

## II B.Tech I Semester Supple Examinations, May-2023

**Sub Code: 19BCC3TH01 BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS**

Time: 3 hours

(Common to CE, CSE, IT)

Max. Marks: 60

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

Q.No.	Questions	Marks	
1	Unit-I		
	a	i) What are the assumptions, applications and limitations of cost volume profit (CVP) analysis? <span style="float: right;">[6M]</span> ii) A store sells t-shirts. The average selling price is Rs. 15 and the average variable cost (cost price) is Rs. 9. Thus, every time the store sells a shirt it has Rs. 6 remaining after it pays the manufacturer. This Rs. 6 is referred to as the unit contribution. (a) Suppose the fixed costs of operating the store (its operating expenses) are Rs. 100,000 per year. Find Break-even in units? (b) If the owner desired a profit of Rs. 25,000, what will be break-even point in Rupees? (c) If fixed costs rose to Rs. 110,000, break-even in units volume would be? <span style="float: right;">[6M]</span>	
	OR		
	b	i) What is law of demand? Explain it with relevant example. <span style="float: right;">[6M]</span> ii) What are the four types of demand? What are the factors that affect price elasticity of demand? <span style="float: right;">[6M]</span>	
	Unit-II		
	a	Record the following transactions in the Journal and post them into ledger and prepare a Trail Balance <span style="float: right;">[12M]</span>  Oct 1 <sup>st</sup> : Neel started business with a capital of 80,000 3 <sup>rd</sup> : Bought goods from Karl on credit 20,000 4 <sup>th</sup> : Sold goods to Tarl 25,000 5 <sup>th</sup> : Cash purchases 25,000 7 <sup>th</sup> : Cash sales 15,000 9 <sup>th</sup> : Goods returned to Karl 2,000 10 <sup>th</sup> : Bought furniture for 15,000 11 <sup>th</sup> : Cash paid to Karl 12,000 12 <sup>th</sup> : Goods returned by Tarl 3,000 14 <sup>th</sup> : Goods taken by Neel for personal use 3,000 15 <sup>th</sup> : Cash received from Tarl 12,000 16 <sup>th</sup> : Took loan from Parl 30,000 17 <sup>th</sup> : Salary paid 5,000 18 <sup>th</sup> : Bought stationery for 1,000 19 <sup>th</sup> : Amount paid to Parl on loan account 18,000 20 <sup>th</sup> : Interest received 4,000	

OR																																															
	b	i) What are the main characteristics of oligopoly market? Mention its advantages and disadvantages to buyers and sellers?	[4M]																																												
		ii) Distinguish between perfect market and monopoly market competition.	[4M]																																												
		iii) Write the basic principles of financial accounting.	[4M]																																												
Unit-III																																															
3	a	i) Examine the contemporary relevance of Henry Fayol's principles of management.	[6M]																																												
		ii) Describe the significant contributions of F.W. Taylor to the management.	[6M]																																												
	OR																																														
	b	i) Briefly explain Douglas Mc Gregor's Theory X and Y.	[6M]																																												
ii) Define management and explain its functions.		[6M]																																													
Unit-IV																																															
4	a	i) What are the primary responsibilities and major functions of HR manager in a modern business organization?	[6M]																																												
		ii) Discuss the changing role of marketing in 21st century.	[6M]																																												
	OR																																														
	b	i) What are the objectives and functions of financial management? Mention the primary decision making areas of a financial manager.	[6M]																																												
ii) Write the roles and responsibilities of production managers in manufacturing?		[6M]																																													
Unit-V																																															
5	a	i) Distinguish between PERT and CPM.	[6M]																																												
		ii) What are the objectives and applications of network analysis (PERT and CPM)	[6M]																																												
	OR																																														
5	b	i) A projects consist of 9 activities whose precedence relationships and their estimates are shown in given table. (i) find the expected duration of each activity (ii) Draw the project network, (iii) Find the critical path and corresponding expected project completion time?		[12M]																																											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Activity</th> <th colspan="3">Time estimates (months)</th> </tr> <tr> <th>Optimistic</th> <th>Most likely</th> <th>Pessimistic</th> </tr> </thead> <tbody> <tr> <td>1-2</td> <td>3</td> <td>6</td> <td>15</td> </tr> <tr> <td>1-6</td> <td>2</td> <td>5</td> <td>14</td> </tr> <tr> <td>2-3</td> <td>6</td> <td>12</td> <td>30</td> </tr> <tr> <td>2-4</td> <td>2</td> <td>5</td> <td>8</td> </tr> <tr> <td>3-5</td> <td>5</td> <td>11</td> <td>17</td> </tr> <tr> <td>4-5</td> <td>3</td> <td>6</td> <td>15</td> </tr> <tr> <td>6-7</td> <td>3</td> <td>9</td> <td>27</td> </tr> <tr> <td>5-8</td> <td>1</td> <td>4</td> <td>25</td> </tr> <tr> <td>7-8</td> <td>4</td> <td>19</td> <td>22</td> </tr> </tbody> </table>			Activity	Time estimates (months)			Optimistic	Most likely	Pessimistic	1-2	3	6	15	1-6	2	5	14	2-3	6	12	30	2-4	2	5	8	3-5	5	11	17	4-5	3	6	15	6-7	3	9	27	5-8	1	4	25	7-8	4	19	22
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# NEC ENGINEERING COLLEGE

(AUTONOMOUS)

II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BCC3TH02 NUMERICAL METHODS AND TRANSFORMATIONS

Time: 3 hours

(Common to CE, EEE, ME)

Max. Marks: 60

Note: Answer All **FIVE** Questions.

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

Q.No	Questions	Marks									
1	Unit-I										
	a	i) Find the real root of the equation $\log x = \cos x$ using Regula-falsi position method. <span style="float: right;">[6M]</span>									
		ii) Prove that $\delta = E^{1/2} - E^{-1/2}$ and $\mu = \frac{1}{2} [E^{1/2} + E^{-1/2}]$ . <span style="float: right;">[6M]</span>									
	OR										
	b	i) Find the real root of the equation $x \log_{10} x = 1.2$ using Newton Raphson method up to 4 decimal places. <span style="float: right;">[6M]</span> ii) Apply Lagrange's interpolation formula to find the f(2) from the following data <span style="float: right;">[6M]</span> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;">x</td> <td style="padding: 2px 10px;">0</td> <td style="padding: 2px 10px;">1</td> <td style="padding: 2px 10px;">3</td> <td style="padding: 2px 10px;">4</td> </tr> <tr> <td style="padding: 2px 10px;">y=f(x)</td> <td style="padding: 2px 10px;">5</td> <td style="padding: 2px 10px;">6</td> <td style="padding: 2px 10px;">50</td> <td style="padding: 2px 10px;">105</td> </tr> </table>	x	0	1	3	4	y=f(x)	5	6	50
x	0	1	3	4							
y=f(x)	5	6	50	105							
2	Unit-II										
	a	i) Use Trapezoidal rule to estimate $\int_0^{10} \frac{1}{1+x} dx$ taking 10 intervals. <span style="float: right;">[6M]</span>									
		ii) Find y (0.1), and y (0.2) using Euler's method given that $y' = x + y, y(0) = 1$ . <span style="float: right;">[6M]</span>									
	OR										
	b	i) Find y (0.1) & y(0.2) using R-K method given that $y' = x + y^2, y(0) = 1$ . <span style="float: right;">[6M]</span> ii) Find y (0.2) and y (0.4) using Taylor's series given that $y' = xy^2 + 1, y(0) = 1$ . <span style="float: right;">[6M]</span>									
3	Unit-III										
a	i) Evaluate $L \left\{ \frac{1 - \cos t}{t} \right\}$ . <span style="float: right;">[6M]</span>										
	ii) State Convolution theorem and hence find $L^{-1} \left\{ \frac{1}{(s-2)(s+2)} \right\}$ <span style="float: right;">[6M]</span>										

