OSDAV Public School, Kaithal

December Exams (2024-25)

SET- A

Class : XI

Subject : Applied Maths

Time: 3 Hrs . **M.M. : 80**

General Instructions:-

1. **All questions are compulsory.**
2. **This question paper has 5 Sections. Section A has 20 questions of 1 mark each which includes 18 M.C.Q.'s and 2 Assertion Reasons Section B has 5 Questions of 2 marks each. Section C has 6 questions of 3 marks each. Section D has 4 questions of 5 mark each and Section E has 3 case study based question of 4 marks each.**

Section – A

Q1 The centre and radius of the circle $x^2 + y^2 - 4x - 2y - 4 = 0$ are

a) (2, 2); 2 b) (2, 1); 4 c) (2, 1); 3 d) (-2, -1); 3

Q2 The two geometric mean between 1 and 64 are

a) 1 and 64 b) 4 and 16 c) 2 and 16 d) 8 and 16

Q3 If $\sum x_i = 24$, $\sum y_i = 55$, $\sum x_i y_i = 144$, n = 10, then Cov. (x, y) between x and y is

a) – 2.5 b) 1.2 c) – 1 d) 4

Q4 If A and B are two independent events such that P(A ∪ B) = 0.6 and P(A) = 0.2, then the value of P(B) is

a) 0.4 b) 0.8 c) 0.1 d) 0.5

Q5 **Statement I** : Some ships are boats.

Statement II : All boats are submarines.

Statement III : Some submarines are yachts.
Conclusion I : Some submarines are boats.
Conclusion II : Some submarines are ships.
Conclusion III : Some yachts are boats.
Conclusion IV : Some yachts are ships.
Which of the following is correct?

a) Only conclusion I follow
b) Only conclusion II follow
c) Both conclusions I and II follows
d) Both conclusions III and IV follows

Q6 The number of ways in which 5 boys and 3 girls can be arranged so that no two girls may sit together, is

a) 1440 b) 14400 c)5! d) ${}_3^6P$

Q7 The odd one among the numbers 253, 136, 352, 324 is

a) 253 b) 136 c) 352 d) 324

Q8 In a certain code 'MISSIONS' is written as 'MSIISNOS', then how is 'ONLINE' written in that code

a) OLNNIE b) ONNLIE c) OEILNN d) OLEINN

Q9 If 3 @ 6 *9 = 45 and 9 @ 8 * 7 = 105 then the value of 5 *6 @ 3 is

a) 67 b) 68 c) 69 d) 70

Q10 The value of Bowley's coefficient of skewness lies between

a) -2 and 1 b) -2 and 2 c) 0 and 1 d) -1 and 1

Q11 If – means ÷, + means x, ÷ means -, x means +, then the value of 48 ÷ 5 + 8 x 10 – 2 is

a) 31 b) 13 c) 83 d) 38

Q12 If A = { a, b, c, d, e} and B = { d, e, f, g} then (A – B) ∪ (B – A) is

a) ∅ b) {a, b, c} c) {f, g} d) {a, b, c, f, g}

Q13 If y = (2x + 3) ($5x^2$ - 7x + 1), then $\frac{dy}{dx}$ at x = 1 is

a) 13 b) 14 c) 15 d) 16

Q14 If log_{27} x $= \frac{4}{3}$ then value of x is

a) 81 b) 9 c) 64 d) 256

Q15 The first quartile of the data 21, 15, 40, 30, 26, 45, 50, 54, 60, 65, 70 is

a) 25 b) 26 c) 45 d) 50

Q16 If the first four central moments of a frequency distribution are 0, 3, 0.4 and 14, then the kurtosis of the distribution is

a) Mesokurtic b) platykurtic c) leptokurtic d) none

Q17 Which of the following binary number is equivalent to decimal number 35?

a) $(10010110)_2$ b) $(10001010)_2$ c) $(100000)_2$ d) $(100011)_2$

Q18 If ${}^{n}_{7}C = {}^{n}_{5}C$ then n is

a) 20 b) 12 c) 6 d) 30

Assertion Reason Based Questions: Choose according to these options in Q 19 and 20

a) **Both A and R are true and R is the correct explanation of A.**
b) **Both A and R are true and R is not the correct explanation of A.**
c) **A is true and R is false.**
d) **A is false and R is true.**

Q19 Assertion (A) : The average of first 20 natural numbers is 10.5

Reason (R) : Sum of first n natural numbers is $\frac{n\,(n+1)}{2}$

Q20 Assertion (A): The equation of straight line which passes through the point (-4, 3) and having slope $\frac{1}{2}$ is 2y – x + 10 = 0

Reason (R) : The equation of line passing through the point (x_1, y_1) and having slope m is given by y $- y_1 = m(x - x_1)$

Section – B

Q21 Convert 213.25 in its binary form.

