NSRIT

AUTONOMOUS

SEMESTER END EXAMINATION MODEL QUESTION PAPERS

Third Semester
B. Tech.

ACADEMIC REGULATION 2020

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NSRIT

Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	CSE (AI & ML)			**Academic Year**	2021 - 2022
Course Code	20AI302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Artificial Neural Networks**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)				
No.	Questions (1 through 5)		Learning Outcome (s)	DoK
1	List any four features of human brain and ANN		20AI302.1	L1
2	What is the significance of bias in ANN?		20AI302.2	L1
3	What are perceptron?		20AI302.3	L1
4	What is generalization in ANN?		20AI302.4	L1
5	List any two applications of associative memory		20AI302.5	L1
Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Describe the function of biological neuron and human brain	6M	20AI302.1	L1
6 (b)	Describe the function of artificial neuron and artificial neural network	6M	20AI302.1	L1
	OR			
7 (a)	Explain any 6 terminologies of ANN	6M	20AI302.1	L1
7 (b)	Write about any 6 activation functions	6M	20AI302.1	L1
8	Explain McCulloh Pitts neuron and its functions and its implementation for logical operations	12M	20AI302.2	L2
	OR			
9	Explain the functioning of Hebbian network and its implementation for logical operations	12M	20AI302.2	L2
10	Explain least mean square algorithm	12M	20AI302.3	L2
	OR			
11	Explain perceptron convergence theorem	12M	20AI302.3	L2
12	With necessary diagrams and algorithms, explain back propagation network	12M	20AI302.4	L2
	OR			
13 (a)	Write about the limitations of back propagation network	6M	20AI302.4	L2
13 (b)	Describe convolution networks	6M	20AI302.4	L2
14 (a)	Describe hetero associative memory	6M	20AI302.5	L2
14 (b)	Explain the training algorithm for auto-associative memory	6M	20AI302.5	L2
	OR			
15	Explain the functioning of bi-directional associative memory with its architectural diagram and its applications	12M	20AI302.5	L2

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	CE, EEE & MECH			**Academic Year**	2021 - 2022
Course Code	20BSX13	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Numerical Methods & Transforms**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Write the iteration formulas of Newton-Raphson method and Secant method	20BSX13.1	L1
2	Prove that $\Delta = \nabla E$	20BSX13.2	L2
3	Write Simpson's one-third rule	20BSX13.3	L1
4	Evaluate L{$(t-1)^3$u(t-1)}	20BSX13.4	L2
5	State the change of scale property of Fourier transforms	20BSX13.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Using the Regula - falsi method, compute a real root of the equation xe^x - 2 =0, correct to three decimal places.	6M	20BSX13.1	L2
6 (b)	Find a real root of the equation cosx - xe^x =0 by Newton-Raphson method, correct to three decimal places, near x= 0.5.	6M	20BSX13.1	L3
	OR			
7 (a)	Find a real root of the equation $x^3 - x - 1 = 0$ that is near to x = 1 by successive approximation method, correct to four decimal places.	6M	20BSX13.1	L2
7 (b)	Solve the following equations by Gauss – Seidel method: 20x + y - 2z =17, 3x + 20y -z =-18 , 2x -3y + 20z =25	6M	20BSX13.1	L3
8 (a)	Evaluate $\frac{\Delta^2}{E}\sin(x+h) + \frac{\Delta^2 \sin(x+h)}{E \sin(x+h)}$	6M	20BSX13.2	L3
8 (b)	Using Lagrange's interpolation formula, find the value of y when x = 10, if the following values of x and y are given: x: 5, 6, 9, 11 y: 12, 13, 14, 16	6M	20BSX13.2	L2
	OR			
9 (a)	Using the method of separation of symbols, prove that $u_0 + u_1 + u_2 + u_3 + \ldots\ldots + u_n =$ $(n+1)C_1 u_0 + (n+1)C_2 \Delta u_0 + (n+1)C_3 \Delta^2 u_0 + \ldots\ldots + (n+1)C_{n+1} \Delta^n u_0$	6M	20BSX13.2	L3
9 (b)	Find the number of students who obtained marks between 40 and 45 Marks: 30-40, 40-50, 50-60, 60-70, 70-80 No. of students: 31, 42, 51, 35, 31	6M	20BSX13.2	L2

10 (a)	Evaluate $\int_0^6 \frac{1}{1+x^2}dx$ by Trapezoidal and Simpson's 3/8th rule, by dividing the interval (0, 6) into 6 parts	6M	20BSX13.3	L2
10 (b)	Solve $y' = xy + 1, y(0) = 1$ using Taylor's series method and compute $y(0.1)$	6M	20BSX13.3	L3
	OR			
11 (a)	Evaluate $\int_0^1 \frac{1}{1+x}dx$ by Simpson's $\frac{1}{3}$ rd and Simpson's $\frac{3}{8}$ th rule	6M	20BSX13.3	L2
11 (b)	Using Runge-Kutta 4th order method, evaluate $y(0.1)$ and $y(0.2)$ given that $y^1 = x + y, y(0) = 1.$	6M	20BSX13.3	L3
12 (a)	Show that $\int_0^\infty t^2 e^{-4t}$sin2t dt = $\frac{1}{250}$	6M	20BSX13.4	L3
12 (b)	Using convolution theorem, evaluate $L^{-1}\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\}$	6M	20BSX13.4	L2
	OR			
13 (a)	Evaluate L$\{\frac{cosat-cosbt}{t} + t\, sinat\}$	6M	20BSX13.4	L2
13 (b)	Solve y'''(t) + y(t) =1, if y(0) = y'(0) =y''(0) = 0 using transform method.	6M	20BSX13.4	L3
14 (a)	Find the Fourier Transform of $f(x) = e^{\frac{-x^2}{2}}$	6M	20BSX13.5	L3
14 (b)	Find the Fourier cosine transform of $f(x) = \begin{cases} x, for\ 0 < x < 1 \\ 2-x, for\ 1 < x < 2 \\ 0\ , for\ x > 3. \end{cases}$	6M	20BSX13.5	L2
	OR			
15 (a)	Find the Fourier Transform of $f(x) = .\begin{cases} 1, -1 < x < 1 \\ 0,\ otherwise \end{cases}$	6M	20BSX13.5	L2
15 (b)	Find the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$.	6M	20BSX13.5	L3

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	ECE			**Academic Year**	2021 - 2022
Course Code	20BSX14	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Complex Variables & Transforms**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Write the Cauchy – Riemann (C – R) Equations in Cartesian form and in Polar Form	20BSX14.1	L1
2	Expand $f(z) = sinz$ in Taylor's series about $z = \frac{\pi}{4}$.	20BSX14.2	L2
3	Write the Euler's formulae	20BSX14.3	L2
4	Find Laplace Transform of $(t^2 + 1)^2$	20BSX14.4	L1
5	Write the Dirichlet's Conditions	20BSX14.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Evaluate $\int_c \frac{z^3 - sin3z}{(z-\frac{\pi}{2})^3}\, dz$ with C:$\lvert z\rvert = 2$ using Cauchy's integral formula	6M	20BSX14.1	L3
6 (b)	Find the regular function whose imaginary part is $v = \log(x^2 + y^2) + x - 2y$	6M	20BSX14.1	L2
	OR			
7 (a)	Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path (i) $y = x$ and (ii) $y = x^2$.	6M	20BSX14.1	L2
7 (b)	Show that the function $f(z) = \sqrt{\lvert xy\rvert}$ is not analytic at the origin although Cauchy – Riemann equations are satisfied at that point	6M	20BSX14.1	L3
8 (a)	Find the Taylor's expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about the point $z = i$.	6M	20BSX14.2	L2
8 (b)	Find the residue of $\frac{z^2-2z}{(z+1)^2\,(z^2+1)}$ at each pole	6M	20BSX14.2	L3
	OR			
9 (a)	Find the Laurent's series expansion of the function $f(z) = \frac{z^2-6z-1}{(z+1)(z-3)(z+2)}$ in the region 3 < $\lvert z + 1\rvert < 5$.	6M	20BSX14.2	L2
9 (b)	Evaluate $\int_c \frac{z-3}{z^2+2z+5}\, dz$, where c is the circle given by (i) $\lvert z\rvert = 1$, (ii) $\lvert z + 1 - i\rvert = 2$, (iii) $\lvert z + 1 + i\rvert = 2$.	6M	20BSX14.2	L3

10 (a)	Obtain the Fourier series for the function $f(x) = e^{ax}$ in $(0, 2\pi)$	6M	20BSX14.3	L2
10 (b)	Find the half range series for $f(x) = x(\pi - x)$, in $0 < x < \pi$. Deduce that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \cdots = \frac{\pi^3}{32}$	6M	20BSX14.3	L3
	OR			
11 (a)	Expand the function $f(x) = x^2$ as a Fourier series in $[-\pi, \pi]$.	6M	20BSX14.3	L2
11 (b)	Find the Fourier series to represent $f(x) = x^2$, when --2 $\leq x \leq 2$.	6M	20BSX14.3	L3
12 (a)	Find Laplace Transform of $e^{2t}\,(3\,sinh2t - 5\,cosh2t)$	6M	20BSX14.4	L2
12 (b)	Show that $\int_0^\infty t^2\,e^{-2t} sin2tdt = \frac{11}{500}$.	6M	20BSX14.4	L3
	OR			
13 (a)	Using Laplace transform method solve $(D^2 + 1)y = 6\,cos2t, \quad t > 0.$	6M	20BSX14.4	L2
13 (b)	Using Convolution theorem find $L^{-1}\{\frac{1}{(s-2)(s+2)^2}\}$	6M	20BSX14.4	L3
14 (a)	Using Fourier integral then show that $e^{-ax} - e^{-bx} = \frac{2\,(b^2 - a^2)}{\pi} \int_0^\infty \frac{\lambda\, sin\lambda x d\lambda}{(\lambda^2 + a^2)(\lambda^2 + b^2)}$, where a, b > 0.	6M	20BSX14.5	L2
14 (b)	Find the Fourier Sine and Cosine transform s of $f(x) = \frac{e^{-ax}}{x}$ and deduce that $\int_0^\infty \frac{e^{-ax} - e^{-bx}}{x} sinsxdx = tan^{-1}\frac{s}{a} - tan^{-1}\frac{s}{b}$.	6M	20BSX14.5	L3
	OR			
15 (a)	Find the Fourier transform of $f(x)$ defined by $f(x) = \begin{cases} 1, \lvert x \rvert < a \\ 0, \lvert x \rvert > a \end{cases}$ and hence find $\int_0^\infty \frac{sinp}{p} dp$ and $\int_{-\infty}^\infty \frac{sinap\; cospx}{p} dp$	6M	20BSX14.5	L2