3	i)	Find the Laplace transform of $\cosh at \sin bt$ using first shifting theorem.	[6M]
	b	ii) Solve the differential equation, $y'' + 2y' + 5y = e^{-t} \sin t$ where $y(0) = 0, y'(0) = 1$ using Laplace transforms.	[6M]
Unit-IV			
4	a	i) Find a Fourier series to represent $x^2$ from $x = -\pi$ to $x = \pi$ .	[6M]
	a	ii) Find the half range Fourier cosine series $f(x) = \pi - x, 0 < x < 2$ .	[6M]
	b	Expand $f(x) = x \sin x$ as a Fourier series in the interval $0 < x < 2\pi$ .	[12M]
OR			
Unit-V			
5	a	i) Find the Fourier Transform of $f(x) = \begin{cases} a -  x , & \text{for }  x  < a \\ 0 & , \text{for }  x  > a \end{cases}$	[6M]
	a	ii) Find the Fourier cosine transform of $f(x)$ defined by $f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$	[6M]
	OR		
5	b	i) Find the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$	[6M]
	b	ii) Find the Fourier Transform of $f(x) = \begin{cases} 1 & \text{for }  x  < 1 \\ 0 & \text{for }  x  > 1 \end{cases}$ Hence evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$	[6M]

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BCE3TH03

**ENGINEERING GEOLOGY**

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 i) Discuss in detail the physical and weathering process of rocks and add a note on its merits and demerits in civil engineering.	[6M]
	ii) Describe the process associated with river. Write their engineering significance.	[6M]
	OR	
	b i) Elucidate the process associated with winds. Write their engineering significance.	[6M]
ii) Explain briefly about branches of geology.	[6M]	
Unit-II		
2	a i) Illustrate the physical properties which helps to identify in the field for the following minerals: a) Augite b) Calcite c) Hornblende	[6M]
	ii) Explain the following rock forming minerals a) Quartz family b) Feldspar family	[6M]
	OR	
	b How rocks are classified? Give the main characteristics and classification of igneous, sedimentary and metamorphic rocks with example.	[12M]
Unit-III		
3	a i) What are folds? How are they classified? Give its engineering importance.	[6M]
	ii) Classify and describe joints structures with neat sketches.	[6M]
	OR	
	b i) What is the fault? Discuss with sketches the terminology of various types of faults.	[6M]
ii) Define dip and Strike. Write its engineering significance.	[6M]	
Unit-IV		
4	a Enumerate the seismic and electrical methods used in civil engineering investigation.	[12M]
	OR	
b Elucidate the radio metric and geothermal methods used in civil engineering investigation.	[12M]	
Unit-V		
5	a What are the various geological factors to be considered for the construction of dams and reservoirs? Explain each factor in detail.	[12M]
	OR	
b Describe the geological conditions necessary for the construction of tunnels.	[12M]	

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BCE3TH04

MECHANICS OF SOLIDS

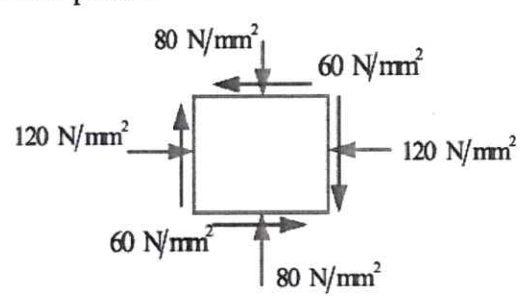
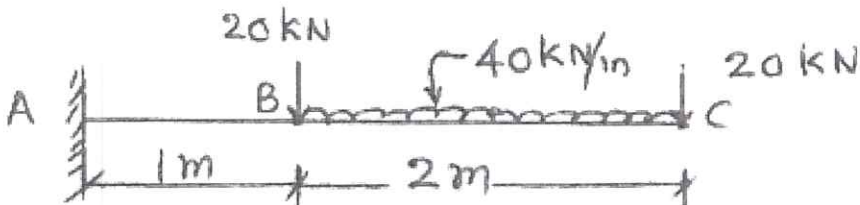
Time: 3 hours

(CE)

Max. Marks: 60

Note: Answer All FIVE Questions.

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

Q.No.	Questions	Marks
1	<b>Unit-I</b>	
	i) Draw stress-strain curve for a mild steel rod subjected to tension and explain about the salient points on it.	[4M]
	a ii) A vertical tie, fixed rigidly at the top end consist of a steel rod 2.5 m long and 20 mm diameter encased throughout in a brass tube 20 mm internal diameter and 30 mm external diameter. The rod and the casing are fixed together at both ends. The compound rod is loaded in tension by a force of 10 kN. Calculate the maximum stress in steel and brass. Take $E_s=2 \times 10^5 \text{N/mm}^2$ and $E_b=1 \times 10^5 \text{N/mm}^2$ .	[8M]
	<b>OR</b>	
b	i) What is proof resilience and modulus of resilience.	[4M]
	ii) A specimen of diameter 13 mm and gauge length 50 mm was tested under tension. At 20 kN load, the extension was observed to be 0.0315 mm. Yielding occurred at a load of 35 kN and the ultimate load was 60 kN. The final gauge length at fracture was 70 mm. Calculate young's modulus, yield stress, ultimate strength and percentage elongation.	[8]
2	<b>Unit-II</b>	
	Draw Mohr's circle for the two-dimensional state of stress shown. Find the principal stresses and their planes.	[12M]
		
<b>OR</b>		
b	Explain maximum shear stress theory and maximum strain theory in detail with neat sketches.	[12M]
3	<b>Unit-III</b>	
a	Sketch SFD and BMD for the cantilever beam shown in figure.	[6M]
		

	OR		
	b	<p>Sketch the S.F. &amp; B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values.</p>	[12M]
	Unit-IV		
	a	Define simple bending and what are the assumptions made in simple bending theory and derive the bending moment equation.	[12M]
	OR		
4	b	A beam section is 10m long and is simply supported at ends. It carries concentrated loads of 100kN and 60kN at a distance of 2m and 5m respectively from the left end. Calculate the deflection under the each load find also the maximum deflection. Take $I = 18 \times 10^8 \text{mm}^4$ and $E = 200 \text{kN/mm}^2$ .	[12M]
	Unit-V		
	a	A shaft is to be transmitted 200KW at 300rpm. The max. shear stress should not exceed 30 MPa and twist should not be more than $1^\circ$ in a shaft length of 2.5 m. If the modulus of rigidity of the material is 105 MPa, Find the required diameter of the shaft to transmit above given power.	[12M]
	OR		
5	b	A shell 3.25m long and 1m diameter is subjected to an internal pressure of $1.2 \text{ N/mm}^2$ . If the thickness to the shell is 10mm, find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in dimensions of the shell. Take $E = 200 \text{ kN/mm}^2$ , poisson's ratio=0.3	[12M]

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BCE3TH05

ENGINEERING SURVEYING

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																		
<b>Unit-I</b>																				
1	a) What are the different sources of error in chain surveying. Distinguish between cumulative and compensating errors.	[12M]																		
	OR																			
	b) Define surveying. Explain about classification of surveying.	[12M]																		
<b>Unit-II</b>																				
2	i) The following are the bearings taken on a compass traverse. <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <table style="border: none;"> <tr> <td style="padding: 0 10px;">Line</td> <td style="padding: 0 10px;">CB</td> <td style="padding: 0 10px;">BB</td> </tr> <tr> <td>AB</td> <td>S 37° 30' E</td> <td>N 37° 30' W</td> </tr> <tr> <td>BC</td> <td>S 43° 15' W</td> <td>N 44° 15' E</td> </tr> <tr> <td>CD</td> <td>N 73° 00' W</td> <td>S 72° 15' E</td> </tr> <tr> <td>DE</td> <td>N 12° 45' E</td> <td>S 13° 15' W</td> </tr> <tr> <td>EA</td> <td>N 60° 00' E</td> <td>S 59° 00' W</td> </tr> </table> </div> <p>Compute the interior angles by applying corrections for errors. Assume that there is no local attraction.</p>	Line	CB	BB	AB	S 37° 30' E	N 37° 30' W	BC	S 43° 15' W	N 44° 15' E	CD	N 73° 00' W	S 72° 15' E	DE	N 12° 45' E	S 13° 15' W	EA	N 60° 00' E	S 59° 00' W	[8M]
	Line	CB	BB																	
	AB	S 37° 30' E	N 37° 30' W																	
	BC	S 43° 15' W	N 44° 15' E																	
CD	N 73° 00' W	S 72° 15' E																		
DE	N 12° 45' E	S 13° 15' W																		
EA	N 60° 00' E	S 59° 00' W																		
	ii) Distinguish between magnetic meridian and true meridian	[4M]																		
OR																				
	b) i) Differentiate between a) Surveyor's compass and Prismatic compass, b) Declination and Dip, c) Fore bearing and Back bearing and d) Meridian and Bearing	[12M]																		
<b>Unit-III</b>																				
3	a) The following readings were observed successively with a level. The instrument having been moved after the second, fifth and eighth readings. [14M] 0.675, 1.230, 0.750, 2.565, 2.225, 1.935, 1.835, 3.220, 3.115 and 2.875 The first staff reading was taken with a staff held on a bench mark of reduced level + 100.000. Enter the readings in the level book form and find the reduced levels of all the points.	[12M]																		
	OR																			
	b) List out the methods of contouring and explain any one method in detail.	[12M]																		
<b>Unit-IV</b>																				
4	a) Explain the various sources of errors in theodolite surveying.	[12M]																		
	OR																			
	b) Describe any two procedures for setting up transition curves in the field.	[12M]																		
<b>Unit-V</b>																				
5	a) Discuss the following in detail about plane tabling a) Errors, b) Advantages and Limitations and c) Method of Intersection.	[12M]																		
	OR																			
	b) List the accessories required for plane table surveying and explain radiation and intersection method of plane table surveying.	[12M]																		