Q22 Solve for x: $\log(x + 4) - \log 7 = 3 \log 2 - \log(x + 5)$

Q23 Let U = {1, 2, 3, 4, 5, 6, 7, 8}, A = { 1, 2, 3, 4}, B = {3, 4, 6} Find i) $A' \cap B'$ ii) A – B

Q24 If A = {1, 2, 3, 4, ……. 14} and a relation R is defined from A to A by

R = {(x, y): 3x – y = 0; x, y ∈ A}.

i) Write R in roster form
ii) Write its domain and range of R

Q25 For what values of k, the function f(x) = $\begin{cases} 2x + 1, & x < 2 \\ k, & x = 2 \\ 3x - 1, & x > 2 \end{cases}$ is continuous at x = 2.

Section – C

Q26 A household in Alwar , Rajasthan consumed 205 kl of water in a month. Calculate the water bill for the month. The tariff plan of Rajasthan is as given below:

Units of Consumption (in kl)	Upto 8	8- 15	15 – 40	>40
Price per kl consumed	₹ 1.89	₹ 2.42	₹ 4.84	₹ 6.05

Meter rent = ₹ 42 per month; Fixed charge = ₹ 30.25; Sewerage charge = 20% of consumption charges.

Q27 Find the domain and range of the function f(x) = $\frac{x^2-36}{x-6}$

Q28 A coin is tossed twice and four possible outcomes are assumed to be equally likely. If E is the event: "both head and tail have occurred" and F is the event "atmost one tail is observed", find P(E), P(F), P($\frac{E}{F}$), P($\frac{\bar{E}}{\bar{F}}$)

Q29 Differentiate $\frac{3x^2-2}{x^2+7}$ with respect to x

Q30 Find the number of arrangements of the letters of the word MATHEMATICS. In how many of these vowels occur together.

Q31 What was the day of the week on 2nd October 1869(birthday of Mahatma Gandhi)?

Section – D

Q32 What will ₹ 500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of 10 % compounded annually ?

Q33 The diameters of circles (in mm) drawn in a design are given below:

Diameters(in mm)	33 – 36	37 – 40	41 – 44	45 – 48	49 – 52
No. of circles	15	17	21	22	25

Calculate the standard deviation and mean diameters of the circles.

Q34 A company has an option to invest in two projects A and B, both of which require an initial investment of ₹ 3,50,000. Project A is for a duration of 3 years and is estimated to generate an income of ₹ 1,00, 000; ₹ 2,70,000 and ₹ 1,90,000 in first, second and third year respectively whereas project B is of duration of 2 years and is estimated to generate an annual income stream of ₹ 2,70,000 per year. In which project should the company invest, if the future values are discounted at 12% per annum.

Q35 Find Karl Pearson's coefficient of correlation between x and y of the following data:

x:	3	4	8	9	6	2	1
y:	5	3	7	7	6	9	2

Section – E

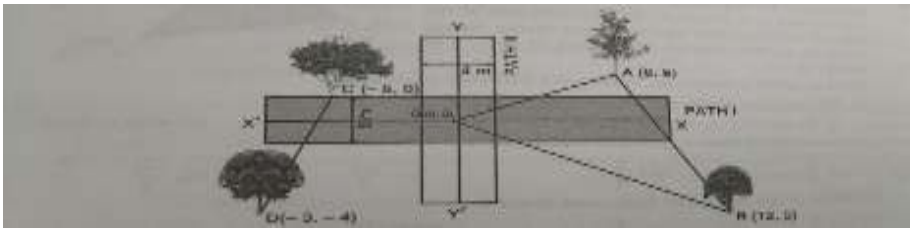
Q36 In a bolt factory machines A and B manufacture respectively 25% and 35% and remaining bolts of the total bolts of the factory are manufactured by machine C. Of their output 5%, 4% and 2% are respectively defective bolts. Based on above information, answer the following;

(i) Find the bolts manufactured in factory by machine C.
(ii) Find the probability that bolt drawn is defective, given that bolt is manufactured by machine B.
(iii) Find the probability that bolt drawn is defective.

Q37 A manufacturer sells a ceiling fan to a dealer for ₹ 5000. The dealer sells it to the consumer at a profit of ₹ 1500. If the sale is intrastate and the rate of GST is 18%

(i) Find the GST charged by the manufacturer from the dealer.
(ii) Find the total amount paid by dealer to manufacturer.
(iii) Find the GST charged by the dealer from the consumer.