15 (b)	Find the Fourier transform of $f(x)$ defined by $f(x) = \begin{cases} 1-x^2, & if \ \ |x| < 1 \\ 0, & if \ |x| > 1 \end{cases}$ and hence find $\int_0^{\infty} \frac{x\,cosx - sinx}{x^3} cos\frac{x}{2} dx$.	6M	20BSX14.5	L3

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Semester End Examination, January/February, 2022

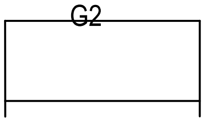
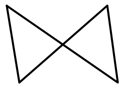
Degree	B. Tech. (U. G.)	**Program**	CSE, CSE (AI & ML) & CSE (DS)			**Academic Year**	2021 - 2022
Course Code	20BSX16	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Mathematical Foundations for Computer Science**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define Tautology. Explain with truth table and suitable example	20BSX16.1	L1
2	Prove that the relation divides (/) is a partial ordered set in the set of integers	20BSX16.2	L2
3	State Division Algorithm	20BSX16.3	L1
4	Find the first two terms in the sequence defined by the recurrence relation $a_n=6a_{n-1}$ with initial condition $a_0 = 2$	20BSX16.4	L2
5	Define cycle graph , write the cycle graphs for c_4, c_5	20BSX16.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Define converse, inverse and contra positive with truth table and suitable example	6M	20BSX16.1	L2
6 (b)	Write the truth table P → (Q → R)	6M	20BSX16.1	L3
	OR			
7 (a)	(i) Obtain the Disjunctive Normal form of ~P→(Q^ R) (ii) Obtain the Conjunctive Normal form of P ^ (P→Q)	6M	20BSX16.1	L2
7 (b)	Show that the hypotheses “It is not sunny this afternoon and it is a colder than yesterday”, “We will go swimming only if it is sunny”, “ If we do not go swimming, then we will take a canoe trip”, and “If we take a canoe trip, then we will be home by sunset” lead to the conclusion “ We will be home by sunset”	6M	20BSX16.1	L3
8 (a)	Write the matrix representation and directed graph of the relation on the set A= {1,2,3,4} where R= { (1,1), (1,2), (2,1), (2,2), (2,4), (3,3), (3,1), (4,3), (4,1), (3,2)}	6M	20BSX16.2	L3
8 (b)	Construct the Hasse diagram of ({1,2,3,4,6,8,12}, divides(/))	6M	20BSX16.2	L2
	OR			
9 (a)	Let S = {1, 2, 3, 4} and let f = $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$ and g = $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 1 & 2 & 3 \end{pmatrix}$ Find f ∘ g and g ∘ f in the permutation form	6M	20BSX16.2	L3
9 (b)	Define group and prove that a * b= a+b+1 is an abelian group in set of integers	6M	20BSX16.2	L2
10 (a)	State and prove Euler’s theorem. Give an example	6M	20BSX16.3	L2
10 (b)	Prove that for all integers a, b, c, (i) if a|b , then a|bc (ii) if a|b and b|c then a|c for all a,b,c integers	6M	20BSX16.3	L3
	OR			
11 (a)	State and prove Fermat’s theorem	6M	20BSX16.3	L2
11 (b)	Find the gcd of 42823 and 6409 using Euclidean algorithm	6M	20BSX16.3	L3
12 (a)	Find the particular solution of the recurrence relation an+2 – 4 an+1 + 4 an = 2n?	6M	20BSX16.4	L3

12 (b)	Solve the recurrence relation an – 2 an-1 - 3 an-2 = 0, n>= 2 by the generating function method a0 = 3 , a1 = 1	6M	20BSX16.4	L2
	OR			
13 (a)	Find all solutions of the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$	6M	20BSX16.4	L2
13 (b)	Find the explicit formula for the Fibonacci numbers	6M	20BSX16.4	L3
14 (a)	Explain about the bipartite and complete bipartite Graphs with diagrams	6M	20BSX16.5	L3
14 (b)	Show that the following two graphs are isomorphic G1 G2  	6M	20BSX16.5	L2
	OR			
15 (a)	Define Eulerian circuit and Hamiltonian circuit, give an example of graph that has neither an Eulerian circuit nor Hamiltonian circuit	6M	20BSX16.5	L2
15 (b)	Explain kruskal's algorithm to find minimal spanning tree of the graph with suitable example	6M	20BSX16.5	L3

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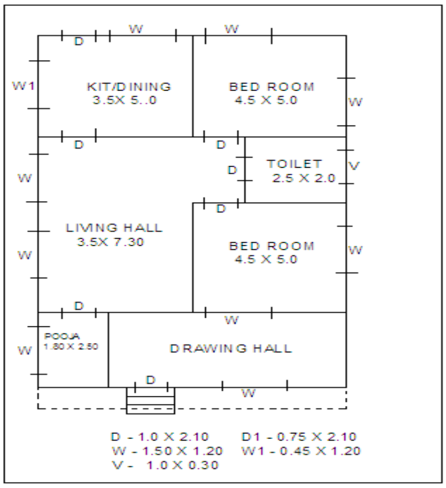
Semester End Examination, January/February, 2021

Degree	B. Tech. (U. G.)	**Program**	Civil Engineering			**Academic Year**	2021 – 2022
Course Code	20CE302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Building Planning And Drawing**						

Part A (Short Answer Questions 14 x 3 = 42 Marks)				
No.	Questions (1 through 5)	Marks	Learning Outcome (s)	DoK
1(a)	Draw the following sign conventions brick, plywood, sheet metal, concrete, glass, manhole, showerhead, Washbasin, Pump, urinal stall	7 M	20CE302.1	L1
1(b)	Draw rough sketch for english bond for 1 ½ brick wall	7 M	20CE302.1	L1
2(a)	Describe the principle and necessity of building bye-laws	7 M	20CE302.2	L2
2(b)	Explain the provision of height of buildings and requirement of lighting & ventilation as per building bye-law	7 M	20CE302.2	L2
3(a)	Write classification of buildings and explain each of them	7 M	20CE302.3	L2
3(b)	Discuss the functions and requirements of kitchen and master bedroom	7 M	20CE302.3	L3
4(a)	Explain the different features of a queen post roof truss	7 M	20CE302.4	L3
4(b)	Explain clearly difference between flush and glazed door	7 M	20CE302.4	L3
5(a)	Draw the layout for the hospital building	7 M	20CE302.5	L3
5(b)	Explain in detail with neat sketch about planning of a bank building	7 M	20CE302.5	L3
Part B (Long Answer Questions 1 x 28 = 28 Marks)				
No.	Questions (6 through 7)	Marks	Learning Outcome (s)	DoK
6(a)	Draw the plan and sectional elevation of a glazed door of size 1.2 X2.1 m	14 M	20CE302.4	L4
6(b)	Draw the detailed elevation of a king post roof truss of 6 m clear span. Indicate all features.	14 M	20CE302.4	L4
	OR			
7	Draw plan, section, elevation for the below line diagram and assume suitable dimensions and section line. All dimensions are in mm.  	28 M	20CE302.5	L4

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	Civil Engineering			**Academic Year**	2021- 2022
Course Code	20CE303	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**SURVEYING**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	What is the object or purpose of surveying?	20CE303.1	L1
2	What is its back bearing?	20CE303.2	L1
3	What is mean by line of collimation and height of collimation?	20CE303.3	L1
4	List the essential qualities of a theodolite telescope	20CE303.4	L1
5	What are the functions of a transition curve?	20CE303.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6	Give a detailed classification of Surveys	12 M	20CE303.1	L2
	OR			
7 (a)	Illustrate the errors in survey measurements	6M	20CE303.1	L1
7 (b)	A 30 m chain was found to be 3 cm too long after chaining 1800 m. It was 9 cm too long at the end of day's work after chaining a total distance of 3000 m. If the chain was correct before commencement of the work, find the true distance	6M	20CE303.1	L1
8	Describe the field procedure of compass survey	12M	20CE303.2	L2
	OR			
9 (a)	List out the temporary and permanent adjustments of a level. State the desired relations	6M	20CE303.2	L1
9 (b)	What is local attraction? How is it detected and eliminated?	6M	20CE303.2	L1
10 (a)	Draw the neat sketch of dumpy level and explain its component parts	6M	20CE303.3	L1
10 (b)	Differentiate between the fixed hair method and movable hair method	6M	20CE303.3	L1
	OR			
11	Differentiate between the stadia and Tangential methods of tachometry. Discuss their merits and demerits	12M	20CE303.3	L1
12	Two observations were taken upon a vertical staff by means of a theodolite, the reduced level of its trunnion axis being 160.95. In the case of the first, the angle of elevation was 4°36' and the staff reading 0.75. In the case of second observation, the staff reading was 3.45 and the angle of elevation 5°48'. Calculate the reduced level of the staff station and its distance from the instrument	12M	20CE303.4	L1
	OR			
13 (a)	Write about the Total Station and state its advantage over other methods of surveying	6M	20CE303.4	L2
13 (b)	Illustrate the methods of setting out simple curves? Explain any one method with a neat sketch	6M	20CE303.4	L2
14 (a)	List out in detail the parts of theodolite	6M	20CE303.5	L1
14(b)	Explain the permanent adjustment of theodolite	6M	20CE303.5	L1
	OR			

15 (a)	What are different types of vertical curves? Draw neat sketches	6M	20CE303.5	L2
15 (b)	Describe the procedure for setting out simple circular curve with a tape and a theodolite	6M	20CE303.5	L2

