



International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
B. Sc. in CSE, Semester Final Examination, Autumn-2018
Course Code: MATH-1201, Course Title: Mathematics-II
Time: 2 hours 30 minutes Marks: 50

*(Answer any two (02) questions from Group-A. and any three (03) questions from Group-B.
Separate answer script must be used for separate group.
Figures in the right margin indicates full marks)*

Group – A

1. a) Define Transformation of Co-ordinates. Transform the axes inclined at 30° to the original axes the equation, $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$ 5
b) Find the bisectors of the angles between the two straight lines represented by the homogeneous second degree equation, $ax^2 + 2hxy + by^2 = 0$ 5

2. a) Prove that the equation $y^3 - x^3 + 3xy(y - x) = 0$ represents three straight lines equally inclined to one another. 5
b) Prove that the straight lines represented by the general equation of second degree in x and y i.e. $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ will be equidistant from the origin if $f^4 - g^4 = c(bf^2 - ag^2)$ 5

3. a) Define the general equation of second degree with all conditions that represents various curves. 5
b) Test the nature of the conic given by the equation, 5
$$32x^2 + 52xy - 7y^2 - 64x - 52y - 148 = 0$$

Group-B

4. a) Define direction cosine and direction ratio of a line. If a line makes angles α, β, γ with the positive direction of x, y and z -axis respectively then prove that, 5
$$\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma = 2$$
- b) Prove that the straight lines whose direction cosine are given by the relations, 5
 $al + bm + cn = 0$ and $fmn + gnl + hlm = 0$ are perpendicular if, $\frac{f}{a} + \frac{g}{b} + \frac{h}{c} = 0$
and parallel if, $\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w} = 0$
5. a) Define a plane. Find the equation of the plane passing through the points $(1, 1, 0)$, $(2, 2, -1)$ and $(1, 2, 1)$ 5
- b) Define Tetrahedron. Find the volume of the tetrahedron formed by the four planes, 5
 $my + nz = 0, \quad nz + lx = 0, \quad xl + my = 0$ and $lx + my + nz = p$
6. a) Define Shortest Distant. Find the shortest distance between the lines, 5
$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} \quad \text{and} \quad \frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$$
- b) Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar. 5
Find also the equation of plane in which they lie.
7. a) Define Great Circle. Find the equation of the sphere for which the circle, 5
 $x^2 + y^2 + z^2 + 7y - 2z + 2 = 0, 2x + 3y + 4z - 8 = 0$ is a great circle.
- b) Define Sphere. Find the equation of sphere with center $(2, 1, -3)$ that is tangent to the plane $x - 3y + 2z - 4 = 0$ 5