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**University Examinations 2015/2016**

THIRD YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

**SME 2350: ENGINEERING MATHEMATICS VI**

**DATE: NOVEMBER 2015 TIME: 11/2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Use appropriate method to evaluate the following integrals;
2.  (3 Marks)
3.  (3 Marks)
4. find the volume of the region bounded above by the ellipitical paraboroid and below by the rectangle  (4 Marks)
5. Use trapezoidal rule to evaluate using 6 intervals. Give your answer correct to 4 significant figures. (5 Marks)
6. Solve the following differential equations:
7.  (3 Marks)
8.  (4 Marks)
9. Find the fourier coefficients and hence the Fourier series of a square wave function defined by  and  (4 Marks)
10. Evaluate  (4 Marks)

**QUESTION TWO (15 MARKS)**

1. Use mid-ordinate rule with 8 intervals to evaluate . Correct to 3 decimal places. (5 Marks)
2. Using the substitution of show that  (4 Marks)
3. Hence use the result to determine  (6 Marks)

**QUESTION THREE (15 MARKS)**

1. Solve  (5 Marks)
2. An alternating current has the following values at equal intervals of 2.0 milliseconds:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time t (ms) | 0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | 12.0 |
| Current,  (A) | 0 | 3.5 | 8.2 | 10.0 | 7.3 | 2.0 | 0 |

Charge, q, in millicoulombs, is given by Use Simpson’s rule to determine the approximate charge in the 12 millisecond period. (4 Marks)

1. derive the reduction formula for  (6 Marks)

**QUESTION FOUR (15 MARKS)**

1. Solve the differential equation given that when and  (5 Marks)
2. Determine the Fourier Series for the periodic function:

 (5 Marks)

1. The equation has a solution near Use Newton’s method to find it correct to 3 decimal places. (5 Marks)

**QUESTION FIVE (15 MARKS)**

1. Given the function and , a positive number such that for show that is a periodic function and determine the period. (4 Marks)
2. Determine the value of for and  (5 Marks)
3. Evaluate  (6 Marks)