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U.G.)	**Program**	**Civil Engineering**			**Academic Year**	2021 - 2022
Course Code	20CE304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Strength of Materials**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Draw the stress strain diagram for mild steel subjected to tensile load test	20CE304.1	L1
2	Define the terms (i) Bending stress (ii) Shear stress	20CE304.2	L1
3	Define the terms (i) Slope (ii) Deflection for a beam	20CE304.3	L1
4	Define (i) Slenderness ratio (ii) Radius of Gyration	20CE304.4	L1
5	Write the relationship between power transmitted and torque	20CE304.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Explain clearly the different types of stresses and strains	6M	20CE304.1	L1
6 (b)	Derive an expression for Young's modulus in terms of bulk modulus	6M	20CE304.1	L2
	OR			
7 (a)	Write note on Mohr's circle of stresses	6M	20CE304.1	L1
7 (b)	The stresses at a point in a bar are 200 N/mm^2 (tensile) and 100N/mm^2 (compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 60 ^{0} to the axis of the major stress. Also determine the maximum intensity of shear stress in the material at the point	6M	20CE304.1	L2
8	A cast iron beam section is of I - section with a top flange 80 mm x 20 mm thick, bottom flange 160 mm x 40 mm thick and the web 200 mm deep and 20 mm thick. The beam is freely supported on a span of 5 metres. if the tensile stress is not to exceed 20 N/mm^2.find the safe uniformly distributed load which the beam can carry . Find also the maximum compressive stress	12M	20CE304.2	L3
	OR			
9 (a)	Find the section modulus for (i) hollow circular section (ii) circular section	6M	20CE304.2	L2
9 (b)	Find the ratio of maximum shear stress to average shear stress is 1.5 in case of rectangular section	6M	20CE304.2	L3
10 (a)	Write and explain Moment area theorems	6M	20CE304.3	L1
10 (b)	Derive an expression for the slope and deflection of a Simply supported beam with a uniformly distributed load	6M	20CE304.3	L2
	OR			
11 (a)	Derive an expression for the slope and deflection of a cantilever of length L, carrying a point load W at free end by double integration method	6M	20CE304.3	L2
11 (b)	A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 kN/ m run over the entire span of 5 m. the value of E = 1 x 10^{4}N/mm^2, find the slope at support and and maximum deflection	6M	20CE304.3	L3
12 (a)	Derive an expression for crippling load when both ends of the column are hinged	6M	20CE304.4	L2

12 (b)	A simply supported beam of length 4 metres is subjected to uniformly distributed load of 30 kN/m over the whole span and deflects 15 mm at the centre. Determine the crippling loads when the beam is used as column with the following conditions. I. One end fixed and other end hinged II. Both the ends pin jointed	6M	20CE304.4	L3
	OR			
13(a)	A hollow cylindrical cast iron column is 4 m long with both ends fixed. Determine the minimum diameter of the column if it has to carry a safe load of 250 kN with a factor of safety. Take the internal diameter as 0.8 times the external diameter Take σ_c = 550 N/mm^2 and $\alpha = \frac{1}{1600}$ in Rankine's formula	8M	20CE304.4	L3
13(b)	A rectangular column of Width 200 mm and of thickness 150 mm carries a point load of 240kN at an eccentricity of 10 mm determine the maximum and minimum stresses on the section	4M	20CE304.4	L3
14	Derive the Torsion equation	12M	20CE304.5	L2
	OR			
15(a)	Explain clearly the different types of springs and their applications	6M	20CE304.5	L1
15(b)	Write short note on thin cylinders and thick cylinders	6M	20CE304.5	L1

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Degree	B. Tech. (U. G.)	**Program**	Civil Engineering			**Academic Year**	2020 - 2021
Course Code	20CE305	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Fluid Mechanics**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)				
No.	Questions (1 through 5)		Learning Outcome (s)	DoK
1	Define Specific Gravity		20CE305.1	L1
2	State Pascal's Law		20CE305.2	L1
3	Write the two expressions for 2-dimensional stream function		20CE305.3	L1
4	What is Buoyancy?		20CE305.4	L1
5	What are the forces acting on fluid in motion according to Euler's equations?		20CE305.5	L1
Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Write about velocity potential function	6M	20CE305.1	L2
6 (b)	What is Flow Net?	6M	20CE305.1	L1
	OR			
7 (a)	State and explain Bernoulli's equation	6M	20CE305.1	L3
7 (b)	State and explain the equation of continuity	6M	20CE305.1	L2
8 (a)	What is the principle involved in the functioning of Venturimeter?	6M	20CE305.2	L2
8 (b)	What is the Principle involved in the functioning of Orifice meter?	6M	20CE305.2	L3
	OR			
9 (a)	What are the types of fluid flow?	6M	20CE305.2	L3
9 (b)	Define any two types of fluid flow	6M	20CE305.2	L2
10 (a)	What is total pressure?	6M	20CE305.3	L3
10 (b)	Derive the expression for total pressure for a vertical plane surface submerged in liquid	6M	20CE305.3	L2
	OR			
11 (a)	Explain the equation of continuity in 3 dimensions	6M	20CE305.3	L3
11 (b)	State how this equation changes for an Incompressible fluid	6M	20CE305.3	L2
12 (a)	State the Laws of fluid friction	6M	20CE305.4	L2
12 (b)	Explain in detail the Darcy-Weisbach equation	6M	20CE305.4	L2
	OR			
13	Explain in detail about Kaplan turbine with a neat diagram	12M	20CE305.4	L2
14	What are the performance characteristics of a turbine? Explain geometric similarity	12M	20CE305.5	L2
	OR			
15 (a)	Write in detail about Laminar boundary layer and turbulent boundary layer	6M	20CE305.5	L2
15 (b)	Write about the development of lift in immersed bodies	6M	20CE305.5	L2

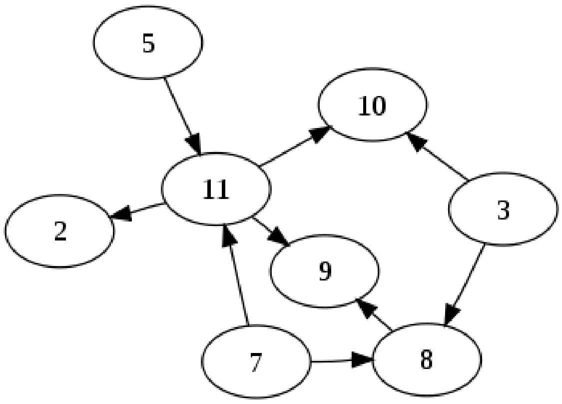
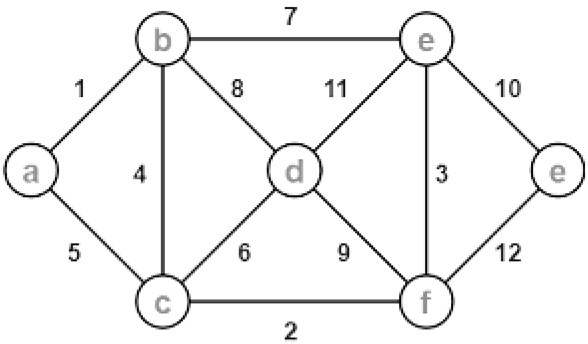
Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	CSE, CSE (AI & ML) & CSE (DS)			**Academic Year**	2021 - 2022
Course Code	20CS302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Design and Analysis of Algorithms**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define time complexity and space complexity	20CS302.1	L1
2	State Master theorem	20CS302.2	L1
3	Write the general method of dynamic programming	20CS302.3	L2
4	What are NP Hard problems?	20CS302.4	L1
5	Write the general principle of branch and bound technique	20CS302.3	L2

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Describe the asymptotic classes. Give example	6M	20CS302.2	L2
6 (b)	Write the recursive algorithm to find factorial of given number and analyze its time complexity	6M	20CS302.2	L2
	OR			
7 (a)	Write the String-matching algorithm. Explain it with example	6M	20CS302.2	L2
7 (b)	Apply bubble sort algorithm to sort the characters of "EXAMPLE"	6M	20CS302.2	L2
8 (a)	Find the topological ordering of vertices of given graph 	6M	20CS302.4	L3
8 (b)	Sort the given array using quick sort algorithm (24, 9, 29, 14, 19, 27)	6M	20CS302.4	L3
	OR			
9 (a)	Explain Karatsuba's algorithm to multiply 2 large integers	6M	20CS302.4	L3
9 (b)	Apply the algorithm to find the product of 1234 and 8765	6M	20CS302.4	L3
10	Explain Prim's algorithm to find the minimum cost spanning tree. Apply it to the following graph 	12M	20CS302.3	L3

	OR			
11 (a)	Design a dynamic programming based algorithm to solve 0/1 knapsack problem. Apply it solve the following problem N=5, W=6, weight vector = (3,2,1,4,5), cost vector = (25,20,15,40,50)	12M	20CS302.3	L3
12 (a)	Describe approximation algorithms for NP-Hard graph problems	12M	20CS302.5	L2
	OR			
13 (a)	State and describe Cook's theorem	6M	20CS302.5	L2
13 (b)	Explain NP Complete problems with examples	6M	20CS302.5	L2
14 (a)	Describe the least-cost based branch and bound strategy	4M	20CS302.3	L2
14 (b)	Solve the following problem by designing an algorithm using appropriate design strategy There are 4 jobs that are to be assigned to 4 persons a, b, c, d. The cost involved in assignment is given below. Find the optimal assignment $\begin{array}{rcl} & \begin{array}{cccc}\text{job 1} & \text{job 2} & \text{job 3} & \text{job 4}\end{array} & \\ C = & \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} & \begin{array}{l}\text{person } a \\ \text{person } b \\ \text{person } c \\ \text{person } d\end{array}\end{array}$	8M	20CS302.4	L3
	OR			
15 (a)	State n-Queen's problem statement	4M	20CS302.3	L2
15 (b)	Generate at least 2 solutions to 8-Queen's problem and draw its state-space tree	8M	20CS302.4	L3

