.	6M
		(OR)	
	B	I. What is a rotary compressor? How are rotary compressors classified?	6M
		II. An axial flow compressor, with compression ratio as 4, draws air at 20^{0}C delivers it at 197^{0}C. The main blade speed and flow velocity are constant throughout the compressor. Assume 50% reaction blading and take the blade velocity as 180 m/s. Find the flow velocity and number of stages. Take work factor = 0.82, $\alpha = 12^0$, $\beta = 42^0$ and Cp = 1.005 kJ/kg K.	6M

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Subject Code: **19BEC4TH01**

II B.Tech - II Semester Supple Examinations, April-2025

ELECTRONIC CIRCUIT ANALYSIS

Time: 3 Hours | Max.Marks:60. | Branch: ECE

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

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1. A) I) Explain of need for biasing and define operating point and DC load lines. **[6M]**
   II) Explain with neat block Self-bias circuit of a BJT amplifier. **[6M]**

   OR

   B) I) Draw the Hybrid model for the transistor (CE, CB & CC) in the different configurations. **[6M]**

   II) An NPN transistor if beta = 50 is used in CE circuit with V_{cc} = 10 V and R_c =2 KΩ. The bias obtained by connecting 100 KΩ resistor from collector to base. Find the quiescent point and stability factor. **[6M]**

2. A) I) List The classification of multistage amplifiers depends on the type of coupling and explain in detail of each amplifier. **[6M]**
   II) Discuss the frequency response of RC coupled amplifiers. **[6M]**

   OR

   B) I) Explain about the distortion in amplifiers. **[6M]**
   II) With neat circuit explain the Bootstrapped Darlington circuit. **[6M]**

3. A) I) Explain with neat circuit diagram of voltage series feedback amplifier. **[6M]**
   II) The current series feedback types of transistor amplifier have the following parameters. R_1= 1 KΩ, R_2= 20 KΩ, h_{ie} =2 KΩ, R_L= 1 KΩ, R_e= 100 Ω and h_{fe} = 80. Calculate A, beta, A_f and loop gain in dB. **[6M]**

   OR

   B) I) Explain with neat circuit diagram of current series feedback amplifier. **[6M]**
   II) Give the general characteristics of negative feedback amplifier with necessary equations. **[6M]**

4. A) I) Derive the expression for frequency response of RC phase shift oscillator. **[6M]**
   II) A Hartley Oscillator is designed with L_1 = 4 mH, L_2 = 32 mH and its frequency of oscillation is 50 KHz. Calculate the value of C. **[6M]**

   OR

   B) I) Derive the expression for frequency response of colpitt's oscillator. **[6M]**
   II) In a RC phase shift oscillator operating at a frequency of 20 KHz, R=2 KΩ, R_c=30 KΩ then find the value of C. **[6M]**

5. A) I) Compare and contrast Class B and Class AB amplifiers. **[6M]**
   II) Explain the working principle of Class A amplifiers. **[6M]**

   OR

   B) I) Explain the DC bias operation of a series-fed Class A amplifier. **[6M]**
   II) Discuss the efficiency of a transformer-coupled Class A amplifier. **[6M]**

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BEC4TH02**

II B.Tech - II Semester Supple Examinations, April-2025

SWITCHING THEORY AND LOGIC DESIGN

Time: 3 Hours | Max.Marks:60. | Branch: ECE

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

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1. A) I) Convert $(101101.101)_2$ to decimal, octal, and hexadecimal number systems. [6M]
   II) Convert $(756)_8$ into its equivalent binary and hexadecimal forms. [6M]

   OR

   B) I) What are error-detecting and error-correcting codes? Explain parity checking with examples. [6M]
   II) Encode the decimal number **25** in BCD and Excess-3 code. [6M]

2. A) I) What are universal gates? Prove that NAND and NOR gates are universal. [6M]
   II) Minimize the Boolean function F (A, B, C) = Σ(0, 1, 3, 4, 6) using a 3-variable K-Map. [6M]

   OR

   B) I) Describe the Karnaugh Map (K-Map) method for minimizing logic functions. [6M]
   II) Implement the function F (A, B, C) = Σ (1, 3, 5, 7) using only NAND gates. [6M]

3. A) I) Design a full adder circuit using two half adders and an OR gate. [6M+6M]
   II) Implement the Boolean function F (A, B, C) = Σ (0, 1, 3, 7) using a 4-to-1 multiplexer.

