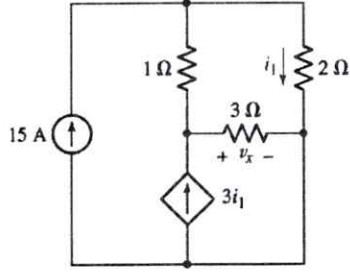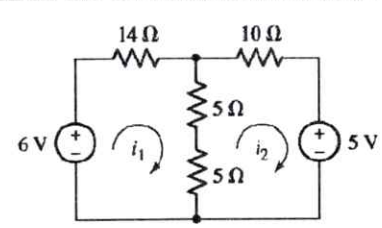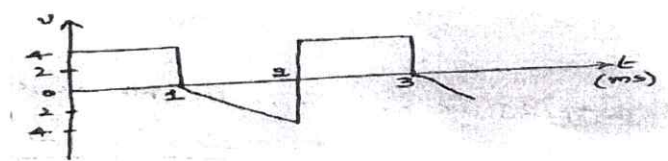# R19

I B.TECH II SEM

SUPPLEMENTARY EXAMINATIONS

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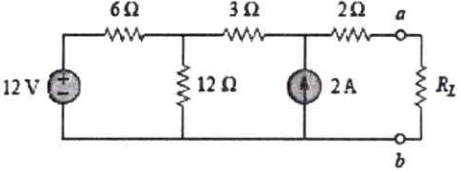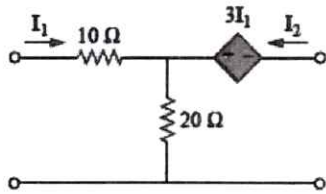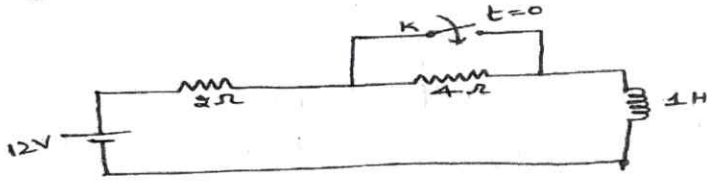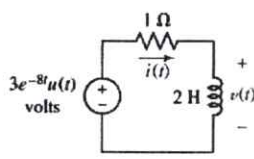
I B.Tech II Semester Supple. Examinations, April-2024

Sub Code: 19BEC2TH04   **NETWORK ANALYSIS**

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	
	a	i) Define the following i) Electric charge ii) Current iii) Electric energy and iv) Potential	[6M]
		ii) Determine the power supplied by the dependent source shown in figure	[6M]
1		**OR**	
	b	i) Explain about star to delta conversion.	[6M]
		ii) Determine the currents i1 and i2 in the circuit shown below.	[6M]
		Unit-II	
	a	i)Define the following terms associated with periodic functions: Time period, Angular velocity and frequency	[6M]
2		ii) Calculate the rms and average values for the Voltage wave form shown:	[6M]
		OR	
	b	i) What is coupling coefficient? Derive the expression for it.	[6M]
		ii) A choke coil (R –L) is connected in series with a 25 µF capacitor. This series combination is connected across a supply voltage of 230V. the circuit draws 55A when the resonance frequency is 50 Hz. Calculate inductance of the coil, and ii) the voltage across the capacitor	[6M]

		Unit-III	
3	a	i) For an RC series circuit, a sinusoidal voltage v (t) Vm sinωt is applied at t=0. Find the expression for transient current using both differential equation approach and Laplace transform approach.	[12M]
		OR	
	b	i) State and explain Norton's theorem.	[6M]
		ii) Find the maximum power across A and B	[6M]
		Unit-IV	
4	a	i) Derive the expression for resonant frequency of series resonant circuit.	[6M]
		ii) A series connected circuit has R = 4Ω and L = 25 mH. (i) Calculate the value of C that will produce a quality factor of 50. (ii) Find ω1, ω2 and bandwidth.	[6M]
		OR	
	b	i) Explain about Z-parameters of a two port network.	[6M]
		ii) Find the transmission parameters of the following two port network:	[6M]
		Unit-V	
5	a	i) Explain the transient response of Series RC circuit when dc voltage is applied to the circuit	[6M]
		ii) For the figure shown, the dc voltage is applied to the circuit keeping the switch K open so that the steady state is reached. Determine the complete response for the circuit after closing the switch K.	[6M]
		OR	
	b	i) Discuss about step response of an RC circuit.	[6M]
		ii) Calculate the voltage v(t) shown in figure, given an initial current I (0⁻) = 1A using Laplace transform method	[6M]

