Premier University
Department of Electrical & Electronic Engineering
3rd Semester Final Year Examination, June, 2019
Course Title: Engineering Mathematics III; Course Code: MAT 201
Full Marks: 50; Time: 3 hours

NB: Answer any five (5) questions

1 a) Evaluate (i) $\int_c \frac{3z^2+z}{(z^2-1)} dz;\ |z| = 1$ 5

(ii) Find the residue of $\frac{z^2}{z^2+a^2}$ at $z = ia$

b) State and prove Cauchy's Residue Theorem. 5

2 a) Verify Stoke's Theorem for the vector $F = 2yi + 3xj - z^2k$ taken over the half of the sphere $x^2 + y^2 + z^2 = 9$ 5

b) If $F = 2xzi - xj + y^2k$ *evaluate* $\iiint_V Fdv$ where V is the closed region bounded by the planes $x = 0, y = 0, y = 6, z = x^2, z = 4$. 5

3 a) State and prove Green's Theorem. 5

b) Verify Divergence theorem for the vector $F = x^2i + y^2j + z^2k$ taken over the cube $0 \le x, y, z \le 1$. 5

4 a) If $F = (2xz^3 + 6y)i + (6x - 2yz)j + (3x^2z^2 - y^2)k$ 6
Then prove that F is conservative. Also find the work done by it along the path C from (1,-1,1) to (2,1,-1).

b) A school consists of 7 teachers of whom 4 are males and 3 are females. A committee of 3 teachers is to be formed. Obtain the probability function for the school teachers for the number of male teachers. 4

5 a) The probability that a person recovers from a rare blood disease is 0.4. If 15 people are known to have contacted this disease, what is the probability that 4
(i) At least 10 people survive; (ii) from 3 to 8 people survive, (iii) exactly 5 survive?

b) Given the following data on the ages of 75 persons in years. Calculate Mean deviation, Standard deviation and Variance using the following: 6

Age	Number of persons
07.5-10.5	3
10.5-13.5	7
13.5-16.5	12
16.5-19.5	15
19.5-22.5	18
22.5-25.5	10
25.5-28.5	8
28.5-31.5	2
Total	75

6 a) Suppose that there are on an average 4 vehicle accident per day on the Asian highways running from Dhaka to Manikgonj. What is the probability that in a given day in the highways 4

(i) there is no vehicle accident
(ii) there are 3 or fewer accidents
(iii) there are 2 or more accidents.

b) Compare Mean, Median and Mode using the following data:: 6

Age	Number of persons
09.5-12.5	3
12.5-15.5	14
15.5-18.5	23
18.5-21.5	12
21.5-24.5	8
24.5-27.5	4
27.5-30.5	1
Total	65

7 a) Evaluate $\iint_R \sqrt{x^2 + y^2}dxdy$ over the region R in the x-y plane bounded by $x^2 + y^2 = 36$ 6

b) The traffic control officer reports that 75% of the trucks passing through a check posts are from within Dhaka city. What is the probability that at least 3 of the next 5 trucks are from out of the city? 4

$A_1 = 23 - 14.$

$=$

$A_2 = 23 - 12$