CLASS-11

JINDAL SCHOOL

MATHEMATICS-041

ANNUAL EXAMINATION-2026

SECTION-A

1. (c) ϕ

2. (b) $[0,\infty)$

3. (d) $\frac{1}{2}$

4. (d) $y \neq 0$

5. (b) $-3 \leq x \leq 3$

6. (c) 26

7. (c) $-\frac{1}{2}$

8. (a) 45°

9. (c) $\sqrt{13}$

10. (c) $0 < e < 1$

11. (b) $4a$

12. (b) $\sqrt{34}$

13. (a) 0

14. (b) 120

15. (d) doesn't exist

16. (a) $\sec^2 x$

17. (b) 2.57

18. (b) $\frac{2}{7}$

19. (D)

20. (A)

SECTION-B

21. $A = \{1,2,3\}$, $B = \{3,4\}$, $C = \{4,5,6\}$

$\cancel{A\times}(B\cap C) = \{4\}$

$A\times(B\cap C) = \cancel{\{1,2,3,4\}}\ \{(1,4),(2,4),(3,4)\}$

22. (A) Denote $(x_1,y_1) = (1,-1)$ and $(x_2,y_2) = (3,5)$

~~Distance between two points is~~ Eq^n of line passing through (x_1,y_1) and (x_2,y_2) is

$\cancel{\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}}$

$= \cancel{\sqrt{(1-3)^2+(-1-5)^2}}$

$= \cancel{4\sqrt{10}\text{ units}}$

$$y - y_1 = \frac{y_2-y_1}{x_2-x_1}(x-x_1)$$

$$\Rightarrow y-(-1) = \frac{5-(-1)}{3-1}(x-1)$$

$$\Rightarrow y+1 = 3x-3 \Rightarrow \boxed{y-3x+4=0}$$

(B) Equation of line having x-intercepts $=-3$ and y-intercepts $=2$ is given by intercept form

$$\frac{x}{x\text{-intercept}} + \frac{y}{y\text{-intercept}} = 1$$

$$\Rightarrow \frac{x}{-3} + \frac{y}{2} = 1$$

23. denote $P = (x_1, y_1, z_1) = (1,-3,4)$,

$Q = (x_2, y_2, z_2) = (-4,1,2)$

Distance between P and Q is

$\sqrt{(x_1-x_2)^2+(y_1-y_2)^2+(z_1-z_2)^2}$

$= \sqrt{(1-(-4))^2+(3-1)^2+(4-2)^2}$

$= 3\sqrt{5}$ units.

24. $$\lim_{x \to 2} \frac{x^2-4}{x^2-2x}$$

$$= \lim_{x \to 2} \frac{(x-2)(x+2)}{(x-2)\,x}$$

$$= \lim_{x \to 2} \frac{x+2}{x}$$

$$= \frac{2+2}{2} = 2$$

Hence $\lim_{x \to 2} \frac{x^2-4}{x^2-2x} = 2$

25. (A) Given observations

6, 7, 10, 12, 13, 4, 8, and 12

$$\text{mean}(\bar{x}) = \frac{6+7+10+12+13+4+8+12}{8}$$

$$\cancel{= \frac{60}{7} \approx 8.57} = \frac{72}{8} = 9$$

$$\text{mean deviation (M.D)} = \cancel{\frac{|6-8.57| + |7-8.57| + |10-8.57| + |12-8.57| + |13-8.57| + |4-8.57| + |8-8.57|}{7}}$$

$$\cancel{= \frac{2.57 + 1.57 + 1.43 + 3.43 + 4.43 + 4.57 + 0.57}{7}}$$

$$\cancel{= \frac{18.57}{7}} = \frac{|6-9| + |7-9| + |10-9| + |12-9| + |13-9| + |4-9| + |8-9| + |12-9|}{8}$$

$$\cancel{\approx 2.65}$$

$$= \frac{3+2+1+3+4+5+1+3}{8}$$

$$= \frac{22}{8} = 2.75$$

(B) Given observation

3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21

~~median~~ = In ascending order is

3, 3, 4, 5, 7, 9, 10, 12, 18, 19 and 21

$$\text{median}(M) = \left(\frac{n+1}{2}\right)\text{th observation}$$

$$= \left(\frac{11+1}{2}\right)\text{th observation}$$

$$= 6^{th} \text{ observation}$$

$$\Rightarrow \boxed{M = 9}$$

$$\text{mean deviation (M.D.)} = \frac{\sum |x_i - M|}{n}$$

$$= \frac{|3-9| + |3-9| + |4-9| + |5-9| + |7-9| + |9-9| + |10-9| + |12-9| + |18-9| + |19-9| + |21-9|}{11}$$

