Chhatrapati Shahu Ji Maharaj University, Kanpur

Answer Script Details
Barcode 8570082

Roll No. 23081000411
Total Mark 50/75.00

Exam BACHELOR OF SCIENCE_ODD EXAM-DEC-24
Subject B030301T - ALGEBRA AND MATHEMATICAL METHODS

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	NA/6	7B	4/6				
1B	4/6	8A	4/6				
1C	NA/6	8B	4/6				
1D	4/6	9A	NA/6				
1E	4/6	9B	NA/6				
1F	NA/6						
1G	NA/6						
1H	4/6						
1I	NA/6						
2	NA/12						
3A	5/6						
3B	5/6						
4	NA/12						
5A	4/6						
5B	4/6						
6	NA/12						
7A	4/6						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

PART-I

Date of Exam: 22/01/25 Shift: I Room No.: 31 Sem: III 3rd sem

Paper Code: B030301T Subject: Mathematics

Name of Candidate: Sneha Shukla

Roll No. 2 3 0 8 1 0 0 0 4 1 1

COE Facsimile

Signature of Invigilator

Signature of Candidate

PART-II

MARKS OBTAINED

Q.	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
(f)										
(g)										
(h)										
(i)										
(j)										
Total										

Total Marks in Figures — Max. Marks

Total Marks in Words

B 0 3 0 3 0 1 T
Paper Code

Signature of Evaluator

PART-III

Course: B.Sc. III rd sem

Session: 2024-25 Year/Semester: III rd sem

Subject Name: mathematics

Medium: English ● Hindi ○

Paper Code: B 0 3 0 3 0 1 T

Exam Date: 2 2 0 1 2 0 2 5

Name of Candidate: S N E H A S H U K L A

Father's Name: A T U L K U M A R

महाविद्यालय का कोड
College Code: A U 0 3

परीक्षा केन्द्र का कोड
Exam Centre Code: A U 0 3

परीक्षा का प्रकार
Type of Exam

Regular ● नियमित परीक्षार्थी Ex-Student ○

Private ○ स्व-पाठ परीक्षा Back Paper Exam ○

ANSWER BOOKLET NO.

8570082

B 0 3 0 3 0 1 T
Paper Code

PART-IV

नामांकन संख्या
Enrollement Number: C S J M A 2 3 0 0 0 0 0 3 8 5 4

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2 3 0 8 1 0 0 0 4 1 1

पेपर कोड Paper Code: B 0 3 0 3 0 1 T

Signature of Candidate

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नोट- 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पत्रे के पृष्ठ भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. बॉक्स में भरी जाने वाली प्रविष्टियां बायीं तरफ से शुरू की जायें। 3. गोलों को काले या नीले बॉलपेन से भरा जायें।

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐☐ boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below, blacken the circles completely.

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

IN ORDER TO AVOD UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tampering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/electronic/digital/ watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

अनुचित साधन से बचने हेतु :

1. उत्तर पुस्तिका के निर्देशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखें तथा कोई भी चिन्ह न बनायें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेद छाड़ करने पर अनुचित साधन माना जायेगा।
3. परीक्षा कक्ष में किसी वस्तुएं साथ न लायें, जैसे लिखे हुए कागज के टुकड़ें, मोबाईल, डिजिटल डायरी, डिजिटल घड़ी, कॉपी, पुस्तक एवं सभी वस्तुएं जो अनुचित साधन की श्रेणी में आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लेस साइंटिफिक कैलकुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में लपेटे न लगें न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

परीक्षार्थियों को दिया जाने वाला

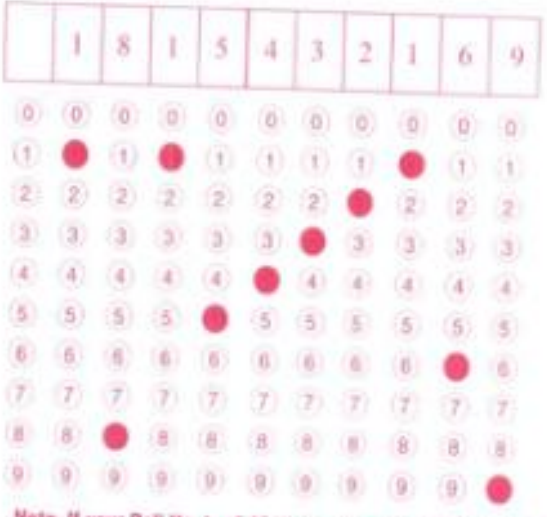
1. प्रवेश पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र ID सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1-24) से कम है या फटे हुए है, तो शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके पढ़ी होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पेंसिल का प्रयोग न करें।
10. दी कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

INSTRUCTION TO THE CANDIDATE

1. Read the instructions carefully given on the Question Paper, Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-24) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code, Sc Name, and Question of the Question Paper during first THIRTY MINUTES of commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in stat as Carry Over. Those appearing as Ex- Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numerals in ☐☐ Boxes.
2. Use blue or black ball point pen for filling the circles.