Q38 In a park, two paths of width 5 m and 4 m are crossing at the centre point O(0,0) as shown in the following figure:



Four trees A, B, C and D are situated at four sides of two paths. The coordinates of the trees A, B, C and D are (6, 8), (12, 5), (-5, 0) and (-3, 4) respectively. Based on above information answer the following questions :

i) What is the slope of line CD.
ii) Find the equation of line AB.
iii) Find the distance of tree C from the origin.

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December Exams (2024-25)

SET- B

Class : XI

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Section – A

Q1 Which of the following binary number is equivalent to decimal number 150?

a) $(10010110)_2$ b) $(10001010)_2$ c) $(100000)_2$ d) $(100011)_2$

Q2 The odd one among the numbers 7, 13, 19, 25, 29, 37, 43 is

a) 25 b) 13 c) 19 d) 29

Q3 If A = { a, b, c, d, e} and B = { d, e, f, g} then (A – B) ∩ (B – A) is

a) ∅ b) {a, b, c} c) {f, g} d) {a, b, c, f, g}

Q4 The number of ways in which 6 different rings can be worn in four fingers of a hand are

a) 24 b) 4^6 c) 6^4 d) 10

Q5 If ${}^{n}_{8}C = {}^{n}_{9}C$ then n is

a) 8 b) 17 c) 6 d) 72

Q6 If 3 @ 6 *9 = 27 and 9 @ 8 * 7 = 91 then the value of 6 @ 3* 5 is

a) 67 b) 68 c) 69 d) 58

Q7 The second quartile of the data 21, 15, 40, 30, 26, 45, 50, 54, 60, 65, 70 is

a) 25 b) 26 c) 45 d) 50

Q8 The value of Bowley's coefficient of skewness lies between

a) -2 and 1 b) -2 and 2 c) 0 and 1 d) -1 and 1

Q9 If y = (x - 1) $(5x^3 + 3x - 1)$, then $\frac{dy}{dx}$ at x = 1 is

a) 7 b) 4 c) 5 d) 6

Q10 If $\sum x_i = 24$, $\sum y_i = 55$, $\sum x_i y_i = 144$, n = 10, then Cov. (x, y) between x and y is

a) – 2.5 b) 1.2 c) – 1 d) 4

Q11 In a certain code HARYANA is written as 8197151, then how is DELHI written in that code

a) 45398 b) 45236 c) 45389 d) 45678

Q12 **Statement I** : Some ships are boats.

Statement II : All boats are submarines.

Statement III : Some submarines are yachts.
Conclusion I : Some submarines are boats.
Conclusion II : Some submarines are ships.
Conclusion III : Some yachts are boats.
Conclusion IV : Some yachts are ships.
Which of the following is correct?

a) Only conclusion I follow
b) Only conclusion II follow
c) Both conclusions I and II follows
d) Both conclusions III and IV follows

Q13 If A and B are two independent events such that P(A ∪ B) = 0.8 and P(A) = 0.2, then the value of P(B) is

a) 0.75 b) 0.8 c) 0.15 d) 0.5

Q14 If – means ÷, + means x, ÷ means -, x means +, then the value of 48 ÷ 5 + 8 x 10 – 2 is

a) 31 b) 13 c) 83 d) 38

Q15 The value of $9^{\frac{1}{3}} . 9^{\frac{1}{9}} . 9^{\frac{1}{27}} . \ldots\ldots$ to ∞ is

a) 1 b) 3 c) 9 d) 27

Q16 The centre and radius of circle $x^2 + y^2 – 6x – 8y – 11 = 0$ are

a) (2, 2); 2 b) (3, 4); 6 c) (2, 1); 3 d) (-2, -1); 3

Q17 The value of $log_{2\sqrt{3}}$ 1728 is

a) 8 b) 6 c) 5 d) 9

Q18 If the first four central moments of a frequency distribution are 0, 3, 0.4 and 14, then the kurtosis of the distribution is

a) Mesokurtic b) platykurtic c) leptokurtic d) none

Assertion Reason Based Questions: Choose according to these options in Q 19 and 20

a) **Both A and R are true and R is the correct explanation of A.**
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Q19 Assertion (A): The equation of straight line which passes through the point (-4, 3) and having slope $\frac{1}{2}$ is 2y – x + 10 = 0

Reason (R) : The equation of line passing through the point (x_1, y_1) and having slope m is given by y – y_1 = m(x – x_1)

Q20 Assertion (A) : The average of first 20 natural numbers is 10.5

Reason (R) : Sum of first n natural numbers is $\frac{n\,(n+1)}{2}$

Section – B

Q21 Convert 337.75 in its binary form.

