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**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DIPLOMA IN ELECTRICAL ENGINEERING.

**SME 2150: ENGINEERING MATHEMATICS II.**

**DATE: APRIL 2016 TIME:11/ 2 HOURS**

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

**QUESTION ONE (30 MARKS)**

1. Differentiate  using product rule (4 marks)
2. If , find  and . Hence prove that  (3 marks)
3. Find the differential coefficient of . (3 marks)
4. Determine the following integrals
5.  (4 marks)
6. ; use  (4 marks)
7. An alternating current in  Amperes, where  is the times in seconds. Determine the rate of change of current when seconds. (3 marks)
8. Evaluate  (3 marks)
9. Determine by integration the area bounded by straight lines  and  (4 marks)
10. Given that , Evaluate  when , correct to 3 significant figures. (2 marks)

**QUESTION TWO (15 MARKS)**

1. Determine  (5 marks)
2. Find the derivatives of from first principles. (4 marks)
3. Use mid-ordinate rule with to evaluate  (4 marks)
4. Use the general rule of differentiation to determine given that  (2 marks)

**QUESTION THREE (15 MARKS)**

1. If , evaluate  when  (2 marks)
2. Given the series 4+11+18+...+39
3. Find the number of terms in the series (3 marks)
4. Find the sum of the terms in the series (2 marks)
5. By partial fractions, determine (4 marks)
6. Determine the gradient of the curve at  (4 marks)

**QUESTION FOUR (15 MARKS)**

1. The speed $v$ of a car in m/s is related to time $t$ seconds by the equation m/s. Determine the maximum speed of the car in Km/hr. (4 marks)
2. Evaluate  correct to 3 s.f. (5 marks)
3. (i) Find in terms of x and y given  (3 marks)

(ii) Evaluate  when $x=1$ and $y=2$. (3 marks)

**QUESTION FIVE (15 MARKS)**

1. Determine the integral  (1 mark)
2. The ratio of the 6th to the 2nd term of a G.P is 256. If the 3rd term of this sequence is 32, determine its first and fifth terms. (3 marks)
3. Use Simpson’s Rule with  to approximate the integral  (4 marks)
4. Find the surface area of the solid of revolution of the area under the curve  from $x=0$ to $x=5$ about the x-axis. (4 marks)
5. Determine the co-ordinate of the point on the graph  where the gradient is -1. (3 marks)