Register Number:

DATE: **21-04-2017**

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

**VI Semester Examination March/April – 2017  
B.Sc. Mathematics  
 MT 6212 - Mathematics VIII**

**Time: 3 Hours Marks: 100**

This question paper has five parts and three printed pages

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

1. Define(i) variational problem (ii) general isoperimetric problem
2. Find the Euler’s differential equation for the functional 
3. Obtain the particular form of Euler’s equation when does not contain explicitly.
4. Find the Fourier integral expansion of and
5. Define the convolution of and and also write the statement of Convolution theorem.
6. If then find
7. Express in terms of
8. Define Bessel’s differential equation and write the general solution of this equation in terms of Bessel’s function.
9. Draw the feasible region for the linear inequalities,

1. Write the mathematical formulation of Transportation problem.
2. Construct the dual of Linear programming problem,
3. Find the initial basic feasible solution of the transportation problem using

North West corner rule and find the transportation cost.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Destination  source |  |  |  |  | Availability |
|  | 6 | 4 | 1 | 5 | 14 |
|  | 8 | 9 | 2 | 7 | 16 |
|  | 4 | 3 | 6 | 2 | 5 |
| Requirement | 6 | 10 | 15 | 4 |  |

MT-6212-A-17

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

1. Show that the geodesic on a right circular cylinder is a circular helix.
2. Find the extremal of the functional
3. State and prove Brachistochrone problem.
4. Find the solid figure of revolution for which the fixed surface area has maximum volume.

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

1. Find the complex Fourier transform of , where ‘’ is a positive constant.
2. Find the Fourier transform of

Where ‘’ is a positive constant. Hence evaluate

1. By employing the Convolution theorem show that the inverse of complex Fourier transform of is
2. Solve the integral equation
3. If is the Fourier transform of then show that

Also, if = find

1. Using Parsevals’s identity for Fourier cosine transform show that

,

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

1. State and prove Rodrigues formula for Legendre’s polynomials.
2. Show that
3. Show that (i)

(ii)

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

1. Solve by using graphical method

1. A firm manufactures 2 types of products X and Y and sales them at a profit of Rs 2/- on X and 3/- on Y. Each product is processed on 2 machines G and H. Type X requires 1 minute of processing time on G and 2 minutes on H. Type Y requires 1 minute of processing time on G and 1 minute on H. The machine G is available for not more than 6 hours 40 minutes while machine H is available for 10 hours during any working days. Formulate it as Linear programming problem and solve it.
2. Solve the following Linear programming problem by simplex method
3. Solve the following Linear programming problem by Big-M method
4. Solve the following Linear programming problem by Dual simplex method
5. 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 |  |  |  |  |  |

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 | Availability |
| A | 20 | 22 | 17 | 4 | 120 |
| B | 24 | 37 | 9 | 7 | 70 |
| C | 32 | 37 | 20 | 15 | 50 |
| Requirement | 60 | 40 | 30 | 110 |  |

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