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DATE:  **15.04.2019**

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**SUPPLEMENTARY Examination April – 2019  
B.Sc. Mathematics  
 MT 6212 - Mathematics VIII**

**Time: 3 Hours Marks: 100**

***Attach this question paper with the answer script***

This question paper has five parts and four printed pages

**I Answer any eight questions: (8x2=16)**

1. Write down the particular form of Euler’s EquationWhen does not contain explicitly.
2. Define (i) general isoperimetric problem (ii) Brachistochrone problem.
3. Obtain the function which makes an extremal.
4. Find the Fourier transform of given by    
   Where  is a positive constant.
5. Find the Fourier cosine transform of 
6. Show that 
7. Express in terms of
8. Show that 
9. Draw the graph of the solution set satisfying the inequalities.



1. Find all the feasible basic solutions of the following equations.  
   
2. Find an initial solution using northwest corner rule for the following problem.

| Destination  Origins | D1 | D2 | D3 | D4 | supply |
| --- | --- | --- | --- | --- | --- |
| O1 | 4 | 3 | 0 | 5 | 24 |
| O2 | 1 | 2 | 6 | 1 | 17 |
| O3 | 3 | 6 | 2 | 3 | 19 |
| Demand | 13 | 9 | 7 | 31 |  |

1. Find the dual of



**I I Answer any three questions: (3x6=18)**

1. State and prove Euler theorem to solve the variational problem.
2. Show that the extremal of the functional is a circle, given that

.

1. If a cable hangs freely under gravity from the fixed points, then show that the shape of the

curve is a Catenary.

1. Show that the extremal of  subject to the constraints  and

 is a parabolic arc.

**III Answer any four questions: (4x6=24)**

1. Using Fourier integral method show that 
2. Find the complex Fourier transform of where  is a positive constant.
3. By employing the Convolution theorem show that the inverse of complex Fourier transform of is

1. By Employing the Parseval’s identity to the function. Show that 
2. Find the function  for which the Fourier sine transform is .Hence deduce that  .
3. If is the Fourier transform of then show that

Also, if = find

**IV. Answer any Two questions: (2x6=12)**

1. Show that 
2. Prove that is generating function of Legender polynomial.
3. If n is an integer , show that 

**V. Answer any five questions: (5x6=30)**

1. Solve by using graphical method
2. A tailor has got 16 square meters of cotton, 11 square meter of silk, and 15 square meters of wool sheets. A garment of type A requires one square meter of cotton, 2 square meter of silks and 3 square meters of wool. A garment of type B requires 2 square meter of cotton, one square meter of silks and one square meters of wool. If the profit per garment of type A is Rs.50, and the profit per garment of type B is Rs.30, how many of each type of garments should be prepared to maximize the profit, assuming that the remaining pieces of cotton, silks and wool cannot be utilized.
3. Using the Simplex Method, solve the Linear programming problem. 
4. Solve the following Linear programming problem by using Big-M method.



1. Using the Dual Simplex Method solve the Linear programming problem.



1. Obtain an initial solution for the following transportation problem using Vogel’s approximation method and find the transportation cost.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Destination  Origin | D | E | F | G | H | Availability |
| A | 7 | 5 | 4 | 3 | 2 | 20 |
| B | 6 | 5 | 3 | 5 | 4 | 40 |
| C | 2 | 7 | 4 | 6 | 3 | 80 |
| Requirement | 10 | 20 | 10 | 40 | 60 |  |

1. Check if the given transportation problem is optimal if not optimize.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | Supply |  |  | A | B | C |
| P | 16 | 20 | 12 | 200 |  | P | 180 |  | 20 |
| Q | 14 | 8 | 18 | 160 |  | Q |  | 120 | 40 |
| R | 26 | 24 | 16 | 90 |  | R |  |  | 90 |
| Demand | 180 | 120 | 150 | 450 |  |  |  |  |  |

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