

I

1) (c) set of irrational numbers.

2) (c) $A \cup B = A$.3) (b) $(-\infty \infty)$ 4) (c) $\emptyset$ 5) (a) $x = (2n+1)\pi/2$.

6) (b) cosine function

7) (a) Both statements are true.

8) (a) $2 - 3i$

9) (d) 0.

10) (d) $(0, \infty)$ 11) (c) $-\frac{3}{2}$.12) (d) $y = 3$.13) (c) $y = mx$.14) (d) $a + b$.

15) (a) 24

16) $A - (A \cap B)$

17) 120.

18) -1.

19) 1

20) -2.

PART - B

21) $A \cup B = \{1, 2, 3, 4, 6, 8\}$ — (1) Mark $(A \cup B)^c = \{5, 7, 9\}$ — (1) Mark22) $x = 2$ — (1) Mark $y = 1$ — (1) Mark23) $\sin(2 \times 360 + 45)$ — (1) Markgetting $\sin 45 = \frac{1}{\sqrt{2}}$ — (1) Mark

(any alternate steps proportionate marks.)

$$24) \quad \sin 2x = \frac{2 \sin x \cos x}{1} \quad \text{--- (1) Mark}$$

$$= \frac{\frac{2 \sin x \cos x}{\cos^2 x}}{\frac{\cos^2 x}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x}} \quad \text{--- (1) Mark}$$

(Any alternate steps carries proportional marks)

$$25) \quad \text{Express} \quad (5-3i)^3 = 5^3 - 3 \times 5^2 \times 3i + 3 \times 5(3i)^2 - (3i)^3 \quad \text{--- (1) Mark}$$

$$\text{getting } (5-3i)^3 = -10 - 198i \quad \text{--- (1) Mark}$$

(Any alternate steps to be considered)

$$26) \quad \text{writing } x-iy = \frac{a-ib}{a+ib} \quad \&$$

$$x-iy = \frac{a^2-b^2}{a^2+b^2} - \frac{2ab}{a^2+b^2} i \quad \text{--- (1) Mark}$$

$$\text{getting } x^2+y^2=1. \quad \text{--- (1) Mark}$$

$$27) \quad (i) \quad \{ \dots -2, -1, 0, 1 \} \quad \text{--- (1) Mark}$$

$$(ii) \quad (-\infty, 2) \quad \text{--- (1) Mark}$$

$$28) \quad \frac{70+75+x}{3} \geq 60. \quad \text{--- (1) Mark}$$

$$x \geq 35 \quad \text{--- (1) Mark}$$

$$29) \quad d = \left| \frac{n_1 - n_2}{\sqrt{A^2 + B^2}} \right| \quad \text{--- (1) Mark}$$

$$\text{getting } d = \frac{65}{17} \quad \text{--- (1) Mark}$$

PART - C

$$30 \quad \text{finding } A \cap B = \{7, 9, 11\} \quad \text{--- (1) Mark}$$

$$B \cup C = \{7, 9, 11, 13, 15\} \quad \text{--- (1) Mark}$$

$$(A \cap B) \cap (B \cup C) = \{7, 9, 11\} \quad \text{--- (1) Mark}$$

31) $R = \{(1, 6), (2, 7), (3, 8)\}$ — (1) Mark

Domain of $R = \{1, 2, 3\}$ — (1) M

Range of $R = \{6, 7, 8\}$ — (1) M.

32) applying $\sin x + \sin y = 2 \sin\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$ formula

— (1) Mark

or

$\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$

— (1) Mark

getting RHS — (1) Mark

33) taking $\tan(x+2x)$ and applying $\tan(A+B)$ formula (1) Mark.

remaining steps — (1) Mark

getting RHS — (1) Mark.

34) taking $x, x+2$ as consecutive odd natural

no $x > 10$ — (1) M.

$x + (x+2) < 40$ (or) $x < 19$ — (1) Mark.