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## II B.Tech I Semester Supple Examinations, May-2023

**Sub Code: 19BCE3TH06 BUILDING MATERIALS AND BUILDING CONSTRUCTION**

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
	<b>Unit-1</b>	
1	a i) What are the qualities of good building stones. Discuss them.	[6M]
	ii) Explain the qualities of aluminum, gypsum and glass used in construction	[6M]
	OR	
	b i) What are the qualities of good building bricks. Discuss them.	[6M]
	ii) Write short notes on the process of burning of bricks in Intermittent kilns with neat sketch.	[6M]
		<b>Unit-II</b>
2	a i) What are the requirements of good partition wall. Explain.	[6M]
	ii) Write short notes on cavity walls.	[6M]
	OR	
	b i) Describe the ashlar stone masonry and state its uses in construction of structures.	[6M]
	ii) Explain about Galvanized Iron, Fiber – Reinforced Plastics.	[6M]
		<b>Unit-III</b>
3	a i) Compare and contrast advantages and disadvantages of using lime and cement in construction works.	[6M]
	ii) Explain the properties of ordinary Portland cement.	[6M]
	OR	
	b i) Explain the types of ordinary Portland cement.	[6M]
	ii) Explain briefly the consistency test conducted on cement.	[6M]
		<b>Unit-IV</b>
	a i) Explain in detail about concrete, mosaic and terrazzo floors in construction.	[6M]
	ii) Explain the king post and queen post trusses in construction.	[6M]

4			
		OR	
	b	i) Write short notes on Lean-to-roof and coupled roof.	[6M]
		ii) Enlist five different types of arches. Explain any two of them in detail.	[6M]
5	Unit-V		
	a	i) What are the characteristics of a good paint. State the importance of preparation of surfaces before applications of surface finish.	[6M]
		ii) Differentiate between paints and distemper.	[6M]
	OR		
	b	i) Give a brief description of the process of painting on different surfaces	[6M]
	ii) Mention the important guidelines for the use of plastic emulsion paints.	[6M]	

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BEE3TH03

ELECTRICAL CIRCUIT ANALYSIS - II

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
<b>Unit-I</b>		
1	a	i) Memorize the process of generation of three phase voltages and write its advantages? [6M]
		ii) A balanced star connected load of $(6.8+j7.2)$ ohms is connected to a balanced 3 phase 415V supply. Find the line current, power factor, power and the total volt-ampere? [6M]
	OR	
	b	i) Elaborate the importance of phase sequence in the 3 phase system with respect to the load utilization? [6M]
	ii) Each phase of a delta connected load has resistance of 28 ohms, an inductance of 0.17H and a capacitance of 118 micro farads. The load is connected across a 440V, 50Hz, 3 phase supply. Determine the line current, active power and reactive volt ampere? [6M]	
<b>Unit-II</b>		
2	a	i) Analyze the objectives and outcomes of star delta transformation techniques? [6M]
		ii) The power readings of two watt meters are +16kW and -5kW for a three phase load. If the supply voltage is balanced 400V, find the true power drawn by the load, power factor and the line current? [6M]
	OR	
	b	i) Draw the circuit and explain in detail about the measurement of 3 phase power by using three watt meter method? [6M]
	ii) A three phase 440V load has a power factor of 0.6. Two watt meters are connected to measure the power. If the input power be 14kW, find the reading of each instrument? [6M]	
<b>Unit-III</b>		
3	a	i) Analyze the transient response of series RLC circuit with sinusoidal excitation? [6M]
		ii) The values of R and L in a series R-L circuit are 11 ohms and 44H respectively. At the instant of closing the switch, the supply current rises at a rate of 5.2A/sec. Find the value of applied voltage, rate of growth of current when 6.4A flows in the circuit. Also find the stored energy in the inductor? [6M]
	OR	
	b	i) Develop the profile characteristics of current and voltages of series RC circuit during transient condition excited with D.C input? [6M]
	ii) A 5.4 micro farad condenser is connected through a 1200 kilo ohms resistor to a D.C source of 13V. After being charged for half minute, the condenser is disconnected and discharged through a resistor. Find the energy dissipated in the resistor? [6M]	
<b>Unit-IV</b>		
4	a	i) State and prove the condition for the reciprocity and symmetry in h-parameters of a two port network? [6M]
		ii) Draw and analyze the parallel connection of two port networks? [6M]
	OR	
	b	i) State and prove the condition for the reciprocity and symmetry in A, B, C, D parameters of a two port network? [6M]
	ii) Deduce the admittance parameters in terms of hybrid parameters of a two port network? [6M]	

Unit-V		
5	a	i) Discuss in detail about the properties and uses of a filter? [6M]
		ii) Compare the band pass and band elimination filters with relevant equations? [6M]
	OR	
	b	i) Explain detail about the classification of filters based on the frequency characteristics? [6M]
ii) Design a prototype band pass filter to match with a load of 660 ohms and to allow frequencies between 4kHz and 8kHz? [6M]		

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BEE3TH04

ELECTRICAL MACHINES-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
<b>Unit-I</b>		
1	a i) By deriving the relevant expressions, analyze the multi excited system?	[6M]
	ii) Draw the magnetic frame diagram and explain the magnetic circuit of D.C machines?	[6M]
	<b>OR</b>	
	b i) Derive the force and torque equations by using the co-energy?	[6M]
	ii) Memorize the process of obtaining the open circuit characteristics of D.C generators with circuit diagram?	[6M]
<b>Unit-II</b>		
2	a i) Compare the demagnetizing and cross magnetizing effects of D.C machines?	[6M]
	ii) A 24.32 kW, 410V, 2 pole wave wound D.C shunt motor has 840 armature conductors and 140 commutator segments. Its full load efficiency is 85% and shunt field current is 1.88A. If brushes are shifted backward through 1.5 segments from the geometrical neutral axis, find the demagnetizing and distorting ampere turn per pole?	[6M]
	<b>OR</b>	
	b i) Elaborate the classification of various losses in the D.C machines?	[6M]
	ii) Deduce and explain in detail about the characteristics of D.C compound motor with necessary relations?	[6M]
<b>Unit-III</b>		
3	a i) Explain in detail about the need and requirements of starter in the D.C motor?	[6M]
	ii) it is desired to reduce the speed of a 440V, 11H.P shunt motor by 25% by the insertion of a resistance in the armature circuit. The torque is to remain unchanged. If the full load efficiency is 87%, find the necessary resistance? The field current is 1.2A and armature resistance is 0.6 ohms?	[6M]
	<b>OR</b>	
	b i) Draw the circuit diagram and explain the procedure of retardation test on a D.C machine?	[6M]
	ii) A 220V shunt motor has armature resistance of 0.4 ohms. The starting armature current must not exceed 57A. If the number of sections is 5, find the value of resistance steps to be used in the starter?	[6M]
<b>Unit-IV</b>		
4	a i) Define and discuss in detail about the role of voltage transformation ratio of single phase transformer?	[6M]
	ii) A 35kVA, single phase transformer has 540 turns in the primary and 32 turns on the secondary. The primary is connected to 6.6kV, 50Hz supply. Find the secondary voltage on open circuit, the current flowing through the two windings on full load, the maximum value of the flux?	[6M]

