TIME: 90 min **KING SAUD UNIVERSITY** **FULL MARKS: 40**

M - 107 **DEPARTMENT OF MATHEMATICS**

II MID TERM EXAM

NOTE: Attempt all Questions.

Question: 1.(a) Find a unit vector perpendicular to the plane determined by A(1, -1, 0), B(2,1,-1), [6+5] and C(-1,1,2), also find area of the triangle ABC.

(b) Find the volume of the parallelepiped determined by the vectors $a = <1, 2, -1>, \; b = <-2, 0, 3>$ and $c = <0, 7, -4>$.

Question: 2 .(a) Check whether lines $x = -4 - 3t, \; y = 5 + t, \; z = -1 - t$ **and**

[7+7] $x = 4 + 5v, \; y = 7 + \frac{v}{2}, \; z = 3 + \frac{v}{2}$ **intersect, if they intersect find the point of intersection.**

(b) If the line $\frac{x}{3} = \frac{y}{5} = \frac{z}{2}$ **is perpendicular to a plane which contains the line** $x = 1 + 2t, \; y = 3t, \; z = 2 - t$**, find the equation of that plane.**

Question: 3(a). Identify the surface $x^2 - 4y^2 - z^2 = 0$**. Find its traces on the coordinate planes [5+5+5] and then sketch the surface.**

(b) The position vector of a point P is moving in xyz-plane is $r(t) = (\cos t)i + (\sin t)j + t\,k$,

i. Find the velocity of P at time t

ii. Find the equation of tangent line to the curve at $t = \frac{\pi}{2}$,

(c) Find the curvature of the curve $y = x^3$ point P(1,1)