TIME: 90 min **KING SAUD UNIVERSITY** **FULL MARKS:50**

M - 107 **DEPARTMENT OF MATHEMATICS**

II MID TERM EXAM (SEM II) 1436-1437

Question: 1. (a) For given vectors $a = i + 3j + k$, $b = j + 2k$ and $c = a - b$,

[8+8+8] **show that** $a \times (b \times c) = (a \cdot b)c + (a \cdot c)b$

(b) Find equation of line passing through the point (1, -2, 3) and parallel to planes $2x - 4y + z = 3$ and $x + 2y - 6z + 4 = 0$.

(c) Find the equation of plane through the points P(1, 0, -2) and Q(0, -2, 0) and containing vector $a = 3i - j + 2k$

Question: 2 . The acceleration of a space ship is given by $a(t) = \langle 2t, 0, -\sin t \rangle$ **for all** $t \geq 0$

[12] **with initial velocity** $v(0) = \langle 0,0,1 \rangle$ **and initial position** $r(0) = \langle 1,2,300 \rangle$

- **i.** **Find the velocity** ***v(t)*** .
- **ii.** **Find the position of space ship at time** $t = \frac{\pi}{2}$ **and**
- **iii.** **Find the tangential and normal components of the acceleration.**

Question: 3. (a) Find equation of the tangent line to the curve $r(t) = (1+t)i + e^{2t}j + e^{-2t}k$

[6+8] **at the point t = 0.**

(b) Identify the surface $x^2 + 4z^2 = 9y$. **Find its traces on the coordinate planes and sketch the surface.**

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