Remained pairs $(11, 13), (13, 15), (15, 17), (17, 19)$

— (1) Mark

35) $a+b=9$ or $b=9-a$ — (1) Mark

(or) $\frac{x}{a} + \frac{y}{9-a} = 1$ — (1) Mark

(or) $a = 3, 6$ — (1) Mark.

Remained line is $\frac{x}{3} + \frac{y}{6} = 1$ or $\frac{x}{6} + \frac{y}{3} = 1$ — (1) Mark.

36) $nP_5 = n(n-1)(n-2)(n-3)(n-4)$ or

$nP_3 = n(n-1)(n-2)$ — (1) Mark.

getting $(n-3)(n-4) = 42$ — (1) Mark.

writing $n = 10$ — (1) Mark.

37) (i) Selecting 3 persons from total 5 persons
 $= {}^5C_3 = 10$. — (1) Mark

(ii) Selecting 1 man from 2 men $= {}^2C_1$ — (1) Mark
 (or) selecting 1 woman from 3 women $= {}^3C_1$ — (1)

Remaining no of ways $= {}^2C_1 \times {}^3C_1 = 2 \times 3 = 6$

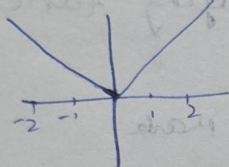
— (1) Mark

38) (i) $(f+g)(x) = x^2 + 2x + 1$ — (1)

(ii) $f-g(x) = x^2 - 2x - 1$. — (1)

(iii) $fg(x) = 2x^3 + x^2$. — (1)

39)



Sgn — (1) Mark

Figure — (1) Mark

Domain — (1) Mark

Range — (1) Mark

40) $\sin x = -\frac{4}{5}$ — (1)

$\operatorname{cosec} x = -\frac{5}{4}$ — (1)

$\cos x = -\frac{3}{5}$ — (1)

$\sec x = -\frac{5}{3}$ — (1)

$\tan x = \frac{4}{3}$ — (1)

41) $\frac{1}{2} (1 + \cos 2x) + \frac{1}{2} (1 + \cos 2(x + \frac{\pi}{3})) + \frac{1}{2} (1 + \cos 2(x - \frac{\pi}{3}))$ — (1) Mark

$= \frac{1}{2} [3 + \cos 2x + (\cos(2x + \frac{2\pi}{3}) + \cos(2x - \frac{2\pi}{3}))]$ — (1)

$= \frac{1}{2} [3 + \cos 2x + 2 \cos 2x \cos \frac{2\pi}{3}]$ — (1) Mark

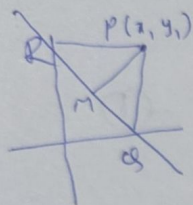
$= \frac{1}{2} [3 + \cos 2x + 2 \cos 2x (-\frac{1}{2})]$ — (1) M.

$= \frac{1}{2} [3 + \cos 2x - \cos 2x]$ — (1) M

H2) Taking x-intercept point as $Q(-c/A, 0)$ } or.
 y-intercept point as $R(0, -c/B)$ }

Area of triangle = $\frac{1}{2} \text{ base} \times \text{height}$ — (1) M.

perpendicular distance = $\frac{2 \times \text{Area of triangle}}{QR}$ — (1) M.

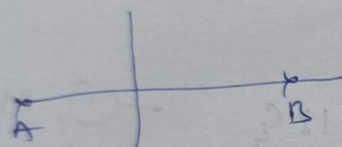


2 Area of triangle = $\frac{c}{AB} |Ax_1 + By_1 + c|$ — (1) M.

using distance formula and finding $QR = \frac{c}{AB} \sqrt{A^2 + B^2}$ — (1)

distance = $\left| \frac{Ax_1 + By_1 + c}{\sqrt{A^2 + B^2}} \right|$ — (1) M.

H3)



A (3, 4) B (-1, 2)

Midpoint of AB = (1, 3) — (1) M.

Slope of AB = $\frac{1}{2}$ — (1) M.

Slope of perpendicular = -2 — (1) M.