		i) Describe the parallel operation of transformer with equal voltage ratios?	[6M]
	b	ii) A single phase, 50Hz, transformer has 58 primary turns and 660 secondary turns. The cross sectional area of the core is 420sq.cm. If the primary of the transformer is connected to 230V supply, find the secondary induced e.m.f and the peak flux density in the core?	[6M]
	Unit-V		
5	a	i) Explain in detail about the delta-star connected three phase transformer relations, phasor diagram and disadvantages?	[6M]
		ii) A three phase transformer is used to step down the voltage of a 3 phase, 3300kV feeder line. The per phase turns ratio is 14. For a primary current of 11A, find the secondary line voltage, line current and kVA for delta-delta and star-star connections?	[6M]
	OR		
	b	i) Draw the diagram and explain the stud moment of no-load tap changer?	[6M]
ii) A three phase transformer is used to step down the voltage of a 3 phase, 4400kV feeder line. The per phase turns ratio is 16. For a primary current of 15A, find the secondary line voltage, line current and kVA for star-delta and delta-star connections?		[6M]	

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BEE3TH05

**ELECTRO MAGNETIC FIELDS**

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
<b>Unit-I</b>		
1	a	i) State and explain the Coulombs law? [6M] ii) A pair of negative and positive charges of 10 micro coulombs are separated by a distance of 0.1m along the x-axis. Find the Dipole moment? [6M]
	OR	
	b	i) Describe the work done in moving a point charge in an Electrostatic field? [6M] ii) Define the potential difference and prove that it is independent on the shape of the path? [6M]
	<b>Unit-II</b>	
2	a	i) Derive the Maxwell's first equation using Gauss's law? [6M] ii) Three equal point charges of 2 micro coulombs are in free space at (0,0,0), (2,0,0) and (0,2,0) respectively. Find the force on $Q_4 = 5$ micro coulombs at (2,2,0) [6M]
	OR	
	b	i) What are the applications of Gauss's law? [6M] ii) Derive the boundary conditions between dielectric to dielectric medium? [6M]
	<b>Unit-III</b>	
3	a	i) Determine the magnetic field intensity H at the center of a square current element. The length of each side is 2m and the current $I = 1.0$ Amp? [6M] ii) Define Ampere's law and explain two applications? [6M]
	OR	
	b	Explain the following i) Biot Savart's law ii) Magnetic flux and Magnetic flux density [12M]
	<b>Unit-IV</b>	
4	a	i) Derive the force equation, flux on a long current carrying conductor in magnetic field? [6M] ii) In a magnetic flux density of $B = (1.0 a_x + 3.0 a_y)$ wb/m <sup>2</sup> , a current element $10 a_z$ ma/m is placed. Find the force on the current element? [6M]
	OR	
	b	Derive an expression for the mutual inductance if two straight filamentary circuits of length L and of infinitesimal cross sections which are parallel to each other and a distance D apart? [12M]
	<b>Unit-V</b>	
5	a	Represent Maxwell's equations both in integral form and differential form for i) Static EMF ii) Time varying fields [12M]
	OR	
	b	i) Derive the expressions for displacement current and explain its significance? [6M] ii) State and explain the Poynting theorem? [6M]

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**II B.Tech I Semester Supple Examinations, May-2023**

**Sub Code: 19BEE3TH06**

**ANALOG ELECTRONICS**

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
<b>Unit-I</b>		
1	a	i) Draw the circuit diagram of a current series feedback amplifier and explain the operation. [6M]
		ii) Derive expressions of input & output impedances, Gain, feedback factor for current series feedback amplifier. [6M]
	<b>OR</b>	
	b	i) Draw the circuit diagram of a voltage series feedback amplifier and explain the operation. [6M]
	ii) If negative feedback with a feedback factor, $\beta$ of 0.1 is introduced into an amplifier with a gain of 20 and bandwidth of 0.6 MHz, obtain the resulting bandwidth of the feedback amplifier. [6M]	
<b>Unit-II</b>		
2	a	A square wave whose peak-to-peak amplitude is 2 V extends $\pm 1V$ with respect to ground. The duration of the positive section is 0.1 s and that of the negative section is 0.2 s. if this waveform is impressed upon an RC integrating circuit whose time constant is 0.2 s, what are the steady-state maximum and minimum values of the output waveform? [12M]
	<b>OR</b>	
	b	i) Explain the response of High-pass RC circuit for square wave input. [4M]
		ii) Derive the expression for clamping circuit theorem. [4M]
iii) Draw the Diode series clippers and explain the operation. [4M]		
<b>Unit-III</b>		
3	a	i) Draw the circuit of any one type of differential amplifier and explain the operation. [6M]
		ii) What is an integrator circuit? Discuss the relative advantages and disadvantages of integrator circuits. [6M]
	<b>OR</b>	
	b	i) Explain the concept of Virtual Ground in detail. [6M]
	ii) Explain how an op-amp can be used as integrator? Also derive expression for the output. [6M]	
<b>Unit-IV</b>		
4	a	i) Draw and explain the circuit of astable multivibrator using 555 timer. [6M]
		ii) Describe the 555 timer monostable multivibrator applications in Frequency divider. [6M]
	<b>OR</b>	
	b	i) Draw and explain the circuit of monostable multivibrator using 555 timer. [6M]
	ii) Design a monostable multivibrator using 555 timer to produce a pulse width of 100 m sec. [6M]	
<b>Unit-V</b>		
5	a	i) Describe the operation of dual slope A/D converter with necessary diagrams. Give some of its advantages & disadvantages. [6M]
		ii) Draw a weighted resistor DAC and obtain the transfer characteristics of a 3-bit DAC. [6M]
	<b>OR</b>	



		i) Draw and explain the circuit operation of Successive approximation ADC.	[6M]
	b	ii) How many resistors are required for an 8-bit weighted resistors D/A converter? What are those resistor values, assuming the smallest resistance is R?	[6M]

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BME3TH01

**FLUID MECHANICS AND HYDRAULIC MACHINERY**

Time: 3 hours

(ME)

Max. Marks: 60

Note: Answer All FIVE Questions.

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

Q.No.	Questions	Marks
1	Unit-I	
	a	i) State and explain Newton's law of viscosity. Also briefly explain different types of fluids. <span style="float: right;">[6M]</span> ii) The space between two parallel square plates each of side 0.8 m is filled with an oil of specific gravity 0.8. If the space between the plates is 12.5mm and the upper plate which moves with velocity of 1.25m/s requires a force of 51.2N. Determine i. Dynamic viscosity of the oil in poise ii. Kinematic viscosity in stokes. <span style="float: right;">[6M]</span>
	OR	
	b	i) A U- tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure is 750 mm of Hg. <span style="float: right;">[8M]</span> ii) Write the relations between absolute pressure, gauge pressure and vacuum pressure. <span style="float: right;">[4M]</span>
	Unit-II	
2	a	i) Derive an equation of continuity of liquid flow. <span style="float: right;">[6M]</span> ii) Water is flowing through a pipe of 100 mm diameter with an average Velocity of 10 m/s. Determine the rate of discharge of the water in liters/s. Also determine the velocity of water at the other end of the pipe, if the diameter of the pipe is 200 mm. <span style="float: right;">[6M]</span>
	OR	
	b	i) State and Prove Bernoulli's equation from Euler's equation of motion. Also state its assumptions <span style="float: right;">[6M]</span> ii) A pipe 300m has a slope of 1 in 100 and tapers from 1m diameter at the higher end to 0.5 m at the lower end. The quantity of water flowing is 900Ltrs/sec. If the pressure at the higher end is 70kPa, find the pressure at lower end <span style="float: right;">[6M]</span>
	Unit-III	
3	a	i) Explain with a neat sketch boundary Layer formation over a flat plate. <span style="float: right;">[6M]</span> ii) Why is it necessary to control the growth of boundary layer on most of the bodies. What methods are used for such a control. <span style="float: right;">[6M]</span>
	OR	
	b	i) What are the advantages and limitations of Dimensional Analysis. <span style="float: right;">[6M]</span> ii) State and explain Buckingham's II method. <span style="float: right;">[6M]</span>