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2

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

Sub Code: 19BCC2TH01   **COMMUNICATIVE ENGLISH-II**

Time: 3 hours   (Common to CE, EEE, ME, ECE, CSE, IT)   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) How did Rahul contribute to the growth of the automobile industry in India?	[6M]
			ii) What is communication? How would you describe good/effective communication?.	[6M]
			OR	
	b		i) In what way did the Government of India acknowledge Rahul Bajaj's contribution?	[6M]
			ii) You are an engineering graduate. Write an e-mail application letter in response to an advertisement for the Technical Associate in a well-known petrochemical company	[6M]
2	a		**Unit-II**	
			i) Briefly describe the various companies under the umbrella of Tata sons	[6M]
			ii) Fill in the blanks with the words formed by adding suitable prefix/suffix in the following sentences. A) All my life would be _____ (meaning) without you B) I will totally_____(play) the entire season of my favourite TV series, Silicon Valley. C) _____ (thinking) can cause depression or anxiety. D) Is there any new _____ (develop)? E) A large number of NGOs in India work for the people. They are not concerned with politics. They are_____ (political). F) The guest speaker lectured _____ (stop) for more than one hour. [6M]	
			OR	
	B		i) Write your assessment of Ratan Tata's achievements and his contribution to Indian industries.	[6M]
			ii) What are the features of human communication?	[6M]
3	a		**Unit-III**	
			i) Describe some of the ventures that Bhatia started after selling Hotmail.	[6M]
			ii) Write the importance of listening for effective communication?	[6M]
			OR	
	b		i) 'It was not the individuals but their human stories that inspired me to become an entrepreneur.' Who were Bhatia's role models in his journey?	[6M]
			ii) Write a few tips for effective listening.	[6M]

		Unit-IV	
4	a	i) The Only way to do great work is to love what you do" how did Steve job proved this in his own life.	[6M]

		Write one word substitutes for the following.
		
		    A) One who often talks of his achievements.
		
		    B) A person who speaks many languages.
		
		    C) A community of people smaller than a village
		
		    D) A group of worshippers.
		
		    E) A group of things that have been hidden in a secret place.
		
		    F) One who does not believe in the existence of God.
			[6M]

		OR	
	b	i) What is Pixar and what was Steve Jobs's role there?	[6M]
		ii) Tech Mahindra Ltd, Secunderabad, requires software engineer with good communication skills and knowledge of Oracle/.Net. Attractive salary for the deserving candidate. Apply with your resume along with the covering letter within 10 days.	[6M]
5		Unit-V	
	a	i) Describe some of the work done by Sudha Murthy in the field of philanthropy and social work.	[6M]
		ii) Develop a dialogue between a Scientist and the Prime Minister of India in the advantages of supplying Corona Vaccine to foreign Countries to save the mankind.	[6M]
		OR	
	b	i) 'We should make way for the youngsters instead of expecting them to come around to our ways.' Do you agree with Sudha Murthy?	[6M]
		ii) Write an essay on advantages of Social Media" use creative effective expressions.	[6M]