Q22 Solve for x: log(x + 4) - log 7 = 3 log 2 – log(x + 5)

Q23 Let U = { 2, 4, 6, 8, 10, 12}, A = {2, 4}, B = { 4, 6, 10} Find i) $A' \cup B'$ ii) B - A

Q24 If A = {1, 2, 3, 4, ……. 14} and a relation R is defined from A to A by

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i) Write R in roster form
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Q25 For what values of k, the function f(x) = $\begin{cases} kx^2, & x > 1 \\ k, & x = 1 \\ 4, & x < 1 \end{cases}$ is continuous at x = 1.

Section – C

Q26 Find the domain and range of the function f(x) = $\frac{x^2-81}{x-9}$

Q27 Differentiate $\frac{5x^3+7}{x^2-6}$ with respect to x

Q28 Find the number of arrangements of the letters of the word ALGEBRA. In how many of these vowels occur together.

Q29 A family in Jaipur, Rajasthan consumes 2950 units of electricity in a month. It has a connection load of 11 kW. Calculate the electricity bill for the month if no surcharge is applicable. The energy tax is NIL and the energy duty is ₹ 0.40 per unit. The tariff plan is given

No. of units\month	0- 50	51 – 150	151 - 300	301 – 500	➢ 500
Price	₹ 4.75	₹ 6.50	₹ 7. 35	₹ 7.65	₹ 7.95
Fixed charges per month	₹ 230	₹ 230	₹ 275	₹ 345	₹ 400

Q30 What was the day of the week on 15th august 1947 ?

Q31 A coin is tossed twice and four possible outcomes are assumed to be equally likely. If E is the event: "both head and tail have occurred" and F is the event "atmost one tail is observed", find P(E), P(F), P($\frac{E}{F}$), P($\frac{\bar{E}}{\bar{F}}$)

Section - D

Q32 Find the Karl Pearson's coefficient of skewness for the following data:

x:	10	11	12	13	14	15
f:	2	4	10	8	5	1

Q33 A company has an option to invest in two projects A and B, both of which require an initial investment of ₹ 3,50,000. Project A is for a duration of 3 years and is estimated to generate an income of ₹ 1,00, 000; ₹

2,70,000 and ₹ 1,90,000 in first, second and third year respectively whereas project B is of duration of 2 years and is estimated to generate an annual income stream of ₹ 2,70,000 per year. In which project should the company invest, if the future values are discounted at 12% per annum.

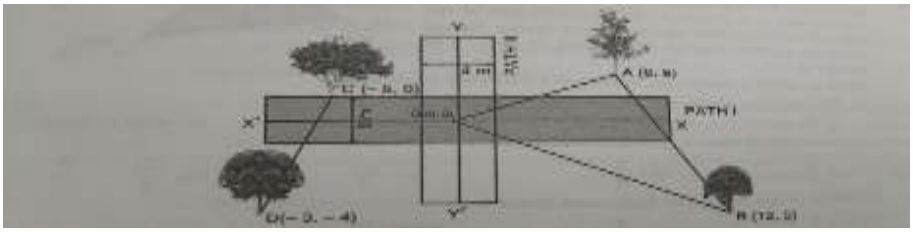
Q34 Calculate the standard deviation of the following data:

Marks	10 – 20	20 - 30	30 – 40	40 - 50	50 - 60	60 - 70	70 – 80
No. of students	5	12	15	20	10	4	2

Q35 What will ₹ 500 amounts to in 10 years after its deposit in a bank which pays annual interest rate of 10 % compounded annually ?

Section – E

Q36 In a park, two paths of width 5 m and 4 m are crossing at the centre point O(0,0) as shown in the following figure:



Four trees A, B, C and D are situated at four sides of two paths. The coordinates of the trees A, B, C and D are (6, 8), (12, 5), (-5, 0) and (-3, 4) respectively. Based on above information answer the following questions :

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(i) Find the GST charged by the manufacturer from the dealer.
(ii) Find the total amount paid by dealer to manufacturer.
(iii) Find the GST charged by the dealer from the consumer.