Unit-IV			
4	a	Explain in detail the steps involved in construction of a combined velocity triangle of a turbine blade.	[6M]
		Derive efficiency for a moving curved vane.	[6M]
	OR		
	b	i) Explain performance characteristics curves of turbines.	[6M]
	ii) Explain with neat sketch parts and working of a Pelton wheel turbine.	[6M]	
Unit-V			
5	a	A single acting Reciprocating pump running at 30rpm delivers $0.012 \text{ m}^3 / \text{s}$ of water. The diameter of the piston is 25cm and stroke length is 50 cm. Determine: i) The theoretical discharge of the pump, ii) Co-efficient of discharge, and iii) slip and percentage slip of the pump.	[12M]
	OR		
	b	i) Define a centrifugal pump. Explain the working of a single stage centrifugal pump with neat sketches.	[6M]
	ii) Define cavitation. What are the effects of cavitation?	[6M]	

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BME3TH04

**THERMODYNAMICS**

Time: 3 hours

(ME)

Max. Marks: 60

Note: Answer All FIVE Questions.

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

Q. No	Questions	Marks
<b>Unit-I</b>		
1	a	i) Explain the thermodynamic system and control volume. [6M]
		ii) Explain about electrical resistance thermometer and thermocouple. [6M]
	OR	
	b	i) Explain about Quasi-static process and Thermodynamic Equilibrium. [8M]
	ii) The e.m.f. in a thermocouple with the test junction at $t^{\circ}\text{C}$ on a gas thermometer scale and reference junction at ice point is given by $e = 0.20t - 5 \times 10^{-4} t^2 \text{ mV.}$ The millivoltmeter is calibrated at ice and steam points. What will this thermometer read in a place where the gas thermometer reads $50^{\circ}\text{C}$ ? [4M]	[4M]
<b>Unit-II</b>		
2	a	i) Explain about different forms of stored energy. [6M]
		ii) Derive the steady flow energy equation for a single stream of fluid entering and leaving the control volume. [6M]
	OR	
	b	i) What is PMM 1 and what are the limitations of the first law. [4M]
		ii) Explain the steady flow process in a Turbine. [4M]
	iii) A stationary mass of gas is compressed without friction from an initial state of $0.3 \text{ m}^3$ and $0.105 \text{ MPa}$ to a final state of $0.15 \text{ m}^3$ and $0.105 \text{ MPa}$ , the pressure remaining constant during the process. There is a transfer of $37.6 \text{ kJ}$ of heat from the gas during the process. How much does the internal energy of the gas change? [4M]	[4M]
<b>Unit-III</b>		
3	a	i) Explain the Kelvin-Planck Statement of Second Law. [6M]
		ii) Explain about Entropy principle. [6M]
	OR	
	b	Explain about Carnot's theorem. [6M]
	ii) Explain about the Inequality of Clausius. [6M]	[6M]
<b>Unit-IV</b>		
4	a	i) Explain the Dalton's Law of partial pressure. [6M]
		ii) Explain about Avogadro's Laws of additive. [6M]

	OR		
	b	<p>i) Steam initially at 0.3 MPa, 250°C is cooled at constant volume.</p> <p>(a) At what temperature will the steam become saturated vapour?</p> <p>(b) What is the quality at 80°C? What is the heat transferred per kg of steam in cooling from 250°C to 80°C?</p>	[12M]
	Unit-V		
	a	i) Explain the effect of Intercooling and Reheating on Brayton Cycle.	[6M]
		ii) Explain about Bell-Coleman Cycle.	[6M]
	OR		
5		i) Describe about Otto Cycle with P-V and T-S diagrams	[6M]
	b	ii) A refrigerator uses R-134 a as the working fluid and operates on an ideal vapor compression cycle between 0.14 MPa and 0.8 MPa. If the mass flow rate of the refrigerant is 0.06 kg/s, determine (a) the rate of heat removal from the refrigerated space, (b) the power input to the compressor, (c) the heat rejection rate in the condenser, and (d) the COP.	[6M]

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BME3TH05

MECHANICS OF SOLIDS

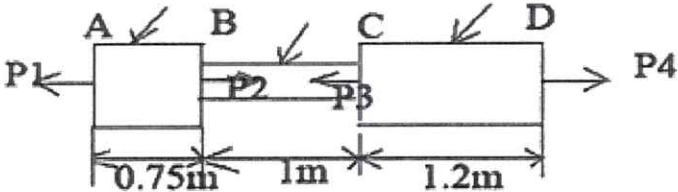
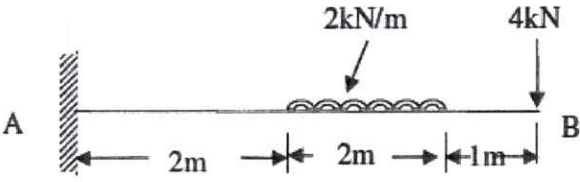
Time: 3 hours

(ME)

Max. Marks: 60

Note: Answer All FIVE Questions.

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

Q.No	Questions	Marks
<b>Unit-I</b>		
1	<p>i) A member ABCD is subjected point loads P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, and P<sub>4</sub> as shown in the figure below. Calculate the force P<sub>3</sub> necessary for equilibrium if P<sub>1</sub>=150kN, P<sub>2</sub>=250kN, P<sub>4</sub>=200kN. Determine the net change in the length of the member. Take E=200GN/m<sup>2</sup>.</p> <div style="text-align: center;"> <p>40X40mm    25X25mm    30X30mm</p>  </div>	[6M]
	<p>ii) A rod 2.5 m long at 10°C is subjected to raise in temperature by 70°C. Find the stress in the rod if the expansion of the rod is prevented. Take E=1 X 10<sup>5</sup> N/mm<sup>2</sup>, α = 0.000012 per°C.</p>	[6M]
	<b>OR</b>	
b	<p>A uniform metal bar has a cross sectional area of 7cm<sup>2</sup> and length of 18m. With the elastic limit of 160 MN/m<sup>2</sup>, what will be its proof resilience? Determine also the maximum value of an applied load which may be suddenly applied without exceeding elastic limit.</p>	[12M]
<b>Unit-II</b>		
2	<p>a) Draw the shear force and bending moment diagram for the loaded beam as shown in figure. Mark the maximum bending moment and also determine its value.</p> <div style="text-align: center;">  </div>	[12M]
	<b>OR</b>	
b	<p>A beam of length 12m is simply supported and carries point loads of 6kN each a distance of 3m and 7m from the left support and also a uniform distributed load of 1kN/m between the point loads. Draw the S.F and B.M diagrams for the beam.</p>	[12M]
<b>Unit-III</b>		
3	<p>a) State the assumptions made in deriving the equation for shear stress distribution</p>	[12M]

		OR	
	b	Determine the shear stress at the NA of a T-section, if the shear force at the section is 30 kN. Flange 150 X10 mm and web 140 X 10 mm. Depth of CG from top of the flange is 41.2 mm and $MI = 6.372 \times 10^6 \text{ mm}^4$ about NA.	[12M]
		Unit-IV	
	a	A cantilever 100 mm wide and 200mm deep is loaded with uniformly distributed load of 4kN/m from the free end up to 50mm. find the deflection and slope at the free end. Take $E= 2.1 \times 10^8 \text{ kN/m}^2$ .	[12M]
		OR	
4	b	A beam of length 15m is simply supported at its ends and carries two point loads of 100KN and 60KN at a distance of 2m and 5m respectively from the left support. Calculate the deflections under the load. Find also the maximum deflections. Take $I=18 \times 10^8 \text{ mm}^4$ and $E=2 \times 10^5 \text{ N/mm}^2$	[12M]
		Unit-V	
	a	Calculate the thickness of metal required for a cylindrical shell of internal diameter 180 mm to withstand an internal pressure of 25MN/m <sup>2</sup> , if the maximum permissible tensile stress is 125 MN/m <sup>2</sup> .	[12M]
		OR	
5	b	A hollow shaft of diameter ratio 3/8 is to transmit 375kW at 100 rpm, the maximum torque being 20% greater than the mean; the shear stress is not to exceed 60 N/mm <sup>2</sup> and the twist in a length of 4 metre is not to exceed 2 degrees. Calculate its external and internal diameters which would satisfy both the above conditions. Take $C=8.5 \times 10^4 \text{ N/mm}^2$	[12M]