   OR

   B) I) Explain the working of a 4-bit binary parallel adder with a neat diagram. [6M]
   II) Design a 4-bit magnitude comparator using basic logic gates. [6M]

4. A) I) Explain the operation of an SR flip-flop using a truth table and logic diagram. [6M]
   II) Discuss the working of a T flip-flop with a truth table and applications. [6M]

   OR

   B) I) Explain the design and working of synchronous counters with an example. [6M]
   II) Design a 4-bit synchronous up-counter using JK flip-flops. [6M]

5. A) I) Describe the architecture of a Programmable Array Logic (PAL) with an example. [6M]
   II) Compare PROM, PLA, and PAL in terms of structure, flexibility, and applications. [6M]

   OR

   B) I) Discuss the applications of FPGAs in modern digital systems. [6M]
   II) Implement the Boolean function F (A, B, C) = Σ(0,1,3,5) using a PLA. [6M]

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: **19BEC4TH04**

II B.Tech II Semester Supple. Examinations, April-2025

COMMUNICATION SYSTEMS

Time: 3 Hours | Max.Marks:60. | Branch: ECE

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

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1. A) I) Explain the function of balanced modulators. **[6M]**
   II) An AM transmitter of 1KW power is fully modulated. Calculate the power transmitted if it is transmitted as SSB. **[6M]**

   OR

   B) I) What is the advantage gained from using a pre-emphasis circuit in the Armstrong transmitter. **[6M]**
   II) What is the function of crystal filters in SSB transmitter? **[6M]**

2. A) I) Draw a block diagram of a typical AM receiver and describe briefly function of each block. **[6M]**
   II) With reference to an AM super heterodyne receiver explain the need for AGC and indicate simple method of obtaining it. **[6M]**

   OR

   B) I) Mention briefly the advantages of super heterodyne receiver over TRF receiver. **[6M]**
   II) Discuss briefly similarities and differences between FM and AM receivers. **[6M]**

3. A) I) Explain the roles of the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF). **[6M]**
   II) Describe the structure and role of the ITU Telecommunication Standardization Sector (ITU-T). **[6M]**

   OR

   B) I) Discuss the comparison of PAM, PWM and PPM. **6M]**
   II) Derive the expression for signal to quantization noise ratio in Delta modulation. **[6M]**

4. A) I) Explain the principle of Amplitude Shift Keying (ASK) in digital communication. **[6M+6M]**
   II) Describe the working principle of Frequency Shift Keying (FSK) in digital communication.

   OR

   B) I) Explain the concept of 16-Phase Shift Keying (16-PSK) modulation. **[6M]**
   II) Describe the working principle of 8-Quadrature Amplitude Modulation (8-QAM). **[6M]**

5. A) I) Determine the Entropy of the message COMMUNICATION using Huff-man coding theorem. **[6M]**
   II) Prove that any three properties of Mutual Information. **[6M]**

   OR

   B) I) Determine the Efficiency for the probabilities of 0.6, 0.2, 0.1, 0.05 and 0.05 using Shannon-Fano coding theorem. **[6M]**
   II) Discuss the concept of error correction in data communication. **[6M]**

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BEC4TH05**

II B.Tech II Semester Supple Examinations, April-2025

ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES

Time: 3 Hours Max.Marks:60. Branch: ECE

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

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1. A) I) Explain Coulomb's Law in electrostatics. Derive the expression for the electrostatic force between two point charges. [6 M]

   II) Explain the Biot-Savart Law and derive the expression for the magnetic field B due to a current element. [6 M]

   OR

   B) I) Using Ampere's Law, calculate the magnetic field intensity at a point at a distance r from an infinitely long straight current-carrying wire, with current I. [6 M]

   II) Using Gauss's Law, calculate the electric field intensity at a point due to an infinite line charge with linear charge density λ, at a distance r from the line charge. (Assume the line charge is uniformly charged and the field is in free space. [6 M]

2 A) I) Explain the reasons for the formation of electrostatic fields, magnetostatic fields, and time-varying fields. [6 M]

   II) Discuss the concept of transformer emf and motional emf for moving loops in both static and time-varying magnetic fields. [6 M]

   OR

   B) I)Explain Maxwell's equations in differential and integral forms. [6 M]

   II) Derive the expression for the induced electromotive force (emf) in a stationary loop placed in a time-varying magnetic field. [6 M]