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

Sub Code: 19BCC2TH02   **DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

Time: 3 hours   (Common to CE, EEE, ME, 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) Solve $(dy/dx) + xy = x^3$ subject to $y(0)=1$.	[6M]
		ii) If the population of a country doubles in 50 years, in how many years will it triple, assuming that the rate of increase is proportional to the number of inhabitants?	[6M]
		OR	
	b	i) Solve $(3y - 2x^3)\,dx + (4x - 3x^2 y^2)\,dy = 0$, subject to $y(1)=2$.	[6M]
		ii) Find the orthogonal trajectory of the family of curves $y = c e^{-2x} + 3x$, passing through the point $(0,3)$.	[6M]
		Unit-II	
2	a	i) Solve $\dfrac{d^3 y}{dx^3} + y = \sin^2\left(\dfrac{x}{2}\right) + e^{-x}$.	[6M]
		ii) Solve $\dfrac{d^2 y}{dx^2} - 6\dfrac{dy}{dx} + 9y = \dfrac{e^{3x}}{x^2}$.	[6M]
		OR	
	b	i) Solve the simultaneous equations: $t\dfrac{dx}{dt} + y = 0,\ t\dfrac{dy}{dt} + x = 0$, given $x(1)=1,\ y(-1)=0$.	[6M]
		ii) Solve $(1+x)^2 \dfrac{d^2 y}{dx^2} + (1+x)\dfrac{dy}{dx} + y = 4\cos.$	[6M]
		Unit-III	
3	a	i) Find the partial differential equation of all spheres of radius a with center lies in xy-plane.	[6M]
		ii) Solve $x(z - 2y^2)\dfrac{\partial z}{\partial x} + y(z - y^2 - 2x^3)\dfrac{\partial z}{\partial y} = z(z - y^2 - 2x^3).$	[6M]
		OR	
	b	i) Form the partial differential by eliminating arbitrary function from $f(x+y+z,\ x^2+y^2+z^2)=0$.	[6M]
		ii) Solve $\dfrac{\partial z}{\partial x} - 2\dfrac{\partial z}{\partial y} = 2x - e^y + 1$.	[6M]

		Unit-IV	
4	a	i) find the directional derivative of $\frac{1}{r}$ in the direction of $\vec{r}$ where $\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$.	[6M]
		ii) If f and g are two scalar point functions, the prove that $\nabla.(f\nabla g)=f\nabla^2 g+\nabla f.\nabla g$	[6M]
		OR	
	b	i) If $\vec{v}=\frac{x\hat{i}+y\hat{j}+z\hat{k}}{\sqrt{x^2+y^2+z^2}}$, find the value of div $\vec{v}$	[6M]
		ii) Prove that $\nabla\times\nabla\times\nabla\times\nabla\times\vec{F}=\nabla^4\vec{F}$, where $\nabla\cdot\vec{F}=0$.	[6M]
5		**Unit-V**	
	a	i) Find the counter clockwise circulation of the field $\vec{f}=xy\hat{i}+y^2\hat{j}$ around the boundary of the region enclosed by the curves $y=x^2$ and $y=x$ in the first quadrant.	[6M]
		ii) Use triple integral to determine the volume of the region that is below $z=8-x^2-y^2$, above $z=-\sqrt{4(x^2+y^2)}$ and inside $x^2+y^2=4$.	[6M]
		OR	
	b	Verify Gauss divergence theorem for $\vec{F}=x^3\hat{i}+x^2 y\hat{j}+x^2 z\hat{k}$ and S is the surface bounded by the circular cylinder $x^2+y^2=a^2$ and the planes $z=0, z=b$, where $a>0, b>0$.	[12M]