$$= \frac{6+6+5+4+2+0+1+3+9+10+12}{11}$$

$$= \frac{58}{11}$$

$$\approx 5.27$$

$\boxed{26.}$ (A) Consider $\frac{\sin(x+y)}{\sin(x-y)} = \frac{\sin x \cdot \cos y + \cos x \cdot \sin y}{\sin x \cdot \cos y - \cos x \cdot \sin y}$

$$= \frac{\dfrac{\sin x \cdot \cos y + \cos x \cdot \sin y}{\cos x \cdot \cos y}}{\dfrac{\sin x \cdot \cos y - \cos x \cdot \sin y}{\cos x \cdot \cos y}}$$

$$= \frac{\dfrac{\sin x \cdot \cos y}{\cos x \cdot \cos y} + \dfrac{\cos x \cdot \sin y}{\cos x \cdot \cos y}}{\dfrac{\sin x \cdot \cos y}{\cos x \cdot \cos y} - \dfrac{\cos x \cdot \sin y}{\cos x \cdot \cos y}}$$

$$= \frac{\tan x + \tan y}{\tan x - \tan y}.$$

(B) Consider $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x}$

$$= \frac{2\cos\left(\frac{7x+5x}{2}\right)\cos\left(\frac{7x-5x}{2}\right)}{2\cos\left(\frac{7x+5x}{2}\right) \cdot \sin\left(\frac{7x-5x}{2}\right)}$$

$$= \cot\left(\frac{7x-5x}{2}\right)$$

$$= \cot x$$

$\boxed{27.}$ Let marks in the third test $= y$

Given in 1st and 2nd test Ravi scored 70 and 75 respectively.

to maintain average at least 60 marks

we must have $\frac{70+75+y}{3} \geq 60$

$\Rightarrow 145 + y \geq 180$

$\Rightarrow \boxed{y \geq 35}$

Hence minimum mark ravi should secure is 35.

28. $(98)^5 = (100-2)^5$

$= {}^5C_0 (100)^5 - {}^5C_1 (100)^4 2 + {}^5C_2 (100)^3 2^2 - {}^5C_3 (100)^2 2^3$

$+ {}^5C_4 (100)^1 2^4 - {}^5C_5 2^5$

$= 10^{10} - 5(10^8) 2 + 10(10^6) 4 - 10(10^4) 8 + 5(10^2) 16 - 32$

$= 10^{10} - 10^9 + 4 \times 10^7 - 8 \times 10^5 + 8 \times 10^3 - 32$

~~= 10,000,000,000 +~~

$= (10^{10} + 4 \times 10^7 + 8 \times 10^3) - (10^9 + 8 \times 10^5 + 32)$

$= 10,04,0,008,000 - 1,000,800,032$

$= 9,039,207,968$

29. (A) $\lim_{x \to 0} \frac{\sin ax}{\sin bx}$

$= \lim_{x \to 0} \frac{\frac{\sin ax}{ax} \times ax}{\frac{\sin bx}{bx} \times bx}$

$$= \frac{a}{b} \frac{\lim_{x \to 0} \left(\frac{\sin ax}{ax}\right)}{\lim_{x \to 0} \left(\frac{\sin bx}{bx}\right)} \qquad \left(\text{As } \lim_{x \to a} \frac{f(x)}{g(x)} = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}\right)$$

$$= \frac{a}{b} \frac{\lim_{ax \to 0} \left(\frac{\sin ax}{ax}\right)}{\lim_{bx \to 0} \left(\frac{\sin bx}{bx}\right)}$$

$$= \frac{a}{b} \frac{1}{1} \qquad \left(\text{As } \lim_{x \to 0} \frac{\sin x}{x} = 1\right)$$

Hence $\lim_{x \to 0} \frac{\sin ax}{\sin bx} = \frac{a}{b}$ if $b \neq 0$.