3 A) I) Explain the types of media used in wave propagation, and characterize different media based on their respective parameters such as permittivity, permeability, and conductivity. [6 M]

   II) Derive the general solution for the wave equation of a uniform plane wave. [6 M]

   OR

   B) I) Explain the concept of the Poynting vector and the Poynting theorem. [6 M]

   II) Derive the wave equation for electromagnetic waves in free space. [6 M]

4 A) I) Discuss the different types of polarization (linear, circular, and elliptical) . [6 M]

   II) Explain the electric boundary conditions at the interface between two media. [6 M]

   OR

   B) I) Explain the concept of Brewster's angle and its significance for parallel and perpendicular polarization. [6 M]

   II) Explain the magnetic boundary conditions at the interface between two media. [6 M]

5 A) I) . Discuss the types of loading and their impact on the performance of transmission lines. [6 M]

   II) Explain the types of transmission lines and the primary constants that characterize them. [6 M]

   OR

   B) I) Describe the secondary constants of a transmission line. [6 M]

   II) What is the difference between lossless and low-loss transmission lines? [6 M]

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BCI4TH01**

II B.Tech - II Semester Supple Examinations, April-2025
DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours | Max.Marks:60. | Branch: CSE,IT

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

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1. A) I) Define Database system. Differences between Database and File System.
   II) Explain different types of database users and write the functions of DBA.

OR

2. B) I) Illustrate the three-tier schema architecture for data independence.
   II) Explain how the data inconsistency problems can be avoided in database systems.

3. A) What is Relational Algebra? Define Relational Algebra Operation cross product with example.

OR

B) Explain the following terms with suitable example: (1) Primary Key (2) Candidate Key (3) Foreign Key, (4) Composite key.

4. A) I) Describe the four clauses in the syntax of a simple SQL retrieval query. Show what type of constructs can be specified in each of the clauses. Which are required and which are optional?

   II) Write the following queries in SQL, using the university schema.
   i. Find the ID and name of each student who has taken at least one Comp. Sci. course; make sure there are no duplicate names in the result.
   ii. Find the ID and name of each student who has not taken any course offered before 2017.
   iii. For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor.

   Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query.

OR

B) I) How does SQL allow implementation of the entity integrity and referential integrity constraints described in E-R? What about referential triggered actions? Explain.

II) Consider the following schema. construct the queries in SQL for creation of tables and given questions below.

Dept(deptno: int, dname: string, loc : string)
Emp(empno: int, ename: string, job: string, sal: num, deptno:num,comm real)

1. List all employee details who belongs to deptno=10 and whose job is clerk
2. Find employee details who have same job as blake?
3. Update emp table by changing sal, comm. to 2000 &500 to an employe with empno 7844
4. Display employee names, employee number, deptname & location of all employees?

5. A) I) What is Functional dependency? Write the Properties of Functional dependency.

II) Compare and Contrast 1NF,2NF and 3NF

OR

B) I) What is Surrogate key? Compare Boyce-Codd normal form (BCNF) and 4NF.

II) Show that there can be more than one canonical cover for a given set of functional dependencies, using the following set of dependencies: $X \rightarrow YZ$, $Y \rightarrow XZ$, and $Z \rightarrow XY$.

6. A) Explain ACID properties with example

OR

B) I) Consider a B+-tree in which the maximum number of keys in a node is 5. Calculate the minimum number of keys in any non-root node.

II) What is meant by transaction rollback? What is meant by cascading rollback? Why do practical recovery methods use protocols that do not permit cascading rollback? Which recovery techniques do not require any rollback? Explain.

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BCI4TH02**

II B.Tech - II Semester Supple Examinations, April-2025

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)

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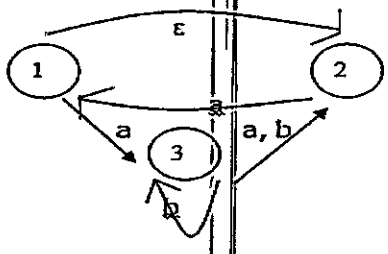
1. A) I) Describe the different Components of Finite State Automata.
   II) Explain the Advantages of FSM and Disadvantages of FSM.

   OR

   B) I) Compare the Context-Free Language and Context-Sensitive Language. Explain the Relationship between Grammars and Languages.