December Exam 2024-25 Set A

Marking Scheme / Hints to Sol"

Class - XI Applied Maths

Note :- Any relevant answer don't given here in but done by the Students are Suitably awarded

Q.No	Value Points / Hints to Sol"	Value Point	Total Point
1	c) (2,1) ; 3	1	
2	b) 4 and 16	1	
3	b) 1.2	1	
4	d) 0.5	1	
5	c) Both Conclusions I and II follows	1	
6	b) 14400	1	
7	d) 324	1	
8	a) OLNNIE	1	
9	b) 68	1	
10	d) -1 and 1	1	
11	b) 13	1	
12	d) {a, b, c, f, g}	1	
13	a) 13	1	
14	a) 81	1	
15	b) 26	1	
16	b) $(1000\,11)_2$ Platykurtic	1	
17	d) $(1000\,11)_2$	1	
18	b) 12	1	
19	b) Both are true and R is not the correct explanation of A	1	
20	c) A is true and R is false.	1	

Section-B

(21)

2	213	R
2	106	1
2	53	0
2	26	1
2	13	0
2	6	1
2	3	0
2	1	1
	0	1

Decimal	Product	Binary
0.25×2	0.50	0
$0.5^{*} \times 2$	1.00	1

1+1/2

$(213.25)_{10} = (11010101.01)_2$ 1/2 2

(22)

$\log(x+4) - \log 7 = 3\log 2 - \log(x+5)$

$\log\left(\frac{x+4}{7}\right) = \log\frac{8}{x+5}$

$\Rightarrow \frac{x+4}{7} = \frac{8}{x+5}$ 1

$\Rightarrow x^2 + 9x + 20 = 56$

$\Rightarrow x^2 + 9x - 36 = 0$

$\Rightarrow x^2 + 12x - 3x - 36 = 0$

$\Rightarrow (x+12)(x-3) = 0$ 1 2

$\Rightarrow x = -12$, $x = 3$

Rejected

$\Rightarrow \boxed{x = 3}$ Ans

(23) $U = \{1, 2, \ldots 8\}$, $A = \{1,2,3,4\}$, $B = \{3,4,6\}$

(i) $A' = \{5,7,8\}$, $B' = \{1,2,5,7,8\}$ 1

$A' \cap B' = \{5,7,8\}$ 1 2

(ii) $A - B = \{1,2\}$

(24) $A = \{1,2,3, \ldots 14\}$

$R = \{(x,y) : 3x - y = 0 \;;\; x, y \in A\}$

(i) $R = \{(1,3), (2,6), (3,9), (4,12)\}$ 1

(ii) Domain of $R = \{1,2,3,4\}$ 1 2

Range of $R = \{3,6,9,12\}$

(25) $f(x) = \begin{cases} 3x+1, & x < 2 \\ k, & x = 2 \\ 3x-1, & x > 2 \end{cases}$ $\quad L.H.L. = R.H.L. = f(2)$ 1H 2

$$\lim_{x\to 2^-} f(x) = \lim_{x\to 2^+} f(x) = f(2)$$

$$\lim_{x\to 2^-} 2x+1 = \lim_{x\to 2^+} 3x-1 = k$$

$$\Rightarrow \lim_{h\to 0} 2(2-h)+1 = k \quad \Big| \quad \lim_{h\to 0} 3(2+h)-1 = k$$

$$\Rightarrow 4+1 = k \qquad 6-1 = k$$

$$\Rightarrow \boxed{k=5} \qquad \boxed{k=5}$$

$$\Rightarrow \boxed{k=5}$$ 2

Section-C

(26) Water consumption charge =

$$₹\,[8\times 1.69 + 7\times 2.42 + 25\times 4.64 + 165\times 6.05]$$

$$= ₹\ 1151.31$$ ½

Sewerage charge $= \frac{20}{100}\times 1151.31 = 230.26$ ½

Fixed charge = ₹ 30.25

Meter rent = ₹ 42

Total Water Bill = Water consumption charge + Sewerage charge + Fixed charge + meter rent

$$= ₹(1151.31 + 230.26 + 30.25 + 42)$$ 1 | 3

$$= ₹\ 1453.82$$

(27) $f(x) = \frac{x^2-36}{x-6}$

Domain : $R - \{6\}$ ½ | 3

$$y = f(x) = \frac{(x+6)(x-6)}{x-6}$$

$$y = x+6$$

$$x = y-6$$ 2½ | 1

As $x \neq 6 \Rightarrow y-6 \neq 6$

$\Rightarrow y \neq 12$

Range $= R - \{12\}$

(28) Total outcomes $S = \{HH, HT, TH, TT\}$

$E = \{HT, TH\}$

$F = \{HT, TH, HH\}$

$P(E) = \frac{n(E)}{n(S)} = \frac{2}{4} = \frac{1}{2}$ $\frac{1}{2}$

$P(F) = \frac{n(F)}{n(S)} = \frac{3}{4}$ $\frac{1}{2}$

$P\left(\frac{E}{F}\right) = \frac{P(E \cap F)}{P(F)} = \frac{\frac{2}{4}}{\frac{3}{4}} = \frac{2}{3}$ 1