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BEC3TH01

NUMERICAL METHODS AND COMPLEX VARIABLES

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														
1	Unit-I															
	a i) State the condition of convergence of the sequence of approximations of the Newton-Raphson method. Find a real root of the equation $x e^x = \cos x$ correct to four decimal places using the Newton-Raphson method.	[6M]														
	ii) Find a real root of the equation $x^2 + x = \cos x$ correct to four decimal places using the bisection method.	[6M]														
	OR															
	b i) State the condition of convergence of the sequence of approximations of the iterative method. Find a real root of the equation $1 + x^2 = x^3$ correct to four decimal places using the iteration method.	[6M]														
	ii) Find a real root of the equation $x = 3e^{-x}$ correct to four decimal places using the Regula-Falsi method.	[6M]														
2	Unit-II															
	a Define the operators $\Delta, \nabla, \mu$ and $\delta$ and show that i) $\mu\delta = \frac{\Delta + \nabla}{2}$ . ii) $1 + \delta^2 \mu^2 = \left(1 + \frac{1}{2} \delta^2\right)^2$ . iii) $\Delta^2 = (1 + \Delta)\delta^2$ .	[12M]														
	OR															
	b i) Given the set of tabulated points (0, 2), (1, 3), (2, 12), and (15, 3587) satisfying the function $y = f(x)$ , compute $f(4)$ using Newton's divided difference formula.	[6M]														
ii) Find $f(0.29)$ from the following table by using appropriate interpolation formula.	[6M]															
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">x</td> <td style="width: 10%;">0.20</td> <td style="width: 10%;">0.22</td> <td style="width: 10%;">0.24</td> <td style="width: 10%;">0.26</td> <td style="width: 10%;">0.28</td> <td style="width: 10%;">0.30</td> </tr> <tr> <td>f(x)</td> <td>1.6596</td> <td>1.6698</td> <td>1.6804</td> <td>1.6912</td> <td>1.7024</td> <td>1.7139</td> </tr> </table>	x	0.20	0.22	0.24	0.26	0.28	0.30	f(x)	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139	
x	0.20	0.22	0.24	0.26	0.28	0.30										
f(x)	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139										
3	Unit-III															
	a i) Given differential equation $\frac{dy}{dx} = x^2 + y$ with $y(0) = 1$ , compute $y(0.01)$ correct to four decimal places using Euler's modified method. Compare the computed value with the exact solution.	[6M]														
	ii) Evaluate $\int_0^1 e^{-x^2} \tan x dx$ using Simpson's $\frac{1}{3}rd$ rule with $h = 0.1$ .	[6M]														



		OR	
	b	Write an algorithm to implement Runge-Kutta fourth-order formula to solve an initial problem. Using the algorithm find $y(0.1), y(0.2)$ , and $y(0.3)$ , given that $\frac{dy}{dx} + y = 0, y(0) = 1.$	[12M]
		Unit-IV	
	a	i) Determine constant $a$ such that the function $u = e^{-\pi x} \cos(ay)$ is harmonic and hence find its harmonic conjugate	[6M]
		ii) Prove that $f(z) = z^{1/2}$ is analytic everywhere except at origin and hence find $f'(z)$ .	[6M]
		OR	
4	b	i) Consider the function $f: C \rightarrow C$ defined by $f(z) = \begin{cases} z^5 & z = 0 \\ z + \bar{z}^4 & z \neq 0 \end{cases}$	[6M]
		ii) Prove that $f(z)$ satisfies Cauchy-Riemann equations at $z = 0$ , but $f(z)$ is not differentiable at $z = 0$ .	
		ii) Prove that an analytic function of constant absolute value is constant.	[6M]
		Unit-V	
	a	i) Using Cauchy's integral formula to evaluate $\oint_C \frac{e^{4z}}{z(z-2i)^2} dz, C:  z-i =3.$	[6M]
		ii) Using Residue theorem, evaluate $\int_0^\infty \frac{dx}{x^6+1}.$	[6M]
		OR	
5	b	i) Determine Laurent's series of the function $f(z) = \frac{z^2-4}{(z+1)(z+4)}$ , in the regions (b1) $0 <  z  < 1$ (b2) $1 <  z  < 4$ (b3) $ z  > 4.$	[6M]
		ii) Using the Residue theorem evaluate $\oint_C \left( ze^{-\frac{2}{z}} + \frac{\tan(\pi z)}{z} \right) dz$ where $C:  z =1.$	[6M]

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BEC3TH02

**ELECTRONIC DEVICES AND CIRCUITS**

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
<b>Unit-I</b>		
1	i) Explain the Diffusion and Drift currents for a semiconductor.	[6M]
	a ii) A P-N junction silicon diode has a reverse saturation current of 50nA at room temperature 27 <sup>o</sup> K. If the new reverse saturation current is observed to be 160nA, calculate the value of new temperature.	[6M]
	<b>OR</b>	
	b i) Draw the energy band diagram of a p-n junction under open circuit condition and derive the expression for contact potential.	[6M]
	ii) Derive the expression for Concentration of Holes and Electrons in an intrinsic semiconductor and also prove the Fermi level position in intrinsic semiconductor.	[6M]
<b>Unit-II</b>		
2	a Draw and explain the circuit diagram of half-wave rectifier with inductor filter and prove that the regulation of both half-wave rectifier and full-wave rectifier is given by % regulation = $\frac{R_f}{R_L} \times 100\%$ .	[12M]
	<b>OR</b>	
	b i) Explain how the zener diode is used for regulation purpose.	[4M]
	ii) What is peak inverse voltage and write its significance in rectifier circuits.	[4M]
	iii) Distinguish between avalanche and Zener mechanisms of a diode.	[4M]
<b>Unit-III</b>		
3	a i) Draw the circuit diagram of an NPN junction transistor CE configuration and describe the static input and output characteristics. Also, Define active, saturation and cutoff regions and saturation resistance of a CE transistor.	[6M]
	ii) What is early effect? Explain the effect of early effect on transistor characteristics.	[6M]
	<b>OR</b>	
	b i) From the transistor current components, deduce the current equation of transistor.	[6M]
	ii) Determine I <sub>C</sub> , I <sub>E</sub> and α for a transistor circuit having I <sub>B</sub> =15μA and β=150.	[6M]
<b>Unit-IV</b>		
4	a i) Explain the collector to base bias method along with circuit diagram and derive the stability factor for it.	[6M]
	ii) Differentiate bias stabilization and compensation techniques.	[6M]
	<b>OR</b>	
	b i) What is thermal runaway? Derive relevant expressions to obtain thermal stability.	[6M]
	ii) In a Self-bias circuit containing R <sub>1</sub> =50Kμ, R <sub>2</sub> =25Kμ, R <sub>e</sub> =1Kμ, R <sub>C</sub> =3Kμ, β =90, V <sub>CC</sub> =12V, V <sub>BE</sub> =0.7V. Find the operating point, S, S', and S''.	[6M]
<b>Unit-V</b>		
5	a i) Explain the four distinct regions of the output characteristics of JFET.	[6M]
	ii) What is UJT and explain the Construction, operation of a UJT along with its characteristics.	[6M]
	<b>OR</b>	
	b i) What are the advantages JFET over BJT?	[6M]
	ii) Explain the V <sub>d</sub> /I <sub>d</sub> s characteristics and operation of depletion type MOSFET With suitable diagram.	[6M]

## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BEC3TH03

SIGNALS AND SYSTEMS

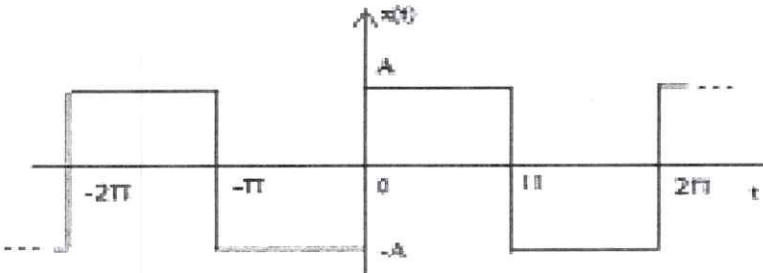
Time: 3 hours

(ECE)

Max. Marks: 60

Note: Answer All FIVE Questions.

