**University of Mumbai**

**Question Bank for May / June (summer) 2022 End Semester Theory Examination (2nd Half of A.Y. 2021-2022)**

**End Semester (Theory) Examinations Commencing from 17th May 2022 to 31st May 2022**

Computer Engineering/Information Technology/Artificial Intelligence and Data Science/Artificial Intelligence and Machine Learning/Computer Science & Engineering (Data Science)

**Curriculum Scheme:** Rev 2019 ‘C’ Scheme

**Course Name:** Engineering Mathematics IV

**Semester:** IV

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|  | **Multiple Choice Questions** |
| 1. | Eigen value of matrix A= is, |
| Option A: | 2 and 3 |
| Option B: | 2 and 1 |
| Option C: | 4 and 1 |
| Option D: | 4 and 2 |
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|  |  |
| 2. | Two of the eigen values of 3×3 matrix are 3 and 4. IF the determinant of the matrix is 24, find its third eigen value. |
| Option A: | 12 |
| Option B: | 2 |
| Option C: | 6 |
| Option D: | 3 |
|  |  |
| 3. | If the line integral along the parabola then |
| Option A: | dz=(1-4xi)dx |
| Option B: | dz=(2+4xi)dx |
| Option C: | dz=(1+4xi)dx |
| Option D: | dz=(2-4xi)dx |
|  |  |
| 4. | If then the simple poles f(z) becomes |
| Option A: | 0 |
| Option B: | 2 |
| Option C: | 3 |
| Option D: | 4 |
|  |  |
| 5. | In LPP if there are four variables and two constraints then the number of basic solutions becomes |
| Option A: | 6 |
| Option B: | 3 |
| Option C: | 2 |
| Option D: | 4 |
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| 6. | In NLPP which of the following is the Lagrange’s function |
| Option A: | L=f/λh |
| Option B: | L=f+λh |
| Option C: | L=f\*λh |
| Option D: | L=f-λh |
|  |  |
| 7. | IF X follows Poisson distribution and P(x=2)=3P(x=1) then find the value of mean |
| Option A: | 3 |
| Option B: | 4 |
| Option C: | 5 |
| Option D: | 6 |
|  |  |
| 8. | IF X is a random variable for the normal distribution with mean 10 and standard deviation 4 then find Z when X=16 |
| Option A: | 0.25 |
| Option B: | 1.5 |
| Option C: | 0.5 |
| Option D: | 0.8 |
|  |  |
| 9. | The z-transform of Discrete unit step function for k≥0 is |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D: |  |
|  |  |
| 10. | Which of the following is Null hypothesis for two tail test |
| Option A: | μ≠μ0 |
| Option B: | μ>μ0 |
| Option C: | μ=μ0 |
| Option D: | μ<μ0 |
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| 11. | Sum of eigen value of is |
| Option A: | 11 |
| Option B: | 9 |
| Option C: | 6 |
| Option D: | 8 |
|  |  |
| 12. | If , find the eigen values of |
| Option A: | 30, -12, 4 |
| Option B: | 25, 15, -10 |
| Option C: | 50, -10, 2 |
| Option D: | 40, -15, 12 |
|  |  |
| 13. | Find Z – Transform of |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D: |  |
|  |  |
| 14. | If f(z)= then if |
| Option A: | *C* is the circle |
| Option B: | *C* is the circle |
| Option C: | *C* is the circle |
| Option D: | *C* is the circle |
|  |  |
| 15. | The singularities of are |
| Option A: | 3 and -3 |
| Option B: | 3 and 3i |
| Option C: | 3 and -3i |
| Option D: | 3i and -3i |
|  |  |
| 16. | For a Poisson Distribution if P(X = 2) = P(X = 3) , then its variance is |
| Option A: | 0 |
| Option B: | 3 |
| Option C: | 2 |
| Option D: | 1 |
|  |  |
| 17. | The probability density function f(x) of normal distribution is |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D: |  |
|  |  |
| 18. | In the example of testing of hypothesis with 65 as mean of the population and n=10 67 , 8.8 then the value of test statistics t is\_\_\_\_\_\_ |
| Option A: | 2.65 |
| Option B: | -1.75 |
| Option C: | 2.02 |
| Option D: | -1.82 |
|  |  |
| 19. | Dual of Min. Z = 3x1+ 7x2   subject to                         x1+ x2 4                         3 x1+ 2 x2 8      where x1, x20   is |
| Option A: | Min. W = 4w1 + 8 w2    subject to           w1 + 3w23           w1 + 2w27         where w1, w20 |