Required eqⁿ of right bisector

$y - 3 = -2(x - 1)$ — (1) Mark

getting $2x + y - 5 = 0$ — (1) Mark.

H4)

(i) No girl = Required ways = ${}^4C_0 \times {}^7C_5$ — (1)

(ii) At least 3 girls

= Selecting (3 girls, 2 boys) + (4 girls, 1 boy)

= ${}^4C_3 \times {}^7C_2 + {}^4C_4 \times {}^7C_1$ — (2)

(iii) At least one boy and one girl

= Selecting (1 girl, 4 boys) + (2 girls, 3 boys) + (3 girls, 2 boys) + (4 girls, 1 boy)

= ${}^4C_1 \times {}^7C_4 + {}^4C_2 \times {}^7C_3 + {}^4C_3 \times {}^7C_2 + {}^4C_4 \times {}^7C_1$

= $140 + 210 + 84 + 07 = 441$ — (2) Mark.

45 (i) when 4 letters are used,
 No. of words formed = $6P_4 = 6 \times 5 \times 4 \times 3$
 $= 360$ — (1)

(ii) when all letters are used = $6P_6$
 $= 720$ — (2)

(iii) 1st place filled in $2P_1$ ways — (1)
 remaining places filling = $5P_5$ ways — (1)
 Required no. of words = $2P_1 \times 5P_5$
 $= 240$.

PART - E

46) Choosing 4 cards from 52 cards = $52C_4$
 $= 270725$ — (1) M

(i) 4 cards of same suit
 $= 13C_4 + 13C_4 + 13C_4 + 13C_4$ — (1) M
 $= 2860$

(ii) 4 cards belonging to different suit.
 $= 13C_1 \times 13C_1 \times 13C_1 \times 13C_1$ — (1) M
 $= 13^4$

(iii) Two red and two black cards are face cards
 $= 26C_4 + 26C_4$ — (4) M
 $= 12C_4 = 495$

(iv) two red cards and 2 black cards
 $= 26C_2 \times 26C_2 = 105625$ — (1) M

(v) Cards are of same colour
 $= 26C_4 + 26C_4 = 29900$ — (1) M

(d)

Figure — (1) M. points coordinates — (1) M.

Proving $(P_1 P_3)^2 = 2 - 2(\cos x \cos y - \sin x \sin y)$ — 2 M

$(P_2 P_4)^2 = 2 - 2 \cos(x+y)$ — (2) M

Proving $\cos 2x = \cos^2 x - \sin^2 x$ — (1) Mark

47 > prove

$$(\cos x + \cos y)^2 + (\sin x + \sin y)^2 = 4 \cos^2\left(\frac{x+y}{2}\right)$$

applying $(a+b)^2 = a^2 + b^2 + 2ab$ formula — (i) M.

$(a-b)^2 = a^2 + b^2 - 2ab$ formula — (ii) M.

getting $1 + 1 + 2(\cos x \cos y + \sin x \sin y)$ — ~~comp~~

$$= 2 + 2 \cos(x+y)$$

$$= 2[1 + \cos(x+y)] \text{ — (1)}$$

$$= 2 \cdot 2 \cos^2\left(\frac{x+y}{2}\right) \text{ — (1)}$$

or.

$$nC_r + nC_{r-1} = \frac{n!}{(n-r)!r!} + \frac{n!}{(n-r+1)!(r-1)!} \text{ — (i) M.}$$

$$= \frac{n!}{(n-r)!(r-1)!} + \frac{n!}{(n-r+1)(n-r)!(r-1)!} \text{ — (ii) M.}$$

$$= \frac{n!}{(n-r)!(r-1)!} \left[\frac{1}{r} + \frac{1}{n-r+1} \right] \text{ — (iii) M.}$$

$$= \frac{n!}{(n-r)!(r-1)!} \times \frac{n-r+1+r}{r(n-r+1)} = \frac{(n+1)!}{(n-r+1)!} \text{ — (iv) M.}$$

$$= (n+1)C_r$$