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

Sub Code: 19BCC2TH03 **ENGINEERING CHEMISTRY**

Time: 3 hours (Common to CE, ME, 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) Explain Ion-exchange method for water softening with a neat diagram and suitable chemical reactions.	[5M]
			ii) Hard water prevents lathering of soaps-Explain the observation with suitable chemical reaction.	[3M]
			iii) Determined the amount of lime and soda required for softening of 20000 litres of hard water containing 40 ppm of $Ca(HCO_3)_2$ and 50 ppm of $MgCl_2$.	[4M]
			OR	
	b		i) Explain the method for the determination of alkalinity of a water sample.	[4M]
			ii) In hardness of water determination experiment, 40 mL hard water required 20 mL 0.05M EDTA solution. Calculate the hardness of water in ppm.	[4M]
			iii) Define BOD of a water sample. A 50 mL of sample contains 840 ppm of dissolved oxygen. After 5 days, the dissolved oxygen value changed to 230 ppm when the sample diluted to 80 mL. Calculate BOD of the sample.	[4M]
			Unit-II	
2	a		i) Classify polymers on the basis of their shapes with appropriate examples.	[4M]
			ii) Mention the differences between addition polymerization and condensation polymerization.	[5M]
			iii) How thermoplastics differs from thermosetting plastics?	[3M]
			OR	
	b		i) Write the differences between octane number and cetane number of a fuel.	[5M]
			ii) Define Calorific value of a fuel. State the relationship between HCV and LCV.	[3M]
			iii) Write down boiling point ranges and uses of three important fractions obtained after fractional distillation of crude petroleum.	[4M]
			Unit-III	
3	a		i) How nanomaterials classify on the basis of their dimensionality? Give suitable examples in each case.	[4M]
			ii) Write a short note on sol-gel method for the preparation of nanomaterial.	[4M]
			iii) Mention the properties and applications of fullerenes.	[4M]
			OR	
	b		i) What is a liquid crystal? How it is different from normal crystal?	[3M]
			ii) How does thermotropic liquid crystals differ from lyotropic liquid crystals?	[4M]
			iii) Define composites. How are composite materials classified? Give suitable examples.	[5M]
4			**Unit-IV**	
	a		i) Construct a H_2-O_2 fuel cell and explain its working principle with the help of chemical reactions involved in it.	[6M]
			ii) An electrochemical cell uses Zn^{2+}/Zn and Cu^{2+}/Cu electrodes. Standard electrode potential of Cu^{2+}/Cu and Zn^{2+}/Zn electrodes are 0.34 V and -0.76 V, respectively. Write the net cell reaction. Also, calculate the EMF of the cell and equilibrium constant of the cell at 25 °C if $[Zn^{2+}]$ = 0.01 M and $[Cu^{2+}]$ = 10 M.	[6M]
			OR	
	b		i) Explain electrochemical theory of wet corrosion with a suitable mechanism.	[4M]
			ii) Mention the factors affecting corrosion.	[3M]
			iii) How anodic coating differs from cathodic coating?	[2M]
			iv) Write a short note on paint.	[3M]

		Unit-V	
5	a	i) What are refractory materials? How are they classified? Give suitable examples.	[4M]
		ii) Mention the characteristics of a good refractory material.	[4M]
		iii) Explain setting and hardening of cement.	[4M]
		OR	
	b	i) Discuss the classification of lubricants with suitable examples. Give two applications of each lubricating oil.	[6M]
		ii) Explain viscosity index, flash point and cloud point of a lubricating oil.	[6M]

***********************All The Best*****************

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

Sub Code: 19BCC2TH07   **ENGINEERING PHYSICS**

Time: 3 hours   (Common to EEE, CSE, IT)   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) Explain the Newton's ring experiment and derive the expression for refractive index of the medium.	[8M]
			ii) What is diffraction grating? Derive grating equation. Discuss its importance.	[4M]
			OR	
	b		i) Differentiate circularly and elliptically polarized light. Explain the principle of double refraction in calcite crystal.	[6M]
			ii) Discuss the construction and working of Nichol's prism and how double refraction is explained using Nichol's prism.	[6M]
			Unit-II	
2	a		Differentiate spontaneous and stimulated emission of radiation. Explain the construction and working of ruby laser. Discuss its merits and demerits.	[12M]
			OR	
	b		i) Discuss the principal of light propagation through optical fiber.	[4M]
			ii) Derive the expression for Numerical aperture of an optical fiber. The refractive indices of core and cladding materials of a step index fiber are 1.48 and 1.45, respectively. Calculate: (i) numerical aperture, (ii) acceptance angle, and (iii) the critical angle at the core-cladding interface and (iv) fractional refractive indices change.	[8M]
			Unit-III	
3	a		i) Define unit cell and its parameters. Based on axial lengths and interfacial angle of a unit cell, classify various Bravais lattices.	[8M]
			ii) Using an example, explain the procedure for the determination of Miller indices of a plane.	[4M]
			OR	
	b		i) Derive the relation between Miller indices and interplanar distance of a plane.	[6M]
			ii) Define atomic packing factor. Derive the atomic packing factor of BCC crystal systems.	[6M]
			Unit-IV	
4	a		i) Discuss Stoke's and Gauss divergence theorem of electromagnetism.	[6M]
			ii) Differentiate soft and hard magnetic materials based on hysteresis.	[6M]
			OR	
	b		i) Classify magnetic materials based on susceptibility, temperature and effective magnetization.	[6M]
			ii) Derive Maxwell's equations in differential form.	[6M]
			Unit-V	
5	a		i) Assuming Schrodinger equation, derive the probability density function, Energy of a particle enclosed in an infinite potential well for three excitation states.	[8M]
			ii) Discuss the physical significance of wave function.	[4M]
			OR	
	b		i) State and explain Hall effect. Derive the relation between Hall coefficient and Hall voltage.	[8M]
			ii) Differentiate intrinsic and extrinsic semiconductors.	[4M]