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Degree	B. Tech. (U. G.)	**Program**	CSE, CSE (AI & ML) & CSE (DS)			**Academic Year**	2021 – 2022
Course Code	20CS303	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Database Management System**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)				
No.	Questions (1 through 5)		Learning Outcome (s)	DoK
1	List out four Database applications		20CS303.1	L1
2	What is entity relation constraint		20CS303.2	L1
3	List out all commands in DML		20CS303.3	L1
4	What is Normalization?		20CS303.4	L1
5	Define durability and atomicity of a transaction		20CS303.5	L1
Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Compare file system with database system	6M	20CS303.1	L2
6 (b)	Explain the symbols used to draw ER diagram and construct ER diagram for hospital	6M	20CS303.1	L2
	OR			
7 (a)	What is a data base model? Explain any two of them	6M	20CS303.1	L2
7 (b)	Explain architecture of DBMS with neat diagram	6M	20CS303.1	L2
8	Explain different join operation in relational algebra	12M	20CS303.2	L2
	OR			
9 (a)	What is view? Explain commands for performing view operations	6M	20CS303.2	L2
9 (b)	Explain any four operators used in relational algebra with examples	6M	20CS303.2	L2
10 (a)	Explain Nested queries with example	6M	20CS303.3	L2
10 (b)	An instance of sailors relation SID | SNAME | RATING | AGE 18 | Jones | 3 | 30.0 41 | Jonah | 6 | 56.9 22 | Ahab | 7 | 44.0 63 | Mobay | Null | 15.0 1. Write SQL query to compute the average rating using AVG, the sum of the rating, using SUM and number of ratings using COUNT 2. If you divide sum computed above by count, would be result be same as the average? How would your answer change, if the above steps were carryout with respect to the age field instead of rating	6M	20CS303.3	L3
	OR			
11 (a)	Apply database trigger for insertion and updating a records	6M	20CS303.3	L3
11 (b)	What are null values? How DBMS deals with null values?	6M	20CS303.3	L2
12 (a)	Explain third and fourth normal forms with example	6M	20CS303.4	L2
12 (b)	Explain Indexed sequential access method	6M	20CS303.4	L2
	OR			
13 (a)	Explain trivial and non trivial dependencies	6M	20CS303.4	L2
13 (b)	What is lossless join decomposition? Explain the same with the example	6M	20CS303.4	L2

14 (a)	Explain in detail about a transaction and its properties	6M	20CS303.5	L2
14 (b)	Identify two phase locking for ensuring serializability	6M	20CS303.5	L3
	OR			
15 (a)	Apply ARIES algorithm for system crash recovery	6M	20CS303.5	L3
15 (b)	Explain different recovery techniques used in transaction failure	6M	20CS303.5	L2

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Degree	B. Tech. (U. G.)	**Program**	CSE, CSE (AI & ML) & CSE (DS)			**Academic Year**	2020 - 2021
Course Code	20CS304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Object Oriented Programming through C++**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define variable and reference variable	20CS304.1	L1
2	Give the properties of a static member variable	20CS304.2	L2
3	What is the difference between a constructor and destructor	20CS304.3	L2
4	Define pure virtual function	20CS304.4	L1
5	Write difference between Templates & Macros	20CS304.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Write differences between POP & OOP	6M	20CS304.1	L1
6 (b)	Explain principles of object oriented programming	6M	20CS304.1	L2
	OR			
7 (a)	What are I/O manipulators? Explain the following I/O Stream functions with suitable examples i) width() ii) precision() iii) setf() iv) unsetf() v) fill() vi) endl	7M	20CS304.1	L2
7 (b)	Write a program in C++ to find the GCD between two numbers using recursion	5M	20CS304.1	L3
8 (a)	With an example explain the syntax for defining a class & object	6M	20CS304.2	L2
8 (b)	How the member function can be defined inside class and outside the class? Explain	6M	20CS304.2	L2
	OR			
9 (a)	What is function overloading? Write a C++ program to define two overloaded functions to swap two integers and to swap two characters	6M	20CS304.2	L3
9 (b)	Explain the friend function with example	6M	20CS304.2	L2
10 (a)	Explain the constructors with example	6M	20CS304.3	L2
10 (b)	What is operator overloading? Write a C++ program illustrating overloading binary ‘+’ operator	6M	20CS304.3	L3
	OR			
11 (a)	Write a C++ program to implement single inheritance with public access specific	6M	20CS304.3	L3
11 (b)	Explain about the multiple inheritance with example	6M	20CS304.3	L2
12 (a)	What is a pointer? How to declare a pointer to a class and an object?	5M	20CS304.4	L1
12 (b)	With an example explain how late binding can be achieved in C++	7M	20CS304.4	L2
	OR			
13 (a)	Explain the abstract class with example	6M	20CS304.4	L2
13 (b)	Write a C++ program that illustrates exception handling with the help of keywords: try, throws and catch	6M	20CS304.4	L3
14	What is STL? Briefly explain the use of containers, vectors, lists	12M	20CS304.5	L2
	OR			
15 (a)	What are class templates? How are they different from classes?	5M	20CS304.5	L1
15 (b)	Write a program to create a template function for bubble sort and demonstrate the sorting of integers and characters	7M	20CS304.5	L3

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Degree	B. Tech. (U. G.)	**Program**	CSE, CSE (AI & ML) & CS (DS)			**Academic Year**	2021 - 2022
Course Code	20CS305	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**COMPUTER ORGANIZATION**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Convert the hexadecimal number F3A7C2 to binary and octal	20CS305.1	L1
2	What is the need of RTL language?	20CS305.2	L2
3	What are the different stack operations?	20CS305.3	L1
4	Perform the arithmetic operations below with binary numbers and with negative numbers in signed 2's complement. Use seven bit to accommodate each number together with its sign -35 + -40	20CS305.4	L2
5	What is virtual memory?	20CS305.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Represent the decimal number 8620 in (i) BCD (ii) Excess-3 (iii) 2421 (iv) Binary number	6M	20CS305.1	L2
6 (b)	Construct a 3 X 8 decoder with two 2 X 4 decoders	6M	20CS305.1	L1
	OR			
7 (a)	With a neat sketch explain 4-bit synchronous binary counter	6M	20CS305.1	L2
7 (b)	"Parity checking can be used for error detection"-Justify your answer with an example	6M	20CS305.1	L1
8 (a)	Starting from an initial value of R=11011101,determine the sequence of binary values in T after a logical shift left , followed by a logical shift right and circular shift left	5M	20CS305.2	L2
8 (b)	Explain various phases of instruction cycle with an example	7M	20CS305.2	L2
	OR			
9 (a)	Explain the following with neat sketches (i) 4-bit binary adder-subtractor (ii) 4-bit binary decrementer using full adder circuits	5M	20CS305.2	L2
9 (b)	Explain memory-reference instructions. Draw the flow chart for memory-reference instructions	7M	20CS305.2	L2
10 (a)	What do you mean by addressing mode? Explain the following addressing modes with examples (i) Direct addressing mode (ii) Immediate addressing mode	8M	20CS305.3	L2
10 (b)	Explain about microprogram sequencer for a control memory	4M	20CS305.3	L2
	OR			
11 (a)	Explain about stack organization	5M	20CS305.3	L2
11 (b)	Explain address sequencing mechanism in microprogrammed control	7M	20CS305.3	L2
12 (a)	What are the steps involved in the addition of 2's complement notation. Explain with an example	6M	20CS305.4	L2
12 (b)	Explain Booth multiplication algorithm with an example	6M	20CS305.4	L2
	OR			
13 (a)	Explain the multiplication of positive numbers using array multiplier with a neat sketch	6M	20CS305.4	L2
13 (b)	Perform floating point addition using the numbers 0.5 and 0.4375 use the floating point addition algorithm	6M	20CS305.4	L2

14 (a)	Discuss the possible methods for specifying the placement of memory blocks in cache	7M	20CS305.5	L1
14 (b)	Explain in detail DMA transfer in a computer system	5M	20CS305.5	L2
	OR			
15 (a)	What is the difference between isolated I/O and memory mapped I/O? What are the advantages and disadvantages of each?	6M	20CS305.5	L2
15 (b)	Explain address mapping using pages	6M	20CS305.5	L2

Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	CSE (DS)			**Academic Year**	2021 - 2022
Course Code	20DS302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Foundations of Data Science**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Identify Big Data Sources	20DS302.1	L1
2	List down any four data types in Python	20DS302.2	L1
3	Distinguish training data and test data	20DS302.3	L2
4	What are the different file formats in geographic information system?	20DS302.4	L1
5	What is web-scraping?	20DS302.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Differentiate Data Science and Data Engineering	6M	20DS302.1	L2
6 (b)	Explain 3 Vs of Big Data	6M	20DS302.1	L1
	OR			
7 (a)	Analyze the Pieces of Data Science puzzle	6M	20DS302.1	L2
7 (b)	Explain Hadoop Architecture	6M	20DS302.1	L1
8 (a)	Explain Python Data types	6M	20DS302.2	L1
8 (b)	Explain any four packages for Visualization, Mapping, and Graphing in R	6M	20DS302.2	L1
	OR			
9 (a)	List down any six Database Normalization properties	6M	20DS302.2	L1
9 (b)	Explain any two applications of Knime	6M	20DS302.2	L1
10 (a)	Explain Artificial Neural Network Model	6M	20DS302.3	L1
10 (b)	Explain Linear Regression Model	6M	20DS302.3	L1
	OR			
11 (a)	Explain Clustering with K-Means algorithm	6M	20DS302.3	L1
11 (b)	Differentiate Classification and Clustering	6M	20DS302.3	L1
12 (a)	Explain the three main types of data visualization	6M	20DS302.4	L1
12 (b)	Write any five applications of D3.js	6M	20DS302.4	L1
	OR			
13 (a)	Explain any two open source applications for data visualization	6M	20DS302.4	L1
13 (b)	What are the best practices for dashboard design	6M	20DS302.4	L1
14 (a)	How to develop, tell, and present the story in data journalism?	6M	20DS302.5	L1
14 (b)	How to model Environmental Human Interactions with environmental intelligence?	6M	20DS302.5	L1
	OR			
15 (a)	List any four web analytics applications	6M	20DS302.5	L1
15 (b)	Explain Predictive spatial models for Crime analysis	6M	20DS302.5	L1