$\boxed{B}$ $\lim_{n \to \infty} \frac{1+2+\cdots+n}{n^2}$

$$= \lim_{n \to \infty} \frac{n(n+1)/2}{n^2}$$

$$= \frac{1}{2} \lim_{n \to \infty} \frac{n^2(1+1/n)}{n^2}$$

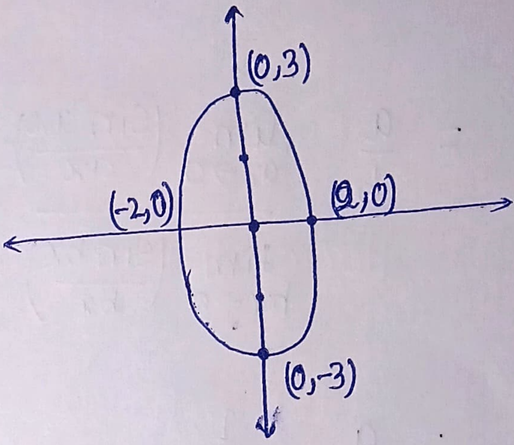
$$= \frac{1}{2} \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)$$

$$= \frac{1}{2}(1+0) = \frac{1}{2}$$

Hence $\lim_{n \to \infty} \frac{1+2+\cdots+n}{n^2} = \frac{1}{2}$

30. Given ellipse $9x^2+4y^2=36$

$$\Rightarrow \frac{x^2}{4}+\frac{y^2}{9}=1$$



Here $b=2$ and $a=3$

$$c^2=a^2-b^2$$
$$=3^2-2^2$$
$$\Rightarrow c=\pm\sqrt{5}$$

$\therefore$ focii are $(0,\sqrt{5})$ and $(0,-\sqrt{5})$

vertices are $(0,3)$ and $(0,-3)$

length of major axis $=2a=6$

length of minor axis $=2b=4$

eccentricity $(e)=\frac{c}{a}=\frac{\sqrt{5}}{3}=\frac{2.236}{3}\approx 0.745$

31. Number of way a committee of 2 persons selected from 2 men and 2 women are $= {}^4C_2 = \frac{4!}{2!\,2!} = 6$ ~~ways~~.

So $n(S)=6$

(i) $E_1=$ no men in a 2 member committee

$\therefore n(E_1)={}^2C_2=1$

$\therefore P(E_1)=\frac{n(E_1)}{n(S)}=\frac{1}{6}$

(ii) $E_2=$

(ii) E_2 = One men in a 2 member committee

$\therefore n(E_2) = {}^2C_1 \times {}^2C_1 = 2 \times 2 = 4$

$\therefore P(E_2) = \frac{n(E_2)}{n(S)} = \frac{4}{6} = \frac{2}{3}$

SECTION-D

32. Let $x \in (A \cup B)'$

$\Leftrightarrow x \notin A \cup B$

$\Leftrightarrow x \notin A$ and $x \notin B$

$\Leftrightarrow x \in A'$ and $x \in B'$

$\Leftrightarrow x \in A' \cap B'$

So, $(A \cup B)' \subset A' \cap B'$ ——(i)

and also $A' \cap B' \subset (A \cup B)'$ ——(ii)

from (i) and (ii)

$(A \cup B)' = A' \cap B'$

33. (A) Consider $\tan 3x = \tan(2x + x)$

$= \frac{\tan 2x + \tan x}{1 - \tan 2x \cdot \tan x}$

$\Rightarrow \tan 3x - \tan 3x \cdot \tan 2x \cdot \tan x = \tan 2x + \tan x$

$\Rightarrow \tan 3x \cdot \tan 2x \cdot \tan x = \tan 3x - \tan 2x - \tan x$.

(B) Consider $\cos\left(\frac{\pi}{4}+x\right)+\cos\left(\frac{\pi}{4}-x\right)$

$$= 2\cos\left(\frac{\frac{\pi}{4}+x+\frac{\pi}{4}-x}{2}\right)\cdot\cos\left(\frac{\frac{\pi}{4}+x-\frac{\pi}{4}+x}{2}\right)$$

$$= 2\cos\left(\frac{\pi}{4}\right)\cdot\cos x$$

$$= \frac{2}{\sqrt{2}}\cos x$$

$$= \sqrt{2}\cos x$$

34. Let $z_1 = x_1+iy_1$ and $z_2 = x_2+iy_2$

$\therefore z_1z_2 = (x_1x_2-y_1y_2)+i(x_1y_2+x_2y_1)$

$\therefore Re(z_1z_2) = x_1x_2-y_1y_2$

$= Re(z_1)\,Re(z_2) - Im(z_1)\,Im(z_2)$

as $Re(z_1) = x_1$
$Re(z_2) = x_2$
$Im(z_1) = y_1$
$Im(z_2) = y_2$

35. ~~(A) Given 3 boys and 3 girls.~~

(B)

35. (A) Given 5 boys and 4 girls.