   II) Check whether the following grammar is ambiguous or not. Justify your answer.
   S ->aSbS/bSaS/∈ (epsilon)

2. A) I) Design a DFA to accept the language L1 = {α ∈ {a, b, c}*| α starts and ends with the same symbol}
   II) Find the ε-closure of the following NFA- ε



   OR

   B) I) Explain the Design of a Mealy Machine with example. Write the Properties of Equivalence of Moore and Mealy Machines.
   II) Design a Finite Automata for regular expression (0+11)01. If it is an N.F.A with ε-moves, convert it into its equivalent D.F.A.

3. A) I) Design a regular expression for language, L= {all strings of a's and b's, where each string has "ab" as substring}.
   II) Compare DFA and 2DFA.

   OR

   B) I) If L is {00,01}, compute L^1
   II) Show that the following language is not a context free language. $L=\{a^n b^n c^n / n>=0\}$.

4. A) I) Explain the application of Context-Free Grammars.
   II) What is ambiguous grammar? Check for E->E+E/E*E/E-E/a is ambiguous grammar.

   OR

B) I) Eliminate epsilon productions from the following grammar

S ->ABC/A0A

a ->0A/B0C/000/B

c ->1B1/0/D

D -CA/AC

D->Є (epsilon)

II) Design a PDA for language L = $\{a^i b^j c^k \mid i=2j \text{ or } j=2k\}$.

5. A) I) What are the Roles of TM's? Explain the steps in design of TM's.

II) Design a Turing machine to compute $m + n$ where m and n are positive integers.

OR

B) I) Explain the concept of Class P, NP, NP-complete and NP-hard. Prove that the 3-SAT problem is NP-complete.

II) Design a TURING MACHINE for language L = $\{wcw^r$ where w ϵ (a+b)*$\}$. And give the instantaneous descriptions for string abcba.

Narasaraopeta Engineering College (Autonomous)

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

Subject Code: **19BIT4TH03**

II B.Tech II Semester Supple. Examinations, April-2025

INTERNET OF THINGS

Time: 3 Hours | Max.Marks:**60**. | Branch: IT

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

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1. A) Explain characteristics and physical design of IoT. [12 M]

   OR

   B) Explain M2M, IOT and compare them. [12 M]

2. A) I) Explain information model specification of IoT system. [6 M]
   II) Explain service specification of IoT system. [6 M]

   OR

   B) I) Explain domain model specification of IoT system. [6 M]
   II) Explain operational view specification of IoT system. [6 M]

3. A) I) Explain Rasberry pi interfaces. [6 M]
   II)Explain PcDuino IoT device. [6 M]

   OR

   B) I) Explain sensors and actuators with examples. [6 M]
   II) Explain Ardunio IoT device. [6 M]

4. A) I) Explain AutoBahn for IoT. [6 M]
   II) Explain different IoT cloud computing services. [6 M]

   OR

   B) Explain communication APIs in IoT in detail. [12 M]

5. A) Explain smart city IoT application development with example. [12 M]

   OR

   B) Explain home automation IoT application development. [12 M]

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: 19BIT4TH05

II B.Tech II Semester Supple. Examinations, April-2025

COMPUTER NETWORKS

Time: 3 Hours | Max.Marks:60. | Branch: IT

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

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1. A) I) Explain various categories of networks

   II) What is the significance of layered architecture? Explain the OSI layered architecture with neat sketch.

   OR

   B) I) Explain the following networks
   i) ARPANET ii) Internet
   II) Explain the TCP/IP with neat sketch

2. A) I) Explain the following error detection techniques
   i) Cheksum ii) CRC
   II) With an example explain the sliding window Flow control mechanism.

   OR

   B) I) Explain the design issues of data link layer
   II) Discuss about IEEE802.3 standard

3. A) I) Describe the stop and wait protocol with neat sketch
   II) Discuss about HDLC protocol

   OR

   B) I) Compare and Contrast aloha schemes
   II) Discuss about CSMA/CD protocol and its basic functions

4. A) I) Explain the Store And Forward Packet Switching in detail
   II) Explain the IPv4 frame format

   OR

   B) I) Explain shortest path routing algorithm with an example.

   II) With an example explain the Flooding, Hierarchical routing algorithms used in computer networks

5. A) I) Enumerate the mechanism of three way handshake protocol for TCP

   OR

   B) I) Compare and Contrast TCP and UDP
   II) Explain in detail about function and structure of e-mail