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

Q.No.	Questions	Marks
<b>Unit-I</b>		
1	i) Explain the concepts of i) impulse ii) step iii) and signum functions.	[6M]
	ii) Determine whether each of the following continuous time signals is periodic or not. If the signal is periodic, find the fundamental time period of the signal. i) $x(t) = \text{Even}[\cos \pi t \cdot u(t)]$ ii) $x(t) = \left[ \cos\left(2t - \frac{\pi}{3}\right) \right]^2$	[6M]
	OR	
	i) Derive the relation between unit step function and signum function along with their appropriate definitions.	[6M]
b	ii) Sketch the following signals. i. $x(t) = r(t)$ ii. $x(t) = r(-t+2)$ iii. $x(t) = -2r(t)$ where $r(t)$ is the ramp signal.	[6M]
	<b>Unit-II</b>	
2	i) Explain about exponential Fourier series expression and evaluate $c_n$ .	[6M]
	ii) Find the trigonometric Fourier series representation of a periodic square wave $x(t) = 1$ , for the interval $(0, \pi)$ $= 0$ , for the interval $(\pi, 2\pi)$	[6M]
	OR	
	i) Discuss the concept of trigonometric Fourier series and derive the expressions for coefficients.	[6M]
b	ii) Find the Exponential Fourier series for the waveform as shown in Fig.1	[6M]
	 <p style="text-align: center;">Fig. 1</p>	

Unit-III		
3	a	i) State and prove any three properties of Fourier Transform [6M]
		ii) Determine the Fourier transform for double exponential pulse whose function is given by $y(t)=e^{-2 t }$ . Also draw its magnitude and phase spectra. [6M]
	OR	
	b	i) State and prove the following properties of Fourier Transform Time Shifting    ii) Convolution in time domain [6M]
ii) Obtain the Fourier transform of the following signals [6M]  a). $x(t) = 1$ b). $\delta(t)$ c). $\text{Sgn}(t)$		
Unit-IV		
4	a	1) Find inverse Z-Transform $X(Z) = 1/(1-1/3z^{-1})(1-1/6z^{-1})$ ROC: $ Z >1/3$ [6M]
		ii) A signal has $X(s) = \frac{s+2}{s^2+4s+5}$ Find $L\{tx(t)\}$ [6M]
	OR	
	b	i) Explain the following properties of Z Transform (i)Initial value theorem    (ii)Final value theorem [6M]
ii) A system is described by $\frac{d^2 y(t)}{dt^2} + 7 \frac{dy(t)}{dt} + 12 y(t) = x(t)$ . Determine the response for $u(t)$ using Laplace Transform [6M]		
Unit-V		
5	a	i) State and prove sampling theorem for band limited signals using graphical approach. [6M]
		ii) Find whether the following system is i) Static or dynamic    ii) Linear or Nonlinear iii) Causal or Non causal    iv) Time invariant or time variant and the system is given as $y(t)=tx(t)+x(-t)$ . [6M]
	OR	
	b	i) Discuss the effect of under sampling a signal with example and neat diagrams and also explain different types of sampling [12M]

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BEC3TH04

INTERNET OF THINGS

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
<b>Unit-I</b>		
1	a i) Define IoT. List out various applications of IoT.	[6M]
	ii) Summarize the various IoT enabled Technologies.	[6M]
	OR	
	b Explain various IoT protocols in detail.	[12M]
<b>Unit-II</b>		
2	a Explain Various applications of IoT in building Smart Cities.	[12M]
	OR	
	b i) Explain various applications of IoT in Agriculture.	[6M]
	ii) Explain in detail various applications of IoT in Health and Life style.	[6M]
<b>Unit-III</b>		
3	a Describe how NFV can be used for virtualizing IoT device.	[12M]
	OR	
	b i) With the help of neat diagrams, explain the M2M system architecture.	[6M]
	ii) Differentiate between Machines in M2M and Things in IOT.	[6M]
<b>Unit-IV</b>		
4	a i) What do you mean by IoT Systems Management. Why it is needed. Explain in detail.	[6M]
	ii) List out various Network Operator Requirements.	[6M]
	OR	
	b Explain about IoT Systems Management with NETCONF-YANG with neat diagram.	[12M]
<b>Unit-V</b>		
5	a Design an automatic refrigerator light system with LED, switch & raspberry pi and write a python program to support the working of that design.	[12M]

b	i) Justify how Raspberry Pi is different from a desktop computer. Describe various features of a Raspberry Pi device.	[6M]
	ii) With the help of neat diagram, Explain the basic building blocks of IoT device.	[6M]

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## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BCI3TH02

FRONT END WEB TECHNOLOGIES

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	Marks	
1	Unit-I		
	a	i) Explain new form input types in HTML5 with example? [6M] ii) Discuss about the drawing graphics using canvas with javascript. [6M]	
	OR		
	b	i) Explain some of the common lists to design a web page with example? [6M] ii) Discuss about the multimedia tags in HTML5. [6M]	
	2	Unit-II	
		a	i) Briefly explain about different CSS in HTML5. [6M] ii) Write short notes on different types of CSS selectors in HTML? [6M]
OR			
b		i) Explain about creating boxes in HTML. [6M] ii) Discuss about different pseudo-elements with example. [6M]	
3		Unit-III	
		a	i) Briefly explain about arrays in javascript with example. [6M] ii) Create a web page to check the given number is even or odd using external javascript. [6M]
	OR		
	b	i) Write short notes on Regular Expressions in javascript. [6M] ii) Create a webpage to explain onclick and onsubmit events. [6M]	
	4	Unit-IV	
		a	i) What are the features of jQuery? [6M] ii) Explain jQuery selectors with suitable example. [6M]
OR			
b		i) Write jQuery to demonstrate parent(), children(), prev() and next(). [6M] ii) Discuss about creating custom events using jQuery. [6M]	
5		Unit-V	
		a	i) Write jQuery code to implement drag and drop File upload. [6M] ii) How do you save the state of sorted lists in jQuery? [6M]
	OR		
	b	i) Write jQuery code to demonstrate Accordion and Date Picker. [6M] ii) How do you show Auto-opening the Dialog in jQuery? [6M]	

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**II B.Tech I Semester Supplement Examinations, May-2023**

Sub Code: 19BCI3TH03

**OOPS THROUGH JAVA**

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	Marks
<b>Unit-I</b>		
1	a	i) List and explain Java Buzzwords. [6M]
		ii) Define Constructor? Formulate a program that illustrates the usage of different types of constructors. [6M]
	OR	
	b	i) Define Array? Is array length mutable in java? Justify your answer. Write a java program to perform transposition of a given matrix. [6M]
	ii) Describe the significance of finalize() in java programming. [6M]	
<b>Unit-II</b>		
2	a	i) Illustrate the difference between method overloading and method overriding with simple programs. [6M]
		ii) Define Package? List out different types of packages supported by Java. Write a program that illustrates the creation of user defined package. [6M]
	OR	
	b	i) Define Abstract Class and Concrete Class? Describe the significance of Abstract Class and Abstract Method with sample programs. [6M]
	ii) Describe different ways of implementing <b>Is-A relationship</b> in Java. [6M]	
<b>Unit-III</b>		
3	a	i) How can you handle Exceptions in Java? Explain. [6M]
		ii) Differentiate StringBuffer and StringBuilder by writing sample program for each. [6M]
	OR	
	b	i) Explain the difference between <b>throw</b> and <b>throws</b> keywords in exception handling with examples. [6M]
	ii) Define Thread? Formulate simple programs to illustrate thread creation by extending thread class and implementing runnable interface. [6M]	
<b>Unit-IV</b>		
4	a	i) Define Array List? List out methods of Array List. [6M]
		ii) Differentiate between Byte Stream and Character Stream. [6M]
	OR	
	b	i) Define Map? Illustrate the usage of Hash Map and its methods by example program. [6M]
	ii) Write a java program to create a file named "Stu.doc" using <b>FileWriter</b> and read contents of same file using <b>FileReader</b> . [6M]	
<b>Unit-V</b>		
5	a	i) Define Applet? Explain the methods of an Applet lifecycle. [6M]
		ii) Write a java program to handle MouseListener Events. [6M]
	OR	
	b	i) List and Explain the classes of Layout Manager. Write a program to illustrate the concept of BorderLayout. [6M]
	ii) Explain the usage of HTML applet Tag. Also explain various attributes related to applet tag. [6M]	





# NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

## II B.Tech I Semester Supple Examinations, May-2023

Sub Code: 19BCI3TH04 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

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	Marks
1	Unit-I	
	a	i) Explain pdnf, pcnf with suitable examples. [8M]
	a	ii) Are $(P \rightarrow Q) \rightarrow R$ and $P \rightarrow (Q \rightarrow R)$ logically equivalent? Justify your answer by using truth table. [4M]
	OR	
	b	i) Show that $(P \rightarrow (Q \rightarrow R)) \leftrightarrow (P \rightarrow Q) \rightarrow (P \rightarrow R)$ . [6M]
b	ii) Show that the following statement is a tautology: $(\sim P \vee (P \vee Q)) \vee (\sim Q)$ [6M]	
2	Unit-II	
	a	i) Show that $(\exists x P(x)) \wedge (\exists x Q(x))$ and $\exists x (P(x) \wedge Q(x))$ are not logically equivalent. [12M]
	a	ii) Show that the following $R \rightarrow \sim Q$ , $R \vee S$ , $S \rightarrow \sim Q$ , $P \rightarrow Q \Rightarrow \sim P$ .
	OR	
	b	i) Verify the validity of the following argument "every living thing is a planet or an animal. Joe's gold fish is alive and it is not a planet. All animals have hearts. Therefore Joe's gold fish has a heart". [6M]
b	ii) If n is a positive integer, using mathematical induction prove that $1.2+2.3+3.4+\dots+n(n+1)=n(n+1)(n+2)/3$ [6M]	
3	Unit-III	
	a	i) Explain isomorphism of two graphs with suitable example [6M]
	a	ii) Explain kruskal's algorithm to find minimal spanning tree of the graph with suitable example? [6M]
	OR	
	b	i) Define Eulerian circuit and Hamiltonian circuit, give an example of graph that has neither an Eulerian circuit nor Hamiltonian circuit. [6M]
b	ii) Is there a Simple Graph with degrees 1,1,3,3,3,3,5,6,8,9? If so justify your answer. [6M]	
4	Unit-IV	
	a	i) Using generating function method solve the recurrence relation $a_n - 3a_{n-1} = n$ , $n \geq 1$ , given that $a_0 = 1$ . [6M]
	a	ii) Find all solutions of the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$ [6M]

OR			
	i) What is a Generating function and explain the operations on generating functions?	[6M]	
b	ii) Solve the recurrence relation $a_n - 2a_{n-1} - 3a_{n-2} = 0, n \geq 2$ by the generating function method $a_0 = 3, a_1 = 1$ .	[6M]	
Unit-V			
5	a	i) A women has 20 close relatives and she wishes to invite 7 of them to dinner. In how many ways she can invite them in the following situations: (*) Two particular persons will not attend separately. (*) Two particular persons will not attend together.	[6M]
		ii) Find the number of ways of giving 15 identical gift boxes to 6 persons A, B, C, D, E, F in such a way that the total number of boxes given to A and B does not exceed 6.	[6M]
	OR		
	b	i) Find the number of permutations of the letters of the word MASSASAUGA, <ul style="list-style-type: none"> <li>• In how many of these, all four A's are together?</li> <li>• How many of these of them begin with S?</li> </ul>	[6M]
	ii) How many arrangements are there of {8.a, 6.b, 7.c} in which each 'a' is on at least one side of another 'a'?	[6M]	

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**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BCI3TH05

**DATA STRUCTURES**

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	Marks
<b>Unit-I</b>		
1	a i) Write an algorithm/pseudo code for linear search and mention the best case and worst case time complexity of Linear Search algorithm?.	[12M]
	OR	
	b i) Explain the various operations of the list ADT with examples	[6M]
	ii) What is algorithm? Why do we require various complexity analysis cases? Justify	[6M]
<b>Unit-II</b>		
2	a Describe insertion sort algorithm and trace the steps of insertion sort for sorting the list- 12, 19, 33, 26, 29, 35, 22, 37. Find the total number of comparisons made.	[12M]
	OR	
	b i) Show all the passes using insertion sort for the following list 54,26,93,17,77,31,44,55,20	[4M]
	ii) Differentiate Linear search and Binary search.	[4M]
	iii) Write about Bubble sort.	[4M]
<b>Unit-III</b>		
3	a i) Explain different collision resolution techniques	[6M]
	ii) Write a python application to perform insertion, deletion operations in single linked list.	[6M]
	OR	
	b i) Explain the four different hashing functions with an example for each	[6M]
	ii) Write a python application to perform insertion, deletion operations in circular linked list.	[6M]
<b>Unit-IV</b>		
4	a i) Define stack ADT and its implementation	[6M]
	ii) Explain the procedure to evaluate postfix expression 6 2 3 + - 3 8 2 / + * 2 4 3 +.	[6M]
	OR	
	b i) Convert the given infix Expression ((A+B)*C-(D-E) ^ (F+G)) into its Equivalent Prefix and Postfix Notations.	[6M]
	ii) Create binary search tree for the following elements (23, 12, 45, 36, 5, 15, 39, 2,19). Discuss about the height of the above binary search tree.	[6M]
<b>Unit-V</b>		
5	a i) Create max heap for the following elements 33, 14, 65, 02, 76, 69, 59, 85, 47, 99,98.	[6M]
	ii) Explain about Breadth First Search with an example.	[6M]
	OR	
	b i) Explain heap sort with an example.	[6M]
	ii) What are connected components of graph? Is there any method to find out all the Connected components of graph? Explain.	[6M]

**II B.Tech I Semester Supple Examinations, May-2023**

Sub Code: 19BCI3TH06

**COMPUTER ORGANIZATION**

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	Marks
1	Unit-I	
	a	i) Explain the types of computers in detail [6M] ii) Explain about shift micro operations with examples [6M]
	OR	
	b	i) Explain the following with respect to logic micro operations i) Selective Set ii) Selective Complement iii) Selective Clear [6M] ii) Explain about tri state buffer [6M]
2	Unit-II	
	a	Explain memory reference instructions with an example each. [12M]
	OR	
	b	i) Discuss about stored program organization [6M] ii) Explain different input output instructions [6M]
3	Unit-III	
	a	i) Explain the addressing modes with example [12M]
	OR	
	b	i) Explain the following a) Subroutines b) Conditional branching [6M] ii) Explain the selection of address for control memory. [6M]
4	Unit-IV	
	a	i) Draw a neat block diagram of memory hierarchy in a computer system. [6M] Compare the parameters size, speed and cost per bit in the hierarchy ii) Explain ROM and RAM with respect to their block diagrams [6M]
	OR	
	b	i) Describe the hardware implementation and hardware algorithm for addition and subtraction of signed magnitude data with an example. [6M] ii) Explain about the addition and subtraction for the floating point numbers with flow chart [6M]
5	Unit-V	
	a	i) Draw the block diagram for asynchronous communication interface [6M] ii) Explain the data transfer procedure for source initiated using handshaking [6M]
	OR	
	b	i) Discuss about parallel priority interrupt [6M] ii) Explain the method of DMA transfer. How does a DMA controller improve the performance of a computer [6M]

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