மு. மு. இஸ்லாமியா மேல்நிலைப்பள்ளி - திருநகர் - மதுரை - 6
மேல்நிலை முதலாம் ஆண்டு
கணிதம் / Mathematics - விடைக்குறிப்பு

		Type - A
1	d	N
2	d	2
3	d	$\frac{1}{5}$
4	d	2.5
5	a	1, 2
6	a	19
7	b	$y = x^3 + 2$
8	b	[1, 2]
9	d	2 x 4
10	b	2
11	b	$\pm \frac{1}{\sqrt{2}}(1+i)$
12	b	$1+i$
13	d	0.25
14	c	$\frac{\pi}{2}$
15	a	(1, 0)
16	b	$\frac{\pi}{6}$
17	c	$\frac{\pi a^3}{6}$
18	b	$\frac{1}{\sqrt{2}}$
19	a	π
20	b	$\frac{1}{f(x)} f'(x)\,dx$

		Type - B
1	b	$\frac{1}{\sqrt{2}}$
2	a	π
3	d	2 x 4
4	a	N
5	d	$\frac{1}{5}$
6	a	(1, 0)
7	d	2.5
8	b	$\frac{1}{f(x)} f'(x)dx$
9	b	[1, 2]
10	d	2
11	c	$\frac{\pi a^3}{6}$
12	a	1, 2
13	b	$\frac{\pi}{6}$
14	a	19
15	b	$1+i$
16	c	$\frac{\pi}{2}$
17	b	$\pm \frac{1}{\sqrt{2}}(1+i)$
18	b	$y = x^3 + 2$
19	d	0.25
20	b	2

பகுதி – II

21 $A^{-1} = \pm \frac{1}{\sqrt{|adjA|}} adjA$

$|adjA| = 9, \sqrt{|adjA|} = \sqrt{9} = 3$

$A^{-1} = \pm \frac{1}{3}\begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

22 $Re\left(\frac{1}{z}\right) = Re\left(\frac{1}{x+iy}\right) = Re\left(\frac{x-iy}{x^2+y^2}\right)$

$= \frac{x}{x^2+y^2}$

23 $\tan^{-1}(-\sqrt{3}) = \tan^{-1}\left(\tan\left(\frac{-\pi}{3}\right)\right)$

$= -\frac{\pi}{3} \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

24 $y = mx + c, \quad x^2 + y^2 = a^2$

$c^2 = a^2(1+m^2)$

$c = \sqrt{9(1+16)}$

$c = \pm 3\sqrt{17}$

25
$$\begin{array}{r} x-11 \\ x+5\overline{)\,x^2-6x+7} \\ x^2+5x \\ \hline -11x+7 \\ -11x-55 \\ \hline 62 \end{array}$$

சாய்ந்த தொலைத் தொடுகோடு

$y = x - 11$

26 $f(\lambda x, \lambda y) = \frac{\lambda^2x^2 + 5\lambda x\lambda y - 10\lambda^2y^2}{3\lambda x + 7\lambda y}$

$= \frac{\lambda^2}{\lambda}\left(\frac{x^2+5xy-10y^2}{7x+7y}\right)$

$= \lambda f(x, y)$

f-ன் படி 1 உடைய சமபடித்தான சார்பு ஆகும்.

27 $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$

$\int \frac{dy}{\sqrt{1-y^2}} = \int \frac{dx}{\sqrt{1-x^2}}$

$\sin^{-1}y = \sin^{-1}x + c$

28 $\int_{-\infty}^{\infty} f(x)dx = 1$

$\int_1^4 cx^2 dx = 1$

$c\left[\frac{x^3}{3}\right]_1^4 = 1$

$c\left[\frac{64-1}{3}\right] = 1$

$c = \frac{1}{21}$

29 $S_2 = -2+i+(-2)-i = -4$

$P_2 = (-2+i)(-2-i) = 5$

சமன்பாடு: $x^2 - (S_2)x + P_2 = 0$

$x^2 + 4x + 5 = 0$

30 $\int_0^{\pi} f(x)\sin x\,dx = 2\int_0^{\frac{\pi}{2}} f(x)dx$

$f(2a-x) = f(x)$

$\int_0^{\pi} f(x)dx = 2\int_0^{\frac{\pi}{2}} \sin x\,dx$

$= 2\int_0^{\frac{\pi}{2}} f(x)dx$

part – III

31 $X = A^{-1}B, \quad A^{-1} = \frac{1}{|A|}adjA$

$|A| = -1$

$A^{-1} = \frac{1}{-1}\begin{bmatrix} 2 & -5 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} -2 & 5 \\ 1 & -2 \end{bmatrix}$

$X = \begin{bmatrix} -2 & 5 \\ 1 & -2 \end{bmatrix}\begin{bmatrix} -2 \\ -3 \end{bmatrix}$