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Degree	B. Tech. (U. G.)	**Program**	EEE & ECE			**Academic Year**	2021 - 2022
Course Code	20EC302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Electronic Devices and Circuits**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	What is diffusion capacitance?	20EC302.1	L1
2	List out any three application of SCR	20EC302.2	L1
3	Give the classification of filters	20EC302.3	L1
4	Write a short note on (i)Thermal Runaway (ii)Thermal stability	20EC302.4	L1
5	Define ripple factor	20EC302.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Derive the current diode equation	6M	20EC302.1	L2
6 (b)	What is the P-N junction? Discuss the behavior of a P-N junction under forward and reverse bias	6M	20EC302.1	L2
	OR			
7 (a)	Describe the current components in P-N diode	6M	20EC302.1	L2
7 (b)	What is the effect of temperature on P-N junction diode?	6M	20EC302.1	L2
8 (a)	Describe a Zener diode. Distinguish between Zener breakdown and avalanche breakdown	6M	20EC302.2	L2
8 (b)	Draw the equivalent circuit of UJT and discuss its working from the circuit	6M	20EC302.2	L2
	OR			
9 (a)	With neat diagram describe the operation of bridge rectifier	6M	20EC302.2	L2
9 (b)	Explain the operation of (i) Inductor filter (ii) capacitor filter	6M	20EC302.2	L2
10 (a)	Explain the mechanism of current flow in PNP and NPN transistor	5M	20EC302.3	L2
10 (b)	Sketch the family of CE output characteristics for a transistor. Explain cutoff, active, saturation region	7M	20EC302.3	L2
	OR			
11 (a)	Define α and β of a transistor and derive the relationship between them	5M	20EC302.3	L2
11 (b)	Sketch a family of CB output characteristics for a transistor. Explain cutoff, active, saturation region	7M	20EC302.3	L2
12 (a)	Obtain an expression of stability factor for fixed bias	5M	20EC302.4	L2
12 (b)	Derive the expression of for stability factor for self bias of JFET	7M	20EC302.4	L2
	OR			
13 (a)	With suitable expressions explain self bias of BJT	6M	20EC302.4	L2
13 (b)	Explain about Thermistor and Sensistor bias compensation techniques	6M	20EC302.4	L2
14 (a)	Investigate the h-parameters of common drain amplifier	7M	20EC302.5	L2
14 (b)	Discuss the analysis of small signal model of JFET	5M	20EC302.5	L2
	OR			
15 (a)	Give the comparison of BJT,JFET and MOSFET	4M	20EC302.5	L1
15 (b)	Analyze the h-parameters of common base amplifier	8M	20EC302.5	L2

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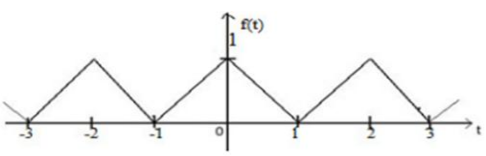
Degree	B. Tech. (U. G.)	**Program**	ECE			**Academic Year**	2021 - 2022
Course Code	20EC303	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Signals and Systems**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define signal and check whether ramp function is even or not	20EC303.1	L1
2	What is the Fourier transform of the impulse function δ(t)	20EC303.2	L1
3	Develop the relations between convolution and correlation	20EC303.3	L3
4	Define Signal bandwidth and System bandwidth	20EC303.4	L1
5	Find the Z-transform of the sequence u[n]	20EC303.5	L3

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	List the different types of systems and explain with an example	6M	20EC303.1	L1
6 (b)	For given the following signals find the periodicity of the signals and its fundamental period. a) $x(t)= \sin 10\pi t+\cos 15\pi t+20\cos(20\pi t+\pi/4)$ b) $x(t)= \sin (3\pi/5)t$.	6M	20EC303.1	L2
	OR			
7 (a)	Check whether the following signals are Energy or power Signals. Justify your answer i) $x(t)= e-4t\ u(t)$, $a>0$ ii) $x(t)=1rect(t/2)$	6M	20EC303.1	L2
7(b)	Define and sketch the unit step function and signum function. Bring out the relation between these two functions	6M	20EC303.1	L1
8(a)	Develop the expression for mean square error using the expression of a function using orthogonal signal space	6M	20EC303.2	L3
8 (b)	Write and derive the necessary expression to represent the function f(t) using Trigonometric Fourier Series	6M	20EC303.2	L1
	OR			
9 (a)	State and prove any five properties of Fourier Transform	6M	20EC303.2	L2
9 (b)	Find the exponential Fourier series for the following periodic function. 	6M	20EC303.2	L3
10 (a)	Perform the convolution of the two sequences x[n]={3,2,1,2} and h[n]= {1,2,1,2}	6M	20EC303.3	L3
10 (b)	Explain and define cross correlation function, write its properties and prove any two of them	6M	20EC303.3	L4
	OR			
11 (a)	Analyse and State Parseval's theorem for energy / power signals	6M	20EC303.3	L4
11 (b)	Perform the convolution of h(t)=e-atu(t) and x(t)=u(t)-u(t-b)	6M	20EC303.3	L3

12 (a)	What are the requirements to be satisfied by an LTI system to provide distortionless transmission of a signal?	6M	20EC303.4	L2
12 (b)	Obtain the output y(t) for the given input x (t) and the impulse response h (t) of a continuous time LTI system are given by x(t) = u(t), $h(t)= e^{-at} u(t), a>0$	6M	20EC303.4	L4
	OR			
13 (a)	A discrete LTI system describe by difference equation is given by y[n]+3y[n-1]+2y[n-2]=2x[n]-x[n-1] and given y(-1)=0 & y(-2)=1 , x(n)=u(n) Obtain i) Zero input Response ii) Zero State Response iii) Total Response	6M	20EC303.4	L4
13 (b)	Illustrate the ideal LPF, HPF and BPF characteristics	6M	20EC303.4	L2
14 (a)	Obtain the Z-transform of x(n) = - anu(-n-1)	6M	20EC303.5	L4
14 (b)	State and prove time shifting and time convolution properties of z- transform	6M	20EC303.5	L2
	OR			
15 (a)	Obtain the Laplace transform of the following signals i) Impulse function ii) unit step function iii) Asinw0t u(t)	6M	20EC303.5	L4
15 (b)	State and Prove the initial and final value theorem of Laplace transform	6M	20EC303.5	L2

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	ECE			**Academic Year**	2021 - 2022
Course Code	20EC304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Random Variables and Stochastic Process**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Write axioms of Probability	20EC304.1	L1
2	Define Random Variable	20EC304.2	L1
3	Define Marginal Distribution Function	20EC304.3	L1
4	What is Autocorrelation Function	20EC304.4	L1
5	Define Band Pass Process	20EC304.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	The random variable X has the discrete variable in the set {-1,-0.5,0.7,1.5,3}. The corresponding probabilities are to be {0.1,0.2,0.1,0.4,0.2}. Plot its distribution function and state whether it is a discrete or continuous distribution function	6M	20EC304.1	L2
6 (b)	State and Prove Bayes Theorem	6M	20EC304.1	L2
	OR			
7 (a)	The p.d.f of a random variable is given by fx(x) = Ke-axu(x), where a is a positive constant. Determine the value of constant K	6M	20EC304.1	L2
7 (b)	Explain about the distribution and density functions of Rayleigh Random variable with neat sketches	6M	20EC304.1	L2
8 (a)	State and prove Chebychev's inequality	6M	20EC304.2	L3
8 (b)	If X discrete is a random variable with probability mass function given as below table X: -2, -1, 0, 1, 2 P(X): 1/5, 2/5, 1/10, 1/10, 1/5 Solve i)E[X] ii) $E[X^2]$ iii) E[2X+3] iv) $E[(2X+1)^2]$	6M	20EC304.2	L3
	OR			
9 (a)	Let Y=2X+3, If the random variable is uniformly distributed over [-1, 2], determine fy(y)	6M	20EC304.2	L3
9 (b)	Explain about the characteristic function and state its properties	6M	20EC304.2	L2
10 (a)	State and explain the properties of joint density function	6M	20EC304.3	L3
10 (b)	If X and Y are two independent random variables, then $\emptyset_{X+Y}(\omega) = \emptyset_X(\omega)\emptyset_Y(\omega)$	6M	20EC304.3	L2
	OR			
11 (a)	The joint p.d.f of a bi-variate (X, Y) is given by $f_{XY}(x, y) = xy/9;\ 0 < x < 2, 0 < y < 3$ =0 ; otherwise (i) Find Conditional Density functions	6M	20EC304.3	L3
11 (b)	State and prove central limit theorem for equal distributions case	6M	20EC304.3	L3

12 (a)	Explain briefly about time average and Ergodicity	6M	20EC304.4	L2
12 (b)	Derive the relationship between power spectral density and autocorrelation function	6M	20EC304.4	L4
	OR			
13 (a)	Explain how random processes are classified with neat sketches	6M	20EC304.4	L2
13 (b)	A wide sense stationary process X (t) has autocorrelation function R_X (τ) =$Ae^{-b|T|}$ where b > 0. Derive the power spectral density function	6M	20EC304.4	L4
14 (a)	A random processes X(t)= Asin(ωt+θ) , where A , ω are constants and θ is a uniformly distributed random variable on the interval (-π ,π) .find average power?	6M	20EC305.5	L2
14 (b)	Derive the relation between input PSD and output PSD of an LTI system	6M	20EC304.5	L4
	OR			
15 (a)	Explain the following i) Noise Figure ii) Noise Sources	6M	20EC304.5	L2
15 (b)	Derive the expression for average cross power between two random process X(t) and Y(t)	6M	20EC304.5	L4

