Dr. Neel Kanth

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END TERM TEST

SUMMER SEMESTER - JUNE 2016

B.Tech- I Semester

COURSE CODE: 10B11MA112 MAX. MARKS: 50

COURSE NAME: BASIC MATHEMATICS I

COURSE CREDITS: 04 MAX. TIME: 2 Hrs

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Each question carries equal marks 5.*

1.

(a) Write down all the subsets of the following sets

(i) $\{a, b\}$

(ii) $\{1,2,3\}$

(iii) $\{a\}$

(iv) ϕ

(b) Let $A = \{1, 2, 3, 4, 5, 6\}, B = \{2, 4, 6, 8\}$.
Find $A - B$ and $B - A$.

2.

(a) Let $U = \{1, 2, 3, 4, 5, 6\}, A = \{2, 3\}$ and $B = \{3, 4, 5\}$.
Find $A', B', A' \cap B', A \cup B$ and hence show that $(A \cup B)' = A' \cap B'$.

(b) Let $A = \{1,2,3\}, B = \{3,4\}$ *and* $C = \{4,5,6\}$. Find

(i) $A \times (B \cup C)$

(ii) $(A \times B) \cap (A \times C)$

3. Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two real functions. For given $x = 0$, find

(i) $(f + g)(x)$

(ii) $(f - g)(x)$

(iii) $(f \times g)(x)$

(iv) $\left(\frac{f}{g}\right)(x)$

4. A tetrahedron is determined by three edge vectors a, b, c given as $\boldsymbol{a} = [2, 0, 3], \boldsymbol{b} = [0, 4, 1]$, $\boldsymbol{c} = [5, 6, 0]$. Find the volume of the tetrahedron.

5. Line through the points $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$. Find the value of x.

6. The Fahrenheit temperature F and absolute temperature K satisfy a linear equation. It is given that $K = 273$ when $F = 32$ and that $K = 373$ when $F = 212$. Express K in terms of F and find the value of F, when $K = 0$.

7. Find the centre and the radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$.

8. Write the equation of circle with radius 2 and center $(0,0)$. Also find the internal area of the circle using integration.

9. Write the equation of line which passes through $(1,0)$ with making $45°$ angle with x –axis. Find the area of triangle covered by the obtained line, $x -$ axis, and $x = 2$.

10. Compute

    (a) $\int \frac{1}{e^x+1} dx$

    (b) $\int_3^6 xy\, dx$ when $x = 6\cos\theta$ and $y = 2\sin\theta$

End