$X = \begin{bmatrix} -11 \\ 4 \end{bmatrix}$

$x = -11, \quad y = 4$

32 $|z+6+8i| \le |z| + |6+8i|$

$\le 2+10$

≤ 12 —— ①

$|z+6+8i| \ge ||z| - |6+8i||$

$\ge |2-10|$

$\ge |-8|$

≥ 8 —— ②

$\therefore 8 \le |z+6+8i| \le 12$

33

	7	−43	−43	7
−1	0	−7	50	−7
	7	−50	7	0
7	0	49	−7	
	7	−1	0	

$(x+1)(x-7)(7x-1) = 0$

$x = -1,\ x = 7,\ x = \frac{1}{7}$

34 LHS

$\tan^{-1}\frac{2}{11} + \tan^{-1}\frac{7}{24}$

$= \tan^{-1}\left(\frac{\frac{2}{11}+\frac{7}{24}}{1-\frac{2}{11}\cdot\frac{7}{24}}\right)$

$= \tan^{-1}\left(\frac{1}{2}\right)$

35 $[\vec{a}+\vec{c},\ \vec{a}+\vec{b},\ \vec{a}+\vec{b}+\vec{c}]$

$= \begin{vmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{vmatrix} [\vec{a}, \vec{b}, \vec{c}]$

$= (1)\ [\vec{a}\ \vec{b}\ \vec{c}]$

$= [\vec{a}\ \vec{b}\ \vec{c}]$

36 $u = x^2y + 3xy^4,\ x = e^t,\ y = \sin t$

$\frac{du}{dt} = \frac{\partial u}{\partial x}\frac{dx}{dt} + \frac{\partial u}{\partial y}\frac{dy}{dt}$

$= (2xy + 3y^4)e^t + (x^2 + 12xy^3)\cos t$

$= e^t[2e^t \sin t + 3\sin^4 t + e^t \cos t + 12\sin^3 t \cos t]$

37 $I = \int_0^{\frac{\pi}{2}} \frac{dx}{4 + 5\cos^2 x} = \int_0^{\frac{\pi}{2}} \frac{\frac{1}{\cos^2 x}}{\frac{1}{\cos^2 x} + 5}$

$= \int_0^{\frac{\pi}{2}} \frac{\sec^2 x}{6 + \tan^2 x}\, dx$

$t = \tan x;\ dt = \sec^2 x\, dx$

x	0	$\frac{\pi}{2}$
t	0	∞

$I = \int_0^{\infty} \frac{dt}{6+t^2} dt$

$= \frac{1}{\sqrt{6}}\left[\tan^{-1}\frac{t}{\sqrt{6}}\right]_0^{\infty}$

$I = \frac{\pi}{2\sqrt{6}}$

38 எதிர்பார்க்கும் இலாபத்தொகை

$E(x) = 200 \times \frac{1}{600} + 100 \times \frac{4}{600} + 50 \times \frac{6}{600} + 0 \times \frac{589}{600}$

