RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2017-20]

B.A./B.Sc. SECOND SEMESTER (January – June) 2018

Mid-Semester Examination, March 2018

Date : 17/03/2018 **MATH FOR IND. CHEMISTRY (General)**

Time : 11 am – 12 noon Paper : II Full Marks : 25

[Use a separate Answer Book <u>for each group</u>]

<u>Group – A</u>

(*Answer <u>any three</u> questions*) [3×5]

1. Show that the three points whose position vectors are $\vec{\alpha}$, $(3\vec{\alpha}-2\vec{\beta})$ and $(2\vec{\beta}-\vec{\alpha})$ are collinear, where $\vec{\alpha}$ and $\vec{\beta}$ are any vectors.
2. Using vector method, find the points, where the straight line joining the points $(3,6,-5)$ and (1, 2, 3) meets the plane through the three points $(1,-2,4),(3,0,2)$ and (3,1,4).
3. A particle being acted on by constant forces $(4\vec{i}+\vec{j}-3\vec{k})$ and $(3\vec{i}+\vec{j}-\vec{k})$ is displaced from the point $(\vec{i}+2\vec{j}+3\vec{k})$ to the point $(5\vec{i}+4\vec{j}-\vec{k})$. Find the total work done by the forces.
4. Evaluate $\int \frac{f(x)}{x^3-1}dx$, where f(x) is a polynomial of degree 2 such that $f(0)=f(1)=3f(2)=-3$.
5. Using the definition of definite integral, evaluate $\int_a^b e^x dx$, where b > a > 0.

<u>Group – B</u>

(*Answer <u>any two</u> questions*) [2×5]

6. Define the following terms with example : [2·5×2]
   a) Mutually exclusive and exhaustive events
   b) Mutually independent events
7. a) State and prove Baye's Theorem. [3]
   b) The probabilities of A, B, C solving a problem are $\frac{1}{3},\frac{2}{7},\frac{3}{8}$ respectively. If all they try to solve the problem simultaneously, find the probability that exactly one of them will solve it. [2]
8. There are two groups of subjects, one of which consists of 5 science and 3 engineering subjects and the other consists of 3 science and 5 engineering subjects. An unbiased die is cast. If the number 3 or number 5 turns up, a subject is selected at random from the first group. Otherwise the subject is selected at random from the second group. Find the probability that an engineering subject is selected ultimately. [5]

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