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1

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

Sub Code: 19BCI2TH08   PROBABILITY AND STATISTICS

Time: 3 hours   (Common to CSE, IT)   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) Players A and B alternately throw a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is 30/61.	[6M]
			ii) The number of monthly breakdowns of a computer is a random variable having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month (a) Without a breakdown (b) With only one breakdown; and (c) With at least one breakdown.	[6M]
			OR	
	b		i) A bag contains 5 balls and it is not known how many of them are white. Two balls are drawn at random from the bag and they are noted to be white. What is the chance that all the balls in the bag are white?	[6M]
			ii) If the random variable X takes the values 1, 2, 3 and 4 such that $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$, find the probability distribution and cumulative distribution function of X.	[6M]
			Unit-II	
2	a		i) A continuous random variable X has a probability density function $f(x) = kx^2e^{-x}$, $x \geq 0$. Find k, mean and variance.	[6M]
			ii) Subway trains on a certain line runs every half an hour between midnight and 6 in the morning. What is the probability that a man entering the station at random time during this period will have to wait at least 20 minutes.	[6M]
			OR	
	b		i) A continuous random variable X has a density function given by $f(x) = k(1 + x)$, $2 < x < 5$. Find $P(X < 4)$.	[6M]
			ii) If X denotes the waiting time in minutes of the shopkeeper that follows Gamma distribution with $\alpha = \frac{1}{2}$, = 2. Find the probability that the shopkeeper will wait more than 5 minutes before the customers arrive?	[6M]
			Unit-III	
3	a		If a population is 3, 6, 9, 15, 27. (i) List all possible sample size of 3, that can be taken without replacement from the finite population. (ii) Calculate the mean of each of the sampling distribution of means.(iii) Find the standard deviation of sampling distribution of mean.	[12M]
			OR	
	b		The personnel department of an organization would like to estimate the family dental expenses of its employees to determine the feasibility of providing a dental insurance plan. A random sample of 10 employees reveals the following family dental expenses (in thousand Rs) in the previous year: 11, 37, 25, 62, 51, 21, 18, 43, 32, 20. Set up a 99 percent confidence interval of the average family dental expenses for the employees of this organization.	[12M]

Unit-IV

4	a	i) Two samples of sizes 9 and 8 give the sum of squares of deviations from their respective means equal to 160 inches square and 91 inches square respectively. Can they be regarded as drawn from the same normal population?	[6M]
		ii) Certain pesticide is packed into bags by a machine. A random same of 8 bags is drawn and their contents are found to weight (in Kgs) as follows: 50, 49, 52, 44, 45, 48, 46, 45 Test if the average packing can taken to be 50 kgs.	[6M]
		OR	
	b	i) From experience, it was recorded that certain workers who underwent a training emerged out as the 1st, 2nd, 3rd, 4th grade workers their number were in the ratio 9 : 3 : 3 : 1. In a current set of 556 such workers the respective graded persons were 315, 101, 108, 32. Use chi-square test to find whether the observed values are commensurable to the recorded values.	[6M]
		ii) A sample of 10 measurement of the diameter of a sphere gave a mean as 4.38 inches and a standard deviation as 0.06 inch. Find 95% confidence limits for the actual diameter.	[6M]

Unit-V

5	a	A factory manufacturing small bolts. To check the quality of the bolts, the manufacturer selected 20 samples of same size 100 from the manufacturing process time to time. He/she visually inspected each selected bolt for certain defects. After the inspection, he/she obtained the following data:	[12M]

Sample Number	1	2	3	4	5	6	7	8	9	10
Proportion Defective	0.10	0.04	0.08	0.15	0.08	0	0.01	0.05	0.05	0.08
Sample Number	11	12	13	14	15	16	17	18	19	20
Proportion Defective	0.10	0	0.06	0.05	0.03	0.20	0.05	0.07	0.01	0.08

Estimate the proportion defective of the process. Does the process appear to be under control with respect to the proportion of defective bolts?