A team has to form of 3 boys and 3 girls.

no of way to select 3 boys out of 5 boys = $^5C_3$

no " " " 3 girlds out of 4 girls = $^4C_3$

Hence no of way a team of 3 boys and 3 girls can be form = $^5C_3 \times {}^4C_3$

$= 10 \times 4$

$= 40$ ways.

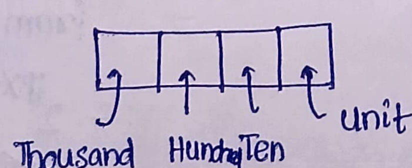
(B) Given digits 1, 2, 3, 4 and 5

~~Neam~~ To form a 4 digit number without repetition

$= {}^5P_4 = \frac{5!}{(5-4)!} = 5! = 5 \times 4 \times 3 \times 2$

$= \cancel{24}\ 120$

To form a 4 digit even number without repetition

= 

unit place has two options

Ten place has four options

Hundred place has three options

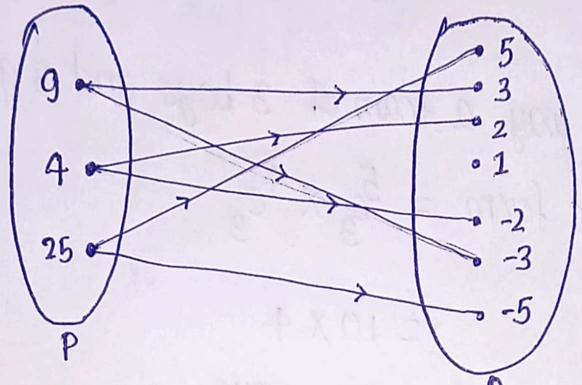
Thousand place has two options

So, by basic counting principle no of 4 digit ~~even~~ number ~~usin~~ are $2 \times 4 \times 3 \times 2 = 48$

SECTION-E

$\boxed{36.}$ Given $P = \{4, 9, 25\}$ and $Q = \{-5, -3, -2, 1, 2, 3, 5\}$

i



P

Q

(i) . $\{(9,3), (9,-3), (4,2), (4,-2), (25,5), (25,-5)\}$

$= \{(x^2, x) : x = \pm 2, \pm 3, \pm 5\}$

(ii) domain $= \{9, 4, 25\}$

(iii) range $= \{2, -2, 3, -3, 5, -5\}$

(iv) $|P \times Q| = |P|\,|Q| = 3 \times \cancel{6}\,7 = \cancel{18}\ 21$

$\therefore$ no. of relation from P to Q = no. of non-empty relation from P to Q

$= 2^{|P \times Q|}$

$= \cancel{2^{18}}\ 2^{21}$

37.

Let x = No. of packet of rice

y = No. of packet of maggie

(i) Cost of each packet of rice = ₹30

Cost of each packet of maggie = ₹20

Aditya has ₹200 buy rice and maggie.

Hence ATQ, $30x + 20y \le 200$

$\Rightarrow \boxed{3x + 2y \le 20}$

(ii) If he buys 4 packets of rice and entire ₹200 spend

then ATQ, $30(4) + 20y = 200$

$\Rightarrow 20y = 200 - 120$

$\Rightarrow y = \frac{80}{20}$

$\Rightarrow \boxed{y = 4}$

$\therefore$ no. of maggie packets is 4.

(iii) Given $4x + 3 < 5x + 7$

$\Rightarrow 3 - 7 < 5x - 4x$

$\Rightarrow -4 < x$

$\therefore x \in (-4, \infty)$

38. One card is drawn from a well-shuffled deck of 52 cards.

then Sample space is S,

$n(S) = {}^{52}C_1 = 52$

(i) E_1 = Card is a heart

$n(E_1) = {}^{13}C_1 = 13$

$\therefore P(E_1) = \frac{n(E_1)}{n(S)} = \frac{13}{52} = \frac{1}{4}$

(iii) E_3 = ace of space

$n(E_3) = {}^{1}C_1 = 1$

$\therefore P(E_3) = \frac{n(E_3)}{n(S)} = \frac{1}{52}$

(ii) E_2 = a black card

$n(E_2) = {}^{26}C_1 = 26$

$P(E_2) = \frac{n(E_2)}{n(S)} = \frac{26}{52} = \frac{1}{2}$

(IV) E_3 = a King of red color

$n(E_3) = {}^{2}C_1 = 2$

$P(E_3) = \frac{n(E_3)}{n(S)} = \frac{2}{52} = \frac{1}{26}$

END