$P\left(\frac{\overline{E}}{F}\right) = \frac{P(\overline{E} \cap F)}{P(F)} = \frac{P(\overline{E \cup F})}{P(F)}$

$= \frac{1 - P(E \cup F)}{1 - P(F)}$ 1

$P(E \cup F) = P(E) + P(F) - P(E \cap F)$

$= \frac{2}{4} + \frac{3}{4} - \frac{2}{4} = \frac{3}{4}$ 3

$\therefore P\left(\frac{\overline{E}}{F}\right) = \frac{1 - \frac{3}{4}}{1 - \frac{2}{4}} = \frac{\frac{1}{4}}{\frac{1}{4}} = 1$

(29) $y = \frac{3x^2 - 2}{x^2 + 7}$

$\frac{dy}{dx} = \frac{(x^2+7) \times \frac{d}{dx}(3x^2 - 2) - (3x^2 - 2)\frac{d}{dx}(x^2 + 7)}{(x^2+7)^2}$ $1\frac{1}{2}$

$= \frac{(x^2+7)(6x) - (3x^2 - 2)(2x)}{(x^2+7)^2}$

$= \frac{6x^3 + 42x - 6x^3 + 4x}{(x^2+7)^2}$ $1\frac{1}{2}$ 3

$= \frac{46x}{(x^2+7)^2}$

(30) MATHEMATICS

2M, 2A, 2T,

Total no. of arrangements $= \frac{11!}{2!\,2!\,2!} = 4989600$ $1\frac{1}{2}$

No. of arrangements when Vowels occupy together

MTHMTCS [AEAI]

$= \frac{8! \times 4!}{2!2!2!} = 120960$ 1½ 3

31) 2nd October 1869

= 1600 + 200 years + 68 years + Period from 1.1.1869 to 2.10.1869 ½

No. of odd days in 1600 years = 0

" " " " 200 years = 2×5 = 10 = 7×1+3 ½

= 3 ½

" " " 68 years → 17 leap year + 51 ordinary

= 17×2 + 51×1

= 85

= 7×12 + 1 = 1 odd ½

No. of odd days = 3+1 = 4

Period from 1.1.1869 to 2.10.1869

Jan Feb M A may J July Aug Sep Oct

31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 2

= 275 = 39×7+2

= 2 odd 1 3

Total odd days = 4+2 = 6

No. Saturday

Section-B

32) $500(1+\frac{10}{100})^1, 500(1+\frac{10}{100})^2, \ldots\ldots 500(1+\frac{10}{100})^{10}$ 1

It is G.P. with $a = 500(\frac{11}{10})$, $r = \frac{11}{10}$ 1

Amount after 10 years $= T_{10} = ar^9 = 500(\frac{11}{10})(\frac{11}{10})^9$ 1

$= 500(\frac{11}{10})^{10}$. 1

Let $x = 500\left(\frac{11}{10}\right)^{10}$

$\log x = \log 500 + 10[\log(11) - \log 10]$

$= 2.6990 + 10[1.0414 - 1]$

$= 2.6990 + 10(0.0414)$

$= 2.6990 + 0.414$

$= 3.113$ 2 5

$x = \text{Antilog}(3.113)$

$= 1297$

So, Amount = ₹ 1297

(93)

C.I.	x_i	f_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$	$f_i u_i^2$
32.5–36.5	34.5	15	−2	−30	60
36.5–40.5	38.5	17	−1	−17	17
40.5–44.5	(42.5)	21	0	0	0
44.5–48.5	46.5	22	1	22	22
48.5–52.5	50.5	25	2	50	100
		100		25	199

2

$\text{Mean} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

$= 42.5 + 4 \times \frac{25}{100}$ 1

$= 43.5$

$S.D.(\sigma) = h\sqrt{\frac{\Sigma f_i u_i^2}{N} - \left(\frac{\Sigma f_i u_i}{N}\right)^2}$

$= 4 \times \sqrt{\frac{199}{100} - \left(\frac{25}{100}\right)^2}$

$= 4 \times \sqrt{1.99 - 0.0625}$

$= 4 \times \sqrt{1.9275}$ 2 5

$= 4 \times 1.38$

$= 5.55$

(34)

Project A:-

Present value of Cash outflow = Initial investment

= ₹ 3,50,000

$i = \frac{12}{100} = 0.12$

Present value of cash inflows for 1st, 2nd and 3rd year ₹ 1,00,00, ₹ 2,70,000 and ₹ 1,90,000.