		OR	
	b	15 tape-recorders were examined for quality control test. The number of defects in each tape-recorder is recorded below. Draw the appropriate control chart and comment on the state of control	[12M]

Unit no. (i)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of defects (c)	2	4	3	1	1	2	5	3	6	7	3	1	4	2	1

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2

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

Sub Code: 19BEC2TH06   **C PROGRAMMING**

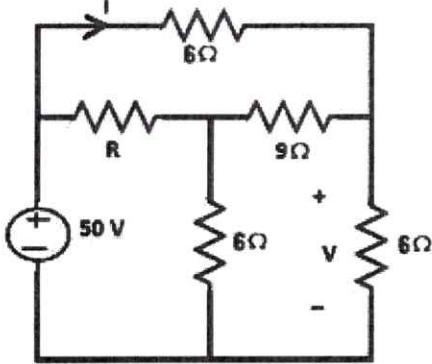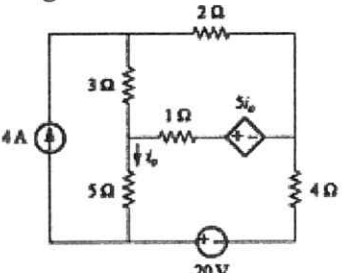Time: 3 hours   (ECE)   Max. Marks: 60

Note: Answer All **FIVE** Questions.

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

Q.No			Questions	Marks
			Unit-I	
1	a		i) What is flowchart? Explain different symbols used for flowchart.	[6M]
			ii) Explain the various generations of programming languages	[6M]
			OR	
	b		i) Explain about relational and logical operators. Explain with examples	[6M]
			ii) Explain any four basic types of constants with an example each	[6M]
			Unit-II	
2	a		Explain about the iterative statements with examples.	[12M]
			OR	
	b		i) What is the difference between call by value and call by reference? Discuss the problems associated with each.	[6M]
			ii) Write a recursive function to obtain the solution for the Tower of Hanoi problem	[6M]
			Unit-III	
3	a		i) How to declare and initialize a Two-dimensional array? Discuss with examples	[6M]
			ii) Write a C program to perform the addition of two matrices	[6M]
			OR	
	b		i) How to declare string? Differentiate between character array and strings	[6M]
			ii) Write a C program to find whether a given string is palindrome or not.	[6M]
			Unit-IV	
4	a		i) How pointers are used to declare single and multi-dimension arrays with examples?	[6M]
			ii) Write a program to print command line arguments on the screen.	[6M]
			OR	
	b		i) How to declare a structure and initialize values for structure members?	[6M]
			ii) Write a C program using a pointer to structure illustrating the initialization of the members in the structure	[6M]
			Unit-V	
5	a		i) Explain about the functions for reading and writing data from a file.	[6M]
			ii) Demonstrate the use of fread( ) and fscanf( ) for reading sequentially from a disk	[6M]
			OR	
	b		i) Write a C program to count the number of characters and number of lines in a file.	[12M]

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

Sub Code: 19BEE2TH13   **ELECTRICAL CIRCUIT ANALYSIS-I**

Time: 3 hours   (EEE)   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) Explain different types of elements that constitute an electric circuit	[6M]
		ii) Differentiate between independent and dependent sources. What is their circuit representation	[6M]
		OR	
	b	i) In the circuit shown below, if V = 20V then determine I and R	[6M]
		ii) Obtain the relationship between star to delta and delta to star conversion.	[6M]
2		**Unit-II**	
	a	An inductive coil, having resistance of 10 Ω and inductance of 50 mH, is connected in series with a capacitance of 100 µF across 100V, 50 Hz supply. Calculate the current, the power factor and the voltage drops across the capacitor and the coil respectively.	[12M]
		OR	
	b	i) Define RMS value and average value and also derive the expressions of the same for a sinusoidal wave form	[6M]
		ii) A resistor (R) of 50 Ω in parallel with a capacitor (C) of 40 µF, is connected in series with a pure inductor (L) of 30 mH to a 100 V, 50 Hz supply. Calculate the total current and also the current in the capacitor. Draw the phasor diagram.	[6M]
3		**Unit-III**	
	a	Draw a suitable tree and dual network. Use general loop analysis to find i0 in the circuit shown in below Figure.	[12M]