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	ECE			**Academic Year**	2021 - 2022
Course Code	20EC305	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Digital System Design**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Represent -41 in singed magnitude	20EC305.1	L1
2	State Duality theorems	20EC305.2	L1
3	Write the steps involved in the design of a combinational circuit	20EC305.3	L1
4	Write the differences between Asynchronous and Synchronous Counter	20EC305.4	L1
5	Define Design Flow	20EC305.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Convert the following (i) $9AC_{16}=(\ )_{10}$ (ii) $123_8=(\ )_{10}$ (iii) $742_{10}=(\ )_{16}$	6M	20EC305.1	L2
6 (b)	Perform the given subtraction using 1's and 2's complement methods: $(101011)_2-(111001)_2$	6M	20EC305.1	L2
	OR			
7 (a)	Determine the single error correct code for the information code 10111 for odd parity	6M	20EC305.1	L2
7 (b)	(i) Convert the following binary 1010011 into gray code (ii)Convert the following gray code 101011 into its equivalent binary	6M	20EC305.1	L2
8 (a)	(i)Simplify the following three variable expression using Boolean algebra $Y=\Sigma m(1,3,5,7)$ (ii) Simplify the expression $Y=(A+B)(A'+C)(B'+C')$	6M	20EC305.2	L2
8 (b)	Solve the given expression using consensus theorem $A'B'+AC+BC'+B'C+AB$	6M	20EC305.2	L2
	OR			
9 (a)	Convert the given expression in canonical SOP form $f(A,B,C)=AC+AB+BC$	6M	20EC305.2	L2
9 (b)	Minimize the following function using Karnaugh map technique $f(A,B,C,D)=\Sigma_m(5,6,7,12,13)+\Sigma_d(4,9,14,15)$	6M	20EC305.2	L2
10 (a)	Design the full adder using two half adders	6M	20EC305.3	L3
10 (b)	Design a 4-bit Parallel adder/subtractor circuit	6M	20EC305.3	L3
	OR			
11 (a)	Design a 2 Bit Magnitude Comparator using gates	6M	20EC305.3	L3
11 (b)	Show and implement the following function using a PROM $F(w,x,y,z)=\Sigma_m(1,9,12,15)$ $G(w,x,y,z)=\Sigma_m(0,1,2,3,4,5,7,8,10,11,12,13,14,15)$	6M	20EC305.3	L3
12 (a)	Explain the working of JK Flip Flop	6M	20EC305.4	L2
12 (b)	Explain the Conversion of SR Flip Flop to T Flip Flop	6M	20EC305.4	L2
	OR			
13 (a)	Explain the working of Ring Counter	6M	20EC305.4	L2
13 (b)	Explain the working of Shift Register	6M	20EC305.4	L2

14 (a)	Explain the program structure of VHDL and Explain the significance of entity and architecture	6M	20EC305.5	L2
14 (b)	Explain the behavioral design style of VHDL programming with suitable example	6M	20EC305.5	L2
	OR			
15 (a)	Describe the dataflow design style of VHDL programming with suitable example	6M	20EC305.5	L4
15 (b)	List and discuss various data types in VHDL with examples	6M	20EC305.5	L4

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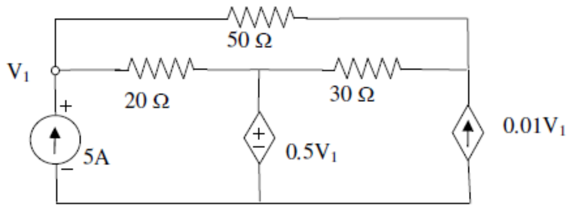
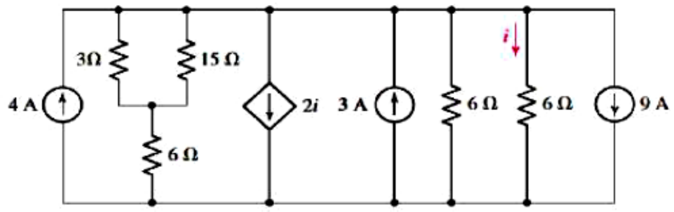
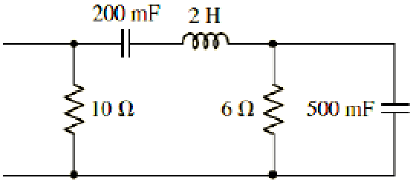
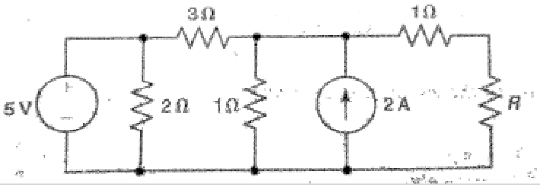
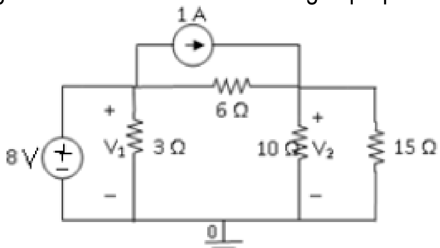
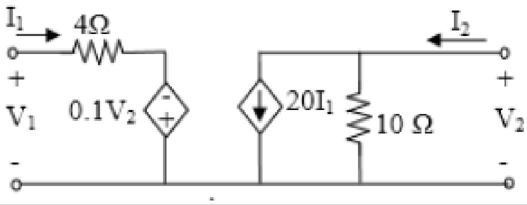
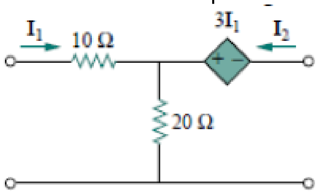
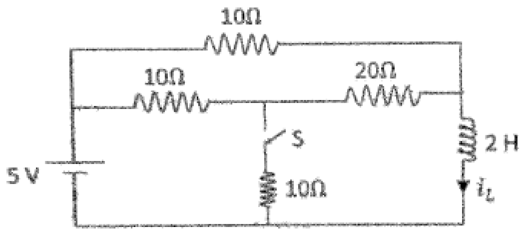
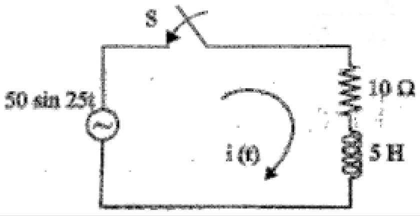
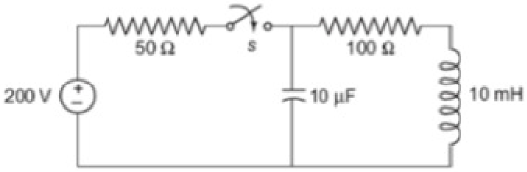
Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	EEE			**Academic Year**	2021 - 2022
Course Code	20EE303	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**ELECTRICAL CIRCUIT ANALYSIS**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)			
No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	A sine wave has a peak value of 12 V. Determine the RMS, Average value and form factor	20EE303.1	L3
2	What is complex impedance?	20EE303.2	L1
3	State the Superposition theorem	20EE303.3	L2
4	Write the condition for symmetry and reciprocity with reference to y and h parameters	20EE303.4	L2
5	Distinguish between Homogeneous and Non–Homogeneous equations	20EE303.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Discuss the principle of Duality with an example	6M	20EE303.1	L2
6 (b)	Use nodal analysis to determine V_1 and power being supplied by dependent current source in the circuit shown in figure 2(b)  Figure 2(b)	6M	20EE303.1	L3
	OR			
7 (a)	Give details for source transformation technique with an example	6M	20EE303.1	L2
7 (b)	Determine the power absorbed by the 15Ω resistor in the circuit given: 	6M	20EE303.1	L3
8 (a)	A series RLC circuit consists of a resistance of 25 Ω inductance 0.4 H, capacitance of 250 μF is connected a supply of 230 V, 50 Hz. Find the total impedance, current, power, power factor, voltage across coil and capacitance	6M	20EE303.2	L3
8 (b)	Prove that in a pure inductive circuit the active power supplied over a complete cycle averages out to Zero.	6M	20EE303.2	L2
	OR			
9 (a)	Determine the equivalent impedance of the network shown in Figure if the operating frequency is 5 rad/s 	8M	20EE303.2	L3
9 (b)	A balanced 3- phase, 3-wire 50 Hz, 100 V supply is given to a load consisting of three impedances (1+j1), (1+j2), (3+j4) ohms connected in star. Compute the line and phase voltages and also currents	4M	20EE303.2	L3

10 (a)	Find the value of R in the circuit shown in figure such that maximum power transfer takes place. What is the amount of this power? 	7M	20EE303.3	L3
10 (b)	State and explain Norton's theorem	5M	20EE303.3	L1
	OR			
11 (a)	Find the voltage across 10Ω resistance using superposition theorem 	7M	20EE303.3	L3
11 (b)	What is maximum power transfer theorem? Explain it.	5M	20EE303.3	L3
12 (a)	Find the y-parameters of the network shown in below figure 	7M	20EE303.4	L3
12 (b)	Explain about Y-parameters of a two-port network	7M	20EE303.4	L2
	OR			
13 (a)	Find the transmission parameters of the following two port network: 	6M	20EE303.4	L3
13 (b)	Explain the interrelationships between Z-parameters in terms of ABCD - parameters for a two-port network	6M	20EE303.4	L2
14 (a)	In the following network the switch s is open and steady state is reached. At t = 0, S is closed. Find $i_L(t)$ for t > 0. 	7M	20EE303.5	L3
14 (b)	Determine the DC response of RL and RC circuit and sketch the voltage transients	5M	20EE303.5	L2
	OR			
15 (a)	The circuit shown in figure consists of series RL elements. The sine wave is applied to the circuit when the switch is closed at t = 0. Determine the current i(t)	6M	20EE303.5	L3

				
15 (b)	When the switch is closed at t = 0, find the transient currents across inductor for the network shown in below Figure. Assume that initial current across the inductor is zero 	6M	20EE303.5	L3

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	EEE			**Academic Year**	2021 - 2022
Course Code	20EE304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**DC MACHINES & TRANSFORMERS**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)			
No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	What is a doubly-excited magnetic system? Mention two examples	20EE304.1	L1
2	What are the two functions of a commutator in dc machines?	20EE304.2	L1
3	What is the difference between 3-point and 4-point starter?	20EE304.3	L1
4	Distinguish between step-up and step-down transformers	20EE304.4	L2
5	Explain why OC test is performed on LV side of a single phase transformer	20EE304.5	L2

Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	For a singly excited magnetic system, derive the expression for the magnetic energy stored in terms of reluctance	6M	20EE304.1	L2
6 (b)	Find expression for magnetic force developed in a doubly-excited translational magnetic system	6M	20EE304.1	L2
	OR			
7 (a)	Derive expressions of field energy, co energy and magnetic force in a singly excited electromechanical unit	6M	20EE304.1	L2
7 (b)	Explain the concept of energy in magnetic system with neat diagram	6M	20EE304.1	L2
8 (a)	Explain construction of DC machine with the help of neat diagram	7M	20EE304.2	L2
8 (b)	An 8 pole lap wound armature having 40 slots with 12 conductors/ slot generates 500 V. Determine speed at which machine is running if the flux per pole is 50 mWb	5M	20EE304.1	L3
	OR			
9 (a)	Explain demagnetizing & cross magnetizing effects of armature reaction	5M	20EE304.2	L2
9 (b)	Draw the internal and external characteristics of different types of DC generators and explain them	7M	20EE304.2	L2
10 (a)	Explain different methods of speed control of dc shunt motor	6M	20EE304.3	L2
10 (b)	A dc motor takes an armature current of 110A at 480V. The armature circuit resistance is 0.2Ω. The machine has 6-poles and the armature is Lap-connected with 864 conductors. The flux per pole is 0.05Wb. Calculate: i. The speed ii. The gross torque developed by the armature	6M	20EE304.3	L3
	OR			
11 (a)	Draw different characteristics of shunt, series and compound motors and explain them	6M	20EE304.3	L2
11 (b)	Explain the procedure of conducting brake-test on DC machine with a neat circuit diagram	6M	20EE304.3	L2
12 (a)	Discuss the working principle of single-phase transformer and also explain the constructional details	7M	20EE304.4	L2
12 (b)	The voltage per turn of a single-phase transformer is 1.1 V. When the primary winding is connected to a 220 V, 50 Hz A.C. supply, the secondary voltage is found to be 550 V. Find: i) Primary and secondary turns ii) Core area if the maximum flux density is 1.1 Wb/m^2	6M	20EE304.4	L3
	OR			
13 (a)	Derive an EMF equation for transformer with usual notation	6M	20EE304.4	L3
13 (b)	Draw and explain the phasor diagram of single phase transformer on load considering with winding resistance	6M	20EE304.4	L2
14 (a)	Discuss about Sumpner's test on a single-phase transformer	7M	20EE304.5	L2
14 (b)	What are the advantages of poly-phase transformers? Give different	5M	20EE304.5	L2

	configurations			
OR				
15 (a)	A 10 kVA, 500/250 V, 50 Hz single-phase transformer gave the following test data: OC Test (LV side): 250 V, 1.0 A, 80 W SC Test (HV side): 25 V, 12 A, 100 W Where LV refers to the low voltage and HV refers to high voltage side. Determine the following: (i) Equivalent circuit referred to LV side (ii) Secondary load voltage at 0.8 p.f. lagging with full-load current	7M	20EE304.5	L3
15 (b)	Derive an expression for the saving of copper in an autotransformer as compared to an equivalent two winding transformer	5M	20EE304.5	L2

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	EEE			**Academic Year**	2021 - 2022
Course Code	20EE305	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**POWER GENERATION AND TRANSMISSION**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define the function of economizer and condenser	20EE305.1	L1
2	Define Tariff & list types of tariff methods	20EE305.2	L1
3	Explain the importance of ACSR conductor	20EE305.3	L2
4	What is meant by skin effect & Ferranti effect	20EE305.4	L1
5	List the types of insulators used in transmission	20EE305.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Draw a neat schematic diagram of thermal power plant and explain its operation	6M	20EE305.1	L2
6 (b)	Draw the layout of Hydro power plant, selection of site and briefly explain the main components in hydro power station	6M	20EE305.1	L2
	OR			
7 (a)	Draw a neat schematic diagram of Nuclear power plant and explain its operation	6M	20EE305.1	L2
7 (b)	Compare the characteristics of Thermal, Hydro & Nuclear power plants	6M	20EE305.1	L2
8 (a)	Define the following terms in Economic aspects of power generation i) Load factor ii) Diversity factor iii) Plant capacity factor iv) Plant use factor v) Utilization factor vi) Spinning Reserve	6M	20EE305.2	L1
8 (b)	A power station has maximum demand of 15000KW, the Annual load factor is 50%, plant capacity factor is 40%. Determine the following i) Annual energy produced ii) Installed capacity of plant iii) Reserve capacity of plant iv) Utilization factor	6M	20EE305.2	L3
	OR			
9 (a)	Explain the cost of generation of electrical energy with respect to fixed cost, Semi-fixed cost and operating cost. Also comment on how load factor & diversity factor influence the cost of generation	6M	20EE305.2	L2
9 (b)	Explain briefly the following types of tariffs in electrical system. i) two-part tariff ii) power factor tariff iii) Block rate part tariff	6M	20EE305.2	L2
10 (a)	Discuss the concepts of self GMD and mutual GMD by deriving the equations of transmission lines	6M	20EE305.3	L2
10 (b)	The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2 m, 2·5 m and 4·5 m. Calculate the inductance per km of the line when the conductors are regularly transposed. The diameter of each conductor is 1·24 cm	6M	20EE305.3	L3
	OR			
11 (a)	Analyze the capacitance of a single phase Two-wire line.	6M	20EE305.3	L3
11 (b)	A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition	6M	20EE305.3	L3
12 (a)	Derive the A, B, C, D constants of the Medium transmission lines by using Nominal- π method	5M	20EE305.4	L2
12 (b)	A 3-phase, 50 Hz transmission line 100 km long delivers 20 MW at 0·9 p.f. lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0·2 Ω and 0·4 Ω respectively, while capacitance	7M	20EE305.4	L3

	admittance is 2·5 × 10− 6 siemen/km/phase. Calculate : (i) the current and voltage at the sending end (ii) efficiency of transmission. Use nominal T method			
	OR			
13 (a)	Describe the effect of power factor on efficiency and regulation	5M	20EE305.4	L2
13 (b)	3-phase line delivers 3600 kW at a p.f. 0·8 lagging to a load. If the sending end voltage is 33 kV, determine (i) the receiving end voltage (ii) line current (iii) transmission efficiency. The resistance and reactance of each conductor are 5·31 Ω and 5·54 Ω respectively	7M	20EE305.4	L3
14 (a)	Derive the expression for the Sag in horizontal plane when the conductor is covering ice and wind pressure	6M	20EE305.5	L2
14 (b)	A transmission line has a span of 200 metres between level supports. The conductor has a cross-sectional area of 1·29 cm^2, weighs 1170 kg/km and has a breaking stress of 4218 kg/cm^2. Calculate the sag for a safety factor of 5, allowing a wind pressure of 122 kg per square metre of projected area. What is the vertical sag?	6M	20EE305.5	L3
	OR			
15 (a)	Explain the role of guard ring in improving the string efficiency	5M	20EE305.5	L2
15 (b)	A 3-phase transmission line is being supported by three disc insulators. The potentials across top unit (i.e., near to the tower) and middle unit are 8 kV and 11 kV respectively. Calculate (i) the ratio of capacitance between pin and earth to the self-capacitance of each unit (ii)the line voltage and (iii) string efficiency	7M	20EE305.5	L3

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	ME			**Academic Year**	2021 - 2022
Course Code	20ME302	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Thermodynamics**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define state, process and cycle	20ME301.1	L1
2	Define specific heat and enthalpy	20ME301.2	L2
3	What is Gibb's function?	20ME301.3	L2
4	Define Dryness Fraction	20ME301.4	L1
5	Define dry and wet bulb temperature	20ME301.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	What is a thermodynamic system? Explain different classes of systems with suitable examples	6M	20ME301.1	L2
6 (b)	Compare macroscopic and microscopic approaches in thermodynamic studies	6M	20ME301.1	L2
	OR			
7 (a)	Show that work is a path function and not a property	5M	20ME301.1	L2
7 (b)	A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which pv = constant. The initial density of air is 1.16 kg/m^3 . Find the work done by the piston to compress the air	7M	20ME301.1	L3
8 (a)	Write down the general equation for steady flow systems and simplify when applied for the following systems: (a) Steam turbine (b) Steam nozzle (c) Centrifugal compressor (d) Condenser	10M	20ME301.2	L3
8 (b)	Define the first law of thermodynamics	2M	20ME301.2	L1
	OR			
9 (a)	A heat engine receives heat at the rate of 1500 kJ/min and gives an output of 8.2 kW. Determine: (i) The thermal efficiency. (ii) The rate of heat rejection	8M	20ME301.2	L3
9 (b)	Define internal energy and prove that it is a property of the system	4M	20ME301.2	L2
10 (a)	Establish the equivalence of Kelvin- Planck and Clausius statements	6M	20ME301.3	L2
10 (b)	Discuss about Carnot theorem with neat diagram	6M	20ME301.3	L2
	OR			
11 (a)	A reversible heat engine operates between two reservoirs at temperatures of 600 ^{0}C and 40 ^{0}C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40 ^{0}C and -20 ^{0}C. The heat transfer to the engine is 2000 kJ and the net work output of the combined engine-refrigerator plant is 360 kJ. (i) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40 ^{0}C. (ii) Reconsider (i) given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible value.	8M	20ME301.3	L3
11 (b)	Explain about heat engine and heat pump	4M	20ME301.3	L2
12 (a)	A mass of wet steam at temperature 165 °C is expanded at constant quality 0.8 to pressure 3 bar. It is then heated at constant pressure to a degree of superheat of 66.5 °C. Find the enthalpy and entropy changes during expansion and during heating. Draw the T–s and h–s diagrams	7M	20ME301.4	L3
12 (b)	Explain about phase transformation and various properties involved during phase change	5M	20ME301.4	L2

OR				
13 (a)	A rigid vessel of capacity 0.2 m^3 holds 10 bar steam at 250 ^0C. The vessel is slowly cooled till the steam pressure drops to 3.5 bar. Determine the (i) final temperature and dryness fraction of steam; (ii) change in entropy	7M	20ME301.4	L3
13 (b)	Sketch the H-S and P-T diagram of a pure substance	5M	20ME301.4	L2
14 (a)	Explain about adiabatic mixing of perfect gases	5M	20ME301.5	L2
14 (b)	A mixture of hydrogen (H_2) and oxygen (O_2) is to be made so that ratio of H_2 to O_2 is 2:1 by volume. If the pressure and temperature are 1 bar and 25 respectively, calculate: (i) The mass of O_2 required. (ii) The volume of the container	7M	20ME301.5	L3
OR				
15 (a)	State van-der-Waals equation of state	6M	20ME301.5	L1
15 (b)	Explain the following i)Heating and humidification ii) Cooling and dehumidification	6M	20ME301.5	L2