∴ NPV of Project A =

$$\left[\frac{100000}{1.12} + \frac{270000}{(1.12)^2} + \frac{190000}{(1.12)^3}\right] - 350000$$

$$= [89285.70 + 215311.00 + 135231.30] - 350000$$

$$= 439828 - 350000$$

$$= ₹ 89,828 \qquad 2\frac{1}{2}$$

Project B:-

Present value of Cash outflow = ₹ 3,50,000

Present value of cash inflows = ₹ 270000 for 2 year

NPV of Project B $= \left[\frac{270000}{1.12} + \frac{270000}{(1.12)^2}\right] - 350000$

$$= [241071.40 + 215311.00) - 350000$$

$$= 456382.40 - 350000$$

~~= ₹ 1,006~~

$$= ₹ 1,06,382.40 \qquad 2\frac{1}{2}$$

So, NPV of project B > NPV of A

So, company will invest in Project B 5

(38)

(i) Slope of $CD = \frac{-4-0}{-3+5} = \frac{-4}{2} = -2$ — 1

(ii) Eqn of line AB:

Slope of $AB = \frac{5-8}{12-6} = \frac{-3}{6} = -\frac{1}{2}$

$y - 8 = -\frac{1}{2}(x-6)$

$2(y-8) = -(x-6)$

$2y - 16 = -x + 6$

$x + 2y - 16 - 6 = 0$ — 1

$\boxed{x + 2y - 22 = 0}$

(iii) Distance of C from origin

$= \sqrt{(5-0)^2 + (0-0)^2}$

$= 5$ — 2 | 4

Class – XI Applied maths Set B

Marking Scheme

December Exams 2024-25

Note:- Any other relevant answer not given here in but done by students are suitably awarded

Q.No.	Value Points / Key Points	Value Point	Total Point
1	a) $(100)_{10}(110)_2$	1	1
2	d) 29	1	1
3	a) ϕ	1	1
4	b) 4^6	1	1
5	b) 17	1	1
6	d) 58	1	1
7	c) 45	1	1
8	d) -1 and 1	1	1
9	a) 7	1	1
10	b) 1.2	1	1
11	c) 45389	1	1
12	c) Both conclusions I and II follows	1	1
13	a) 0.75	1	1
14	b) 13	1	1
15	b) 3	1	1
16	b) (3,4); 6	1	1
17	b) 6	1	1
18	b) platykurtic	1	1
19	c) A is true R is false	1	1
20	b) Both A and R are true and R is not the correct explanation of A.	1	1

(21)

2	337	R
2	168	1
2	84	0
2	42	0
2	21	0
2	10	1
2	5	0
2	2	1
2	1	0
	0	1

Decimal Part	Product	Binary
0.75×2	1.50	1
0.5×2	1.00	1

$1\frac{1}{2}$

$337.75 = (101010001.11)_2$ $\frac{1}{2}$ 2

(22) $U = \{2, 4, 6, 8, 10, 12\}$, $A = \{2, 4\}$, $B = \{4, 6, 10\}$

$A' = \{6, 8, 10, 12\}$, $B' = \{2, 8, 12\}$

(i) $A' \cup B' = \{2, 6, 8, 10, 12\}$ 1

(ii) $B - A = \{6, 10\}$ 1 2

(24) $R = \{(x, y) : 3y - x = 0, x, y \in A\}$

(i) $R = \{(3, 1), (6, 2), (9, 3), (12, 4)\}$ 1

(ii) Domain of $R = \{3, 6, 9, 12\}$

Range of $R = \{1, 2, 3, 4\}$ $\frac{1}{2} + \frac{1}{2}$ 2

(25) $$f(x) = \begin{cases} kx^2, & x > 1 \\ k, & x = 1 \\ 4, & x < 1 \end{cases}$$

$\lim_{x \to 1^-} 4 = \lim_{x \to 1^+} kx^2 = f(1) = k$ 2 2

$\Rightarrow \boxed{k = 4}$

Section-C

(26) $f(x) = \frac{x^2 - 81}{x - 9}$

$D_f = R - \{9\}$

$y = \frac{(x-9)(x+9)}{(x-9)} = x + 9$

$\Rightarrow x = y - 9$

Here $x \neq 9 \Rightarrow y - 9 \neq 9$

$y \neq 18$ $1\frac{1}{2}$ 2

$\Rightarrow$ Range $= R - \{18\}$ $\frac{1}{2}$ 3

(27) $y = \frac{5x^3+7}{x^2-6}$

$\frac{dy}{dx} = \frac{(x^2-6)\times\frac{d}{dx}(5x^3+7) - (5x^3+7)\times\frac{d}{dx}(x^2-6)}{(x^2-6)^2}$ $1\frac{1}{2}$

