USN			MATDIP401
		Fourth Semester B.E. Degree Examination, Dec.09/Ja	n.10
		Advanced Mathematics – II	
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1111	1e: .	Note: Answer any FIVE full questions.	ax. Marks:100
1		If (l, m, n) be the direction cosines of a line then prove that $l^2 + m^2 + n^2 = 1$. Find the value of K if the angle between the lines with direction ratios -2, 1	, -1 and 1, -K, -1
		is $\frac{2\pi}{3}$.	(07 Marks)
	c.	Find the projection of the line segment AB on CD, where $A = (3, 4, 5)$, $B = (2, 4)$, $D = (1, 0, 5)$	(4, 6, 3), C = (-1, (07 Marks)
2	a. b.	Find the angle between the planes $x-y+2z=9$ and $2x+y+z=7$. Find the equation of the plane passing through the line of intersection $x+2y-3z-1=0$ and $3x-y+4z-5=0$ and perpendicular to the plane $3x+3z+3z+3=0$	
			(07 Marks)
		Find the point of intersection of the lines, $\frac{x-4}{1} = \frac{y+3}{4} = \frac{z+1}{7}$ and $\frac{x-1}{2} = \frac{z+1}{2}$	y+1 $z+10$
			$\frac{3}{-3} = \frac{3}{8}$ (07 Marks)
3	a.	If $A = 2i - 3j - k$ and $B = i + 4j - 2k$, find $(A+B) \times (A-B)$.	(06 Marks)
	b.	For any three vectors \vec{a} , \vec{b} , \vec{c} , prove that $(\vec{a} \times \vec{b}) \times \vec{c} = (\vec{a} \cdot \vec{c}) \vec{b} - (\vec{b} \cdot \vec{c}) \vec{a}$	(07 Marks)
	c.	Prove that the four points $4i + 5j + k$, $-(j+k)$, $(3i+9j+4k)$ and $4(-i+j+k)$ are constant.	oplanar.
			(07 Marks)
4	a.	A particle moves along the curve $x = 1 - t^3$, $y = 1 + t^2$ and $z = 2t - 5$ where Find the velocity and acceleration at $t = 1$.	ere t is the time. (06 Marks)
	b.		
	c.	Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2$	
		(2, -1, 2).	(07 Marks)
5		If $\vec{F} = (3x^2y - z)\mathbf{i} + (xz^3 + y^4)\mathbf{j} - 2x^3z^2k$ find grad(div \vec{F}) at (2, -1, 0).	· (06 Marks)
	b.	Find curl (curl \vec{A}) given that $\vec{A} = xyi + y^2zj + z^2yk$.	(07 Marks)
	c.	Show that $\vec{F} = \frac{xi + yj}{x^2 + y^2}$ is both solenoidal and irrotational.	(07 Marks)
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6	a.	Find the Laplace transform of $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$.	(05 Marks)
	b.	Find L(th) where n is a positive integer.	(05 Marks)
4	C.	Find L[t cos at].	(05 Marks)
	d.	Find $L\left[\frac{\cos at - \cos bt}{t}\right]$.	(05 Marks)

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7 Find the inverse Laplace transform for the following:

a.
$$\frac{(s+2)^3}{s^6}$$

(05 Marks)

b.
$$\frac{2s-1}{s^2+4s+29}$$

(05 Marks)

c.
$$\frac{2s^2 + 5s - 4}{s^3 + s^2 - 2s}$$

(05 Marks)

d.
$$\log \left(1 - \frac{a^2}{s^2}\right)$$

(05 Marks)

8 a. Use Laplace transform method to solve, $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$; y(0) = 0, y'(0) = 0 (10 Marks)

b. Find the inverse Laplace transformation of
$$\frac{s^2}{(s-2)}$$

(10 Marks)