NSRIT

Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	Mechanical Engineering			**Academic Year**	2021 - 2022
Course Code	20ME303	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Material Science & Metallurgy**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)

No.	Questions (1 through 5)	Learning Outcome (s)	DoK
1	Define metallic bonding	20ME302.1	L2
2	Compare malleable and nodular cast iron	20ME302.2	L2
3	What is meant by Age hardening	20ME302.3	L1
4	List any two applications of powder metallurgy	20ME302.4	L1
5	What are cermets?	20ME302.5	L1

Part B (Long Answer Questions 5 x 12 = 60 Marks)

No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Classify in detail the different types of crystal imperfections. Explain the edge dislocation with a neat sketch	6M	20ME302.1	L2
6 (b)	What are the three most common intermediate alloy phases? Explain any two of them	6M	20ME302.1	L2
	OR			
7 (a)	What is lever rule? Explain about the rule in detail	6M	20ME302.1	L2
7 (b)	Draw a neat labeled Iron-Iron Carbide diagram and explain eutectic and eutectoid reaction in it	6M	20ME302.1	L2
8 (a)	Explain structure and properties of White cast iron	6M	20ME302.2	L2
8 (b)	Write the properties and applications of tool and die steels	6M	20ME302.2	L2
	OR			
9 (a)	Write the classification of copper alloys? Describe the importance of brass	6M	20ME302.2	L2
9 (b)	Discuss briefly about super alloys and mention their applications	6M	20ME302.2	L2
10 (a)	Differentiate between annealing and normalizing	6M	20ME302.3	L2
10 (b)	Define hardenability of a material and explain the factors affecting hardenability	6M	20ME302.3	L2
	OR			
11 (a)	Draw TTT diagram for eutectoid steel? Explain its features	6M	20ME302.3	L2
11 (b)	Discuss briefly about cryogenic treatment of alloys	6M	20ME302.3	L2
12 (a)	Discuss any two methods of powder production	6M	20ME302.4	L2
12 (b)	What is sintering in powder metallurgy? Explain	6M	20ME302.4	L2
	OR			
13 (a)	Explain different stages of manufacturing of powder metallurgy components	6M	20ME302.4	L2
13 (b)	Discuss about Sintering Secondary operations (i) sizing (ii) coining (iii) machining	6M	20ME302.4	L2
14 (a)	Write the classification of ceramics? Explain with examples	6M	20ME302.5	L2
14 (b)	Explain the importance and applications of C-C composites	6M	20ME302.5	L2
	OR			
15 (a)	Describe various methods of the manufacturing composites	6M	20ME302.5	L2
15 (b)	What are Nano materials? What are their advantages?	6M	20ME302.5	L1

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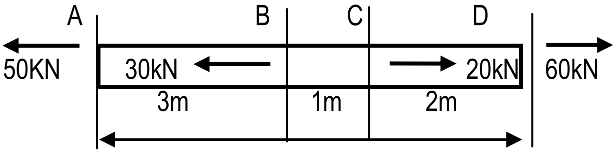
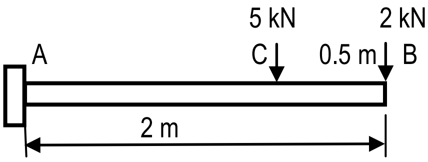
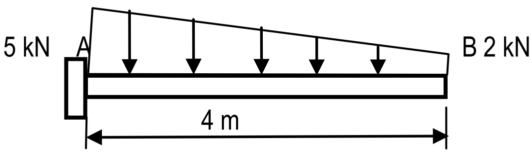
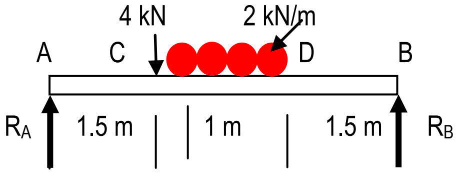
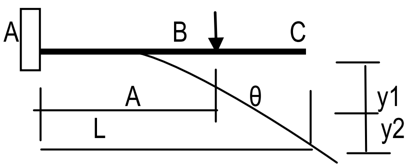
Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	ME			**Academic Year**	2021 - 2022
Course Code	20ME304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**Mechanics of Solids**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)				
No.	Questions (1 through 5)		Learning Outcome (s)	DoK
1	Define the elasticity and plasticity		20ME303.1	L1
2	Differentiate the point load, UDL and VDL		20ME303.2	L1
3	M/I=f/y=E/R – justify		20ME303.2	L2
4	What is pure torsion?		20ME303.2	L1
5	Define buckling and stability		20ME303.1	L1
Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Draw a neat stress- strain curve diagram of stainless steel and explain	6M	20ME303.2	L2
6 (b)	A hollow cylinder 2000 mm long has an outside diameter of 50 mm and inside diameter of 30 mm. If the cylinder is carrying a load of 20 kN, find the stress and elongation when the modulus of elasticity is 100 Gpa	6M	20ME303.2	L2
	OR			
7 (a)	A steel bar of 20 mm diameter is acted upon by the forces. What is the elongation of the bar when young's modulus, E = 210 GPa. Find net elongation by principal of super position 	6M	20ME303.3	L2
7 (b)	The stresses on two perpendicular planes through a point in a body are 100 MPa (Tensile) and 60 MPa (Compression). Determine the normal and tangential stress on a plane at an angle 30^0 with the vertical (ACW). Draw configuration and Mohr's diagrams	6M	20ME303.3	L2
8 (a)	Write about the types of beams	6M	20ME303.2	L2
8 (b)	Draw shear force and bending moment diagrams for a cantilever beam and find shear force and bending moments of span carrying two point loads 2 kN and 5 kN at right end and 0.5 m from right end 	6M	20ME303.2	L2
	OR			
9 (a)	Differentiate the shear force and bending moments when point, uniformly distributed and variably distributed loads applied	6M	20ME303.2	L2
9 (b)	A cantilever beam 4 m long carries a VD, 2 kN/m at the free end to 5 kN/m at the fixed end and draw SFD and BMD 	6M	20ME303.2	L2
10 (a)	Write the sign convention of shear force and bending moment	6M	20ME303.2	L2
10 (b)	Draw the free body diagram, shear force and bending moment diagram of VDL	6M	20ME303.3	L2

	OR			
11 (a)	The simply supported beam is 5 m carries a point load 4 kN at a distance of 1.5 m from left where the UDL of 2 kN/m starts from point load for 1 m. Find the reactions and draw the SFD and BMD 	6M	20ME303.3	L4
11 (b)	Derive the equations for simply supported beam with UVL	6M	20ME303.2	L2
12 (a)	Derive equation for moment of inertia for a rectangular section	5M	20ME303.2	L2
12 (b)	Derive an equation for torsion	7M	20ME303.2	L2
	OR			
13 (a)	A cantilever beam of span L is subjected to a concentrated load W at a distance ‘a’ from fixed end. Find the deflection of free end 	5M	20ME303.2	L2
13 (b)	Explain the Macaulay’s method in deflection of beams	7M	20ME303.3	L2
14 (a)	Explain the buckling	6M	20ME303.2	L3
14 (b)	Derive Euler’s formula	6M	20ME303.2	L2
	OR			
15 (a)	What is a circumferential and longitudinal stress	5M	20ME303.2	L2
15 (b)	Differentiate thin and thick cylinders	7M	20ME303.2	L2

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Semester End Examination, January/February, 2022

Degree	B. Tech. (U. G.)	**Program**	Mechanical Engineering			**Academic Year**	2021 - 2022
Course Code	20ME304	**Test Duration**	3 Hrs.	Max. Marks	70	**Semester**	III
Course	**MANUFACTURING PROCESS**						

Part A (Short Answer Questions 5 x 2 = 10 Marks)				
No.	Questions (1 through 5)		Learning Outcome (s)	DoK
1	What are the advantages casting?		20ME304.1	L1
2	Explain the steel making processes		20ME304.2	L2
3	How do you classify the welding processes?		20ME304.3	L2
4	Describe briefly about forge welding		20ME304.4	L1
5	Write a note on thread rolling process		20ME304.5	L1
Part B (Long Answer Questions 5 x 12 = 60 Marks)				
No.	Questions (6 through 15)	Marks	Learning Outcome (s)	DoK
6 (a)	Explain steps involved in a casting process with a neat sketch	6M	20ME304.1	L2
6 (b)	Explain type of patterns and also explain any three patterns with a neat sketch	6M	20ME304.1	L1
OR				
7 (a)	Explain injection molding and blow molding	6M	20ME304.1	L2
7 (b)	What steps are involved in the preparation of a Casting? Explain briefly the die casting process	6M	20ME304.1	L1
8 (a)	Explain with the help of a neat sketch explain the construction and working of Cupola furnace	6M	20ME304.2	L2
8 (b)	How is upsetting different from fullering in forging?	6M	20ME304.2	L2
OR				
9 (a)	How do you compare forged components with cast components?	6M	20ME304.2	L2
9 (b)	Explain the two types of crucible furnaces with diagrams	6M	20ME304.2	L2
10 (a)	Explain the advantages and applications of oxy-acetylene welding.	7M	20ME304.3	L2
10 (b)	What are the parameters that control the weld quality in manual metal-arc welding?	5M	20ME304.3	L2
OR				
11 (a)	Explain the TIG systems of arc-welding give the applications of each	6M	20ME304.3	L2
11 (b)	Explain the MIG systems of arc-welding give the applications of each	6M	20ME304.3	L2
12 (a)	Describe the electro slag welding process	5M	20ME304.4	L2
12 (b)	Describe the electron beam welding process	7M	20ME304.4	L2
OR				
13 (a)	What applications would require diffusion welding?	6M	20ME304.4	L2
13 (b)	Explain the term HAZ in welding and i s role in the success of a weldment	6M	20ME304.4	L2
14 (a)	Explain hot rolling operations through (i)t wo high (ii) three high and (iii) four high rolling mill	7M	20ME304.5	L1
14 (b)	Write a note on thread rolling process	5M	20ME304.5	L2
OR				
15 (a)	Enumerate the typical applications of cold working	4M	20ME304.5	L1

15 (b)	Explain the various methods available for blow molding of thermoplastics giving their relative applications	8M	20ME304.5	L2