$= \frac{(x^2-6)(15x^2) - (5x^3+7)(2x)}{(x^2-6)^2}$

$= \frac{15x^4 - 90x^2 - 10x^4 - 14x}{(x^2-6)^2}$

$= \frac{5x^4 - 90x^2 - 14x}{(x^2-6)^2}$ $1\frac{1}{2}$ 3

(28) ALGEBRA

No. of arrangements $= \frac{7!}{2!} = 7\times6\times5\times4\times3$

$= 2520$ $1\frac{1}{2}$

No. of arrangements when vowels occur together

AREA LGBR

$= \frac{5!\times3!}{2!} = \frac{5\times4\times3\times2\times1\times2\times1}{2}$ $1\frac{1}{2}$ 3

$= 360$

(29)

No. of units	Rate (₹)	Amount (₹)
0-50 = 50	4.75	237.50
51-150 = 100	6.50	650.00
151-300 = 150	7.35	1102.50
301-500 = 200	7.65	1520.00
501-2950 = 2450	7.95	19477.50
		₹ 22997.50

$1\frac{1}{2}$

Energy duty = 20.40 per unit

= ₹0.40 × 2950 = ₹1180 $\frac{1}{2}$

Electricity Bill = Fixed charge + Energy charges + Energy duty 3

= 400 + 22997.50 + 1180

= ₹ 24577.50 1

(b) 15th August 1947 = 1600 years + 300 years + 46 years + Period from 1.1.1947 to 15.8.1947 ½

No. of odd days in 1600 years = 0 ½

No. of odd days in 300 years = 3 × 5 = 15 days
= 7 × 2 + 1
= 1 odd day ½

A period of 46 years = 11 leap years + 35 non-leap years
= 11 × 2 + 35 × 1 = 57
= 8 × 7 + 1
= 1 odd day. ½

No. of odd days in period of 1.1.1947 to 15.8.1947
Jan + Feb + M + Ap + May + Jun + July + A.
31 + 28 + 31 + 30 + 31 + 30 + 31 + 15
= 227 days = 32 × 7 + 3
= 3 odd days 1

Total odd days = 0 + 1 + 1 + 3 = 5 odd days

Day → Friday. 3

Section-D

(12)

x_i	f_i	$d_i = x_i - A$	$f_i d_i$	$f_i d_i^2$
10	2	−2	−4	8
11	4	−1	−4	4
12	10	0	0	0
13	8	1	8	8
14	5	2	10	20
15	1	3	3	9
	30		13	49

2

Mean = $A + \frac{\Sigma f_i d_i}{\Sigma f_i} = 12 + \frac{13}{30} = 12.43$ 1

S.D = $\sqrt{\frac{\Sigma f_i d_i^2}{N} - \left(\frac{\Sigma f_i d_i}{N}\right)^2}$

$$S.D = \sqrt{\frac{49}{30} - \left(\frac{43}{32}\right)^2}$$

$$= \sqrt{1.633 - (1.433)^2}$$

$$= \sqrt{1.633 - 0.187} \quad = \sqrt{1.446} = 1.203.$$ $1\frac{1}{2}$

Mode = 12

So, Karl Pearson's coefficient of skewness

$$S_{kp} = \frac{\text{Mean} - \text{Mode}}{S.D.}$$ $\frac{1}{2}$ 5

$$= \frac{12.433 - 12}{1.203} = 0.36$$

(34)

C.I.	x_i	f_i	$u_i = \frac{x_i - A}{h}$	$f_i u_i$	$f_i u_i^2$
10–20	15	5	−3	−15	45
20–30	25	12	−2	−24	48
30–40	35	15	−1	−15	15
40–50	(45)	20	0	0	0
50–60	55	10	1	10	10
60–70	65	4	2	8	16
70–80	75	2	3	6	18
		68		−30	152

$2\frac{1}{2}$

$$S.D. = h\sqrt{\frac{\Sigma f_i u_i^2}{N} - \left(\frac{\Sigma f_i u_i}{N}\right)^2}$$

$$= 10\sqrt{\frac{152}{68} - \left(\frac{-30}{68}\right)^2}$$

$$= 10\sqrt{2.24 - 0.19}$$ $2\frac{1}{2}$ 5

$$= 10 \times \sqrt{2.05}$$

$$= 10 \times 1.43$$

$$= 14.1$$