			OR	
	b	i)	Define the following terms with respect to network topology a) Graph b) Tree c) Cut set d)duality between networks	[6M]
		ii)	For the given network graph shown below, write down the basic Tieset matrix, taking the tree consisting of edges 2,4 and 5. 	[6M]
4			Unit-IV	
	a	i) Define Q factor and derive its value for (i) series resonance and (ii) parallel resonance.	[6M]
		ii) Consider a series resonance circuit consisting of a 10 Ohms resistance, a 2mH inductance and a 200nF capacitance. Determine the maximum energy stored, the energy dissipated per cycle and the bandwidth of the circuit	[6M]
			OR	
	b	i) Describe the composite magnetic circuits.	[6M]
		ii) Two coils having 800 and 1000 turns are wound on a common non-magnetic core. The leakage flux and mutual flux due to a current of 5A in coil is 0.3 mwb and 0.6 mwb respectively. Find i) Self and mutual inductance ii) coefficient of coupling.	[6M]
5			Unit-V	
	a	i) State and explain Norton's theorem.	[6M]
		ii)Find the current IL of the shown in following figure. Use Millmans theorem 	[6M]
			OR	
	b	i) State and explain reciprocity theorems with sinusoidal excitations	[6M]
		ii) Calculate the current in the 2Ω resistor of figure bellow using superposition theorem. 	[6M]

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

Sub Code: 19BCI2TH10   NUMERICAL METHODS AND VECTOR CALCULUS

Time: 3 hours   (Common to CSE, IT)   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) Find a negative root of the equation $x^2-4x+9=0$ by bisection method, correct upto three decimal places.	[6M]
		ii) Find a negative root of the equation $x^3-21x+3500=0$ using Newton-Raphson method, correct to three decimal places.	[6M]
		OR	
	b	i) Find the positive real root of the equation $2x-\log_e x-7=0$ using Regula falsi method, correct to three decimal places.	[6M]
		ii) Obtain the root of the equation $x^5-5x^2+3=0$ correct to three decimal places, using Newton-Raphson method.	[6M]
		Unit-II	
2	a	i) Estimate the value of $f(22)$ and $f(42)$ from the following table	[6M]

x:	20	25	30	35	40	45
$f(x)$:	354	332	291	260	231	204

ii) From the following table, estimate the number of students who obtained marks between 40 and 45.   [6M]

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

OR

b i) Prove that $\nabla^2=h^2D^2-h^3D^3+\dfrac{7}{12}h^4D^4-\cdots$ where h and ∇ are interval of differencing and backward difference operators, respectively.   [2M]

ii) Find the missing term in the following table using Newtwon's divided difference formula   [5M]

x:	0	1	2	3	4
$f(x)$:	1	3	9	-	81

iii) Find the distance moved by a particle and its acceleration at the end of 4 seconds, if the time verses velocity data is as follows: [5M]

t:	0	1	3	4
v:	21	15	12	10

Use Lagrange's method of interpolation.

Unit-III

3 a i) A slider in a machine moves along a fixed straight rod. Its distance x cm. along the rod is given below for various values of the time t seconds. Find the velocity of the slider and its acceleration when $t=0.3\ seconds$.   [6M]

t:	0	0.1	0.2	0.3	0.4	0.5	0.6
x:	30.13	31.62	32.87	33.64	33.95	33.81	33.24

	ii)	The following table gives the velocity v of a particle at time t:	[6M]

t (seconds)	0	2	4	6	8	10	12
v (m/s)	4	6	16	34	60	94	136

Find the distance moved by the particle in 12 seconds and also the acceleration at $t = 2\,sec$.