$= \frac{3}{2}$

$= 1.5$

39 $f(x) = x^3 + 2x + 1$

$f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2$

$= 13 + 14(x-2) + 6(x-2)^2 + (x-2)^3 + \cdots$

40 $a*b = a+b-ab+7$

$\frac{3}{2} * m = \frac{87}{10}$

$\frac{3}{2} + m - \frac{3}{2}m + 7 = \frac{87}{10}$

$\frac{17-m}{2} = \frac{87}{10}$

$-m = \frac{87-85}{5}$

$-m = \frac{2}{5}$

$m = -\frac{2}{5}$

part - iv

41 (a) $\Delta = 6,\ \Delta_1 = 12,\ \Delta_2 = -6,\ \Delta_3 = 24$

$x_1 = \frac{\Delta_1}{\Delta} = \frac{12}{6} = 2$

$x_2 = \frac{\Delta_2}{\Delta} = \frac{-6}{6} = -1$

$x_3 = \frac{\Delta_3}{\Delta} = \frac{24}{6} = 4$

$(x_1, x_2, x_3) = (2, -1, 4)$

(b) $\frac{dy}{dx} = -\frac{2\cos t}{7\sin t}$

Tangent: $y - 2\sin t = \frac{-2\cos t}{7\sin t}(x - 7\cos t)$

$2x\cos t + 7y\sin t = 14$

Normal

$y - 2\sin t = \frac{7\sin t}{2\cos t}(x - 7\cos t)$

$7x\sin t - 2y\cos t = 45\sin t\cos t$

42 (a) $(z-1)^3 = -8$

$(1-z)^3 = 8$

$1 - z = (8)^{\frac{1}{3}} = 2(1)^{\frac{1}{3}} = (1, \omega, \omega^2)$

$z = 1 - 2 = -1$

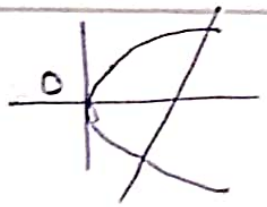
$z = 1 - 2\omega$

$z = 1 - 2\omega^2$

(b) $y = x$

$y = x - 2$

$y = 2,\ y = -1$



$\text{Area} = \int_{-1}^{2} (x_2 - x_1)$

$= \int_{-1}^{2} (y + 2 - y^2)\,dy$

$= \left[\frac{y^2}{2} + 2y - \frac{y^3}{3}\right]_{-1}^{2}$

$= \frac{9}{2}$ sq. units

43 (a) $6x^4 - 5x^3 - 38x^2 - 5x + 6 = 0$

One root $\frac{1}{3}$

Other roots $3, -\frac{1}{2}, -2$

(b) $\frac{dy}{dx} = \frac{3y}{2x} - \frac{x}{2y}$

$y = vx \Rightarrow v + x\frac{dv}{dx} = \frac{3v}{2} - \frac{1}{2v}$

$\frac{2v\,dv}{v^2 - 1} = \frac{dx}{x}$

$\log|v^2 - 1| = \log|x| + \log|c|$

$v^2 - 1 = cx$

$\frac{y^2}{x^2} - 1 = cx$

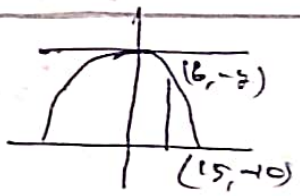
$y^2 - x^2 = \pm cx^3$

44 (a) $x^2 = -4ay$

$15^2 = -4a(-10)$

$4a = \frac{225}{10}$

$x^2 = -\frac{225}{10}y$



$(6, -y_1)$ lies on the parabola

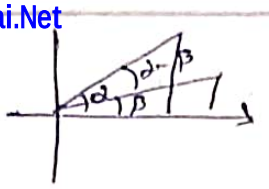
$36 = \frac{225}{10}y$

$y = 1.6$

Distance $= 10 - 1.6$

$= 8.4$ m

b $\vec{a} = \cos\alpha\,\hat{i} + \sin\alpha\,\hat{j}$



$\vec{b} = \cos\beta\,\hat{i} + \sin\beta\,\hat{j}$

$\vec{a}\cdot\vec{b} = \cos(\alpha-\beta)$

$\vec{a}\cdot\vec{b} = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

A5 (a) $p = \frac{8}{9}$, $q = \frac{1}{9}$

$P(X=x) = {}^nC_x\, p^x q^{n-x}$

$= {}^nC_x \left(\frac{8}{9}\right)^x \left(\frac{1}{9}\right)^{n-x}$

$n=6,\ x=3$

$P(X=3) = {}^6C_3 \left(\frac{8}{9}\right)^3 \left(\frac{1}{9}\right)^3$

$= 20\left(\frac{8^3}{9^6}\right)$

$n=4,\ x=0$

$P(X=0) = 4C_0 \left(\frac{8}{9}\right)^0 \left(\frac{1}{9}\right)^4$

$= \frac{1}{9^4}$

(b) $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

$(h,k) = (0,1)$

$b^2 = 3a$

$c^2 = a^2 - b^2 \Rightarrow 4 = a^2 - 3a$

$a^2 - 3a - 4 = 0$

$(a+1)(a-4) = 0$

$a = -1,\ a = 4,\ a^2 = 16$

$b^2 = 3\times 4 = 12$

$\frac{x^2}{16} + \frac{(y-1)^2}{12} = 1$

A6 (a) $\vec{b} = 2\hat{i} + 3\hat{j} + 6\hat{k}$, $\vec{c} = \hat{i} + \hat{j} - \hat{k}$

$\vec{b}\times\vec{c} = -9\hat{i} + 8\hat{j} - \hat{k}$

$(\vec{r} - (\hat{j} - 5\hat{k}))\cdot(-9\hat{i} + 8\hat{j} - \hat{k}) = 0$

$\vec{r}\cdot(-9\hat{i} + 8\hat{j} - \hat{k}) = 13$

அல்லது தேவை தேர்வு

$9x - 8y + z + 13 = 0$

(b) $A = ce^{kt}$

$t=0$, $A = A_0$ என்றால்

$A = A_0 e^{kt}$

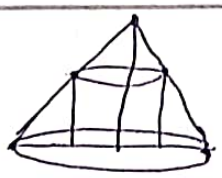
$t = 50$, $x = 2A_0$ என்றால்

$k = \frac{1}{50}\log 2$

$t = t$, $A = 3A_0$ என்றால்

$t = 50\left(\frac{\log 3}{\log 2}\right)$

A7 (a) $h = \frac{b}{a}(a-r)$



$V = \pi r^2 h$

$= \pi r^2\left(\frac{b}{a}(a-r)\right)$

$V = \frac{\pi b}{a}(ar^2 - r^3)$

$V' = \frac{\pi b}{a}(2ar - 3r^2)$

$V'' = \frac{\pi b}{a}(2a - 6r)$

$V' = 0$ என்றால் $r = 0$,

$V = \frac{\pi b}{a}\left(\frac{4a^3}{9} - \frac{8a^3}{27}\right)$

$= \frac{\pi b}{a} \times \frac{4a^3}{27}$

$= \frac{4}{9}\left(\frac{\pi a^2 b}{3}\right)$

$= \frac{4}{9}$ (Volume of a cone)

(b) $P\wedge(Q\vee r) = T\ T\ T\ F\ F\ F\ F\ F$

$(P\wedge Q)\vee(P\wedge) = T\ T\ T\ F\ F\ F\ F$

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