| Option B: | Max. W = 4w1 + 8 w2    subject to           w1 + 3w23           w1 + 2w27         where w1, w2 0 |
| Option C: | Min. W = 4w1 + 8 w2    subject to           w1 + 3w2 =3           w1 + 2w2 =7            where w1, w2 0 |
| Option D: | Max. W = 4w1 + 8 w2    subject to           w1 + 3w23            w1 + 2w27             where w1, w2 0 |
|  |  |
| 20. | If the problem is standard primal form of minimization then all the constraints involve the sign |
| Option A: | ≤ |
| Option B: | ≥ |
| Option C: | > |
| Option D: | < |
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|  | **Descriptive Questions** |
| 1 | Find Eigen values of the matrix if |
| 2 | Evaluate along the curve x=t+1, y=2-1 |
| 3 | Find the z-transform of {sin5k}, k≥0 |
| 4 | A random sample size of 16 from a normal population showed a mean of 103.75cm. and sum of squares of deviation from the mean 843.75cm2. Can we say that the population has a mean of 108.75cm? |
| 5 | Solve the following NLPP by Kuhn-Tucker conditions    subject to |
| 6 | Write the dual of the following LPP    subject to    , , |
| 7 | Find Eigen values and Eigen vectors A if |
| 8 | Evaluate using Cauchy Residue theorem. |
| 9 | The number of accident on a particular highway in a month is a Poisson variate with parameter 5. Find the probability that more than 2 accidents have occurred on the road in a given month*.* |
| 10 | Find all basic solutions of the following system of equations. Also find basic feasible solutions 2x+y+4z=11, 3x+y+5z=14 |
| 11 | Using the method of Lagrange’s Multiplier’s solve the following NLPP    subject to |
| 12 | Find the z-transform of { } |
| 13 | Verify Cayley Hamilton theorem and find inverse of A  If |
| 14 | Obtain Laurent’s series expansion *of for .* |
| 15 | *Find inverse Z-transform of* |
| 16 | The weight of 4000 students are found to be Normally distributed with mean 50kgs. And Standard deviation 5kgs. Find the probability that a student selected at random will have weight between 45 and 60kgs. |
| 17 | Solve the following LPP by using simplex method  ,  subject to  , |
| 18 | Solve the following NLPP    subject to |
| 19 | Find eigen values and eigen vectors for the matrix |
| 20 | Evaluate along the path |
| 21 | Find Z-Transform of |
| 22 | A die was thrown 132 times and the following frequencies were observed   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | No. Obtained | 1 | 2 | 3 | 4 | 5 | 6 | Total | | Frequency | 15 | 20 | 25 | 15 | 29 | 28 | 132 |   Test the hypothesis that die is unbiased. |
| 23 | Use dual simplex method to solve the following L.P.P. |
| 24 | Using Lagrange’s Multipliers method, solve the following N.L.P.P.  Optimize  Subject to |
| 25 | Find the matrix represented by the  , where |
| 26 | Find Laurent’s series expansion of in the regions |
| 27 | Find , where |
| 28 | An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policy holders were randomly selected from the population, what is the probability that no more than two of its clients are involved in such accident next year? |
| 29 | Determine all basic solutions to the following problem.  Which of them are basic feasible, non – degenerate, infeasible basic and optimal basic feasible solutions? |
| 30 | Using Lagrange’s Multipliers method, solve the following N.L.P.P.  Optimize  Subject to |
| 31 | Show that the matrix is diagonalizable. Find the diagonal form and the diagonalizing matrix . |
| 32 | Using Cauchy’s Residue Theorem evaluate , where is the circle |
| 33 | Find the Inverse Z – Transform of in the region 2 |
| 34 | In a normal distribution 7% of items are under 35 and 89% items are under 63. What are the mean and standard deviation? |
| 35 | Solve the following linear programming problem by simplex method |
| 36 | Use Kuhn – Tucker conditions to solve the following N.L.P.P.  Maximize  Subject to |