<div align="center">OR</div>

	i)	Obtain the Picard's third approximation for the initial value problem $$\frac{dy}{dx} = -xy,\ y(0) = 1$$	[6M]
b	ii)	Apply Runge-Kutta fourth order method to find approximate value of y for $x = 0.2$, in steps of 0.1, if $\dfrac{dy}{dx} = \dfrac{y^2 - 2x}{y^2 + x}$, given that $y = 1$ when $x = 0$.	[6M]

<div align="center">Unit-IV</div>

4	a	i) Find the values of a and b such that the surface $a x^2 - byz = (a+2)x$ and $4 x^2 y + z^3 = 4$ cut orthogonally at $(1,-1,2)$.	[6M]
		ii) Show that $\left| grad\, r^n \right| = n(n+1) r^{n-2}$.	[6M]

<div align="center">OR</div>

	b	i) Find the values of the constants a, b, and c so that the directional derivative of $\phi = ax y^2 + byz + c z^2 x^3$ at $(1,2,-1)$ has a maximum of magnitude 64 in a direction parallel to the z axis.	[6M]
		ii) Find the acute angle between the surfaces $x y^2 z = 3x + z^2$ and $3 x^2 - y^2 + 2z = 1$ at the point $(1,-2,1)$.	[6M]

<div align="center">Unit-V</div>

5	a	i) Show that $\vec{F} = (2xy + z^3)\vec{i} + x^2 \vec{j} + 3x z^2 \vec{k}$ is a conservative force field. Find the scalar potential. Find the work done in moving an object in this field from $(1,-2,1)$ to $(3,1,4)$.	[6M]
		ii) Evaluate $\iint_S \vec{F} \cdot \vec{n}\, dS$ where $\vec{F} = 18z\vec{i} - 12\vec{j} + 3y\vec{k}$ and S is the portion of the plane $2x + 3y + 6z = 12$ in the first octant.	[6M]

<div align="center">OR</div>

	b	Verify the divergence theorem for $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - zx)\vec{j} + (z^2 - xy)k$ taken over the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b, 0 \le z \le c$	[12M]

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<div align="center">2</div>

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

Sub Code: 19BCC2TH14

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time: 3 hours (Common to CE, 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	a		i) Distinguish between Active and passive elements	[6M]
			ii) A 100 W, 250 V bulb is put in series with a 60 W, 250 v bulb across a 500 V Supply. What will be the power consumed by each bulb	[6M]
			OR	
	b		i) State and explain ohms Law. What is the limitation of the Law?	[6M]
			ii) Two resistances of 10Ω and 40Ω respectively are connected in parallel. A third resistance of 5Ω is connected in series with the combination and a D.C supply of 240 V is applied to the ends of the completed circuit. Calculate the current in each resistance.	[6M]
			Unit-II	
2	a		i) Explain the basic principle of operation of DC generator	[6M]
			ii) Calculate the generated EMF of a 4-pole, wave-wound armature having 40 slots with 18 conductors per slot when driven at 1200 rpm. The flux / pole is 0.018 wb.	[6M]
			OR	
	b		i) Explain the speed control methods of DC motors	[6M]
			ii) What are the various types of DC Motors and mention their applications	[6M]
			Unit-III	
3	a		i) Deduce the EMF equation of single phase transformer	[6M]
			ii) A 3300/250 V, 50 Hz, single-phase transformer is built on a core having an effective cross sectional area of 125 cm^2 and 70 turns on the low voltage winding. Calculate (i) maximum value of flux density (ii) the number of turns on HV winding?	[6M]
			OR	
	b		i) What is synchronous speed? Establish the relation among frequency, speed and no of poles.	[6M]
			ii) A three-phase induction motor is wound for four poles and is supplied from a 50-Hz supply. Calculate (i) the synchronous speed, (ii) the speed of the rotor when the slip is 3%, and (iii) the rotor frequency when the speed of the rotor is 900 rpm.	[6M]
			Unit-IV	
4	a		i) What is a rectifier? Explain operation of bridge rectifier	[6M]
			ii) Compare half wave and full wave rectifiers	[6M]
			OR	
	b		i) Explain the working of P-N junction diode	[6M]
			ii) Explain the following terms with respect to rectifiers: i) Ripple factor ii) Peak Inverse Voltage iii) Regulation	[6M]
			Unit-V	
5	a		i) Explain in detail about common emitter configuration and draw its input and output characteristic	[6M]
			ii) Explain how a transistor can be used as a static Switch	[6M]
			OR	
	b		i) How a transistor acts as an amplifier? Explain?	[6M]
			ii) Compare CE, CC and CB amplifier in terms of voltage and current gains and input and output impedances	[6M]

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