Note- If your Roll No. is of 10 digits. Please leave first three columns .

Paper Code
B 0 30 30 1 T

1

Section-A
Short Answer

Answer-1(D)

Two Permutation $f = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}$, $g = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}$ of Set $A = \{1, 2, 3, 4\}$ are said to be inverse of each other

$f = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}$, $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{bmatrix}$

Inverse of $f = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}^{-1} = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}$

$g = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}$

Inverse of $g = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}^{-1}$

$= \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}$

Hence Inverse of $[f] = [g] = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}$

& Inverse of $[g] = [f] = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}$

Hence Two permutation f & g of Set A are said to be inverse of each other

It has prove that

Inverse of $f = g = \begin{bmatrix} 3 & 4 & 1 & 2 \\ 1 & 2 & 3 & 4 \end{bmatrix}$

Inverse of $g = f = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{bmatrix}$

Answer - 1(E)

Two groups are homomorphism.

Homomorphism :-

A homomorphism is said that the two group on $f(x,y)$ and $f(a,b)$ are homomorphism when function

$$f(x,y) = f(x) \text{ of } f(y)$$
$$f(x \cdot y) = f(x) \cdot f(y)$$

when this function $f(x,y)$ is onto function two groups are homomorphism

Ex- $F = \{1, -1, i, -i\}$, $G_4 = \{0, 1, 2, 3\}$ mod 4
$(F, *)$ $(G_4, +)$

$f($

$*$	1	-1	i	$-i$
1	1	-1	i	$-i$
-1	-1	1	$-i$	i
i	i	$-i$		
$-i$				

G_4	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

$f(1) = 0$, $f(-1) = 1$, $f($ $) = 2$, $f(-i) = 3$

$f(1 \cdot i) = f(1) + f(i) = 0 + 2 = 2 = f(1 \cdot i)$

$f(1 \cdot (-i)) = 0 + 3 = f(1) + f(-i)$

Hence $f(x \cdot y) = f(x) + f(y)$
$f(x + y) = f(x) + f(y)$

It's proof that two group are homomorphism.

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Answer - 1 (B)

$R = \{(x, y) : x \in N, y \in N, x - y$ is divisible by 5

Prove that R is an equivalence Relation

R is set of all natural numbers

To prove that R is an equivalence Relation we have to show that R is symmetric, Reflexive and commutative

Symmetric :-

$R = \{x, y : x \in N, y \in N, x - y$ is divisible by 5

$x - y$ divisible by 5

Then $y - x$ also divisible by 5

because $x \in N, y \in N, x - y$ divisible by 5

R is symmetric

Reflexive :-

$R = \{x, y : x \in N, y \in N, x - y$ is divisible by 5

If x, y and z (take z)

$(x - y)$ divisible by 5

$(y - z)$ divisible by 5

then $(x - z)$ is also divisible by 5

R is Reflexive

Commutative :-

If $x - y$ is divisible by 5

then $(y - x)$ is also divisible by 5

Hence R is commutative

Hence proved -

R is an equivalence Relation

Answer - 1(H)

Maximum Value for a function $f(x,y)$

In the defination of maximum value said that if $\boxed{rt - s^2 > 0 \ \& \ r < 0}$ then function is maxima

where

$$r = \frac{\partial^2 f}{\partial x^2} \quad \because \frac{\partial f}{\partial x} = 0$$

$$s = \frac{\partial^2 f}{\partial x \partial y} \qquad \frac{\partial f}{\partial y} = 0$$

$$t = \frac{\partial^2 f}{\partial y^2}$$

then find the value of x & y put in function and find the maximum value.

Minimum Value for a function $f(x,y)$:-

In defination of minimum value said that if $\boxed{rt - s^2 > 0, \ \& \ r > 0}$ then function is minima

where

$$r = \frac{\partial^2 f}{\partial x^2}, \quad s = \frac{\partial^2 f}{\partial x \partial y} \quad \text{and} \quad t = \frac{\partial^2 f}{\partial y^2}$$

$$\frac{\partial f}{\partial x} = 0, \quad \frac{\partial f}{\partial y} = 0$$

find the value x & y put in function and find minimum value.

Paper Code

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PART(A)

Long Answer

Answer - 3(a)

$x = r\sin\theta\cos\phi$, $y = r\sin\theta\sin\phi$, $z = r\cos\theta$

find

$$\frac{\partial(x,y,z)}{\partial(r,\theta,\phi)} = \begin{vmatrix} \frac{\partial x}{\partial r} & \frac{\partial x}{\partial \theta} & \frac{\partial x}{\partial \phi} \\ \frac{\partial y}{\partial r} & \frac{\partial y}{\partial \theta} & \frac{\partial y}{\partial \phi} \\ \frac{\partial z}{\partial r} & \frac{\partial z}{\partial \theta} & \frac{\partial z}{\partial \phi} \end{vmatrix}$$

$$= \begin{vmatrix} \sin\theta\cos\phi & r\cos\theta\cos\phi & -r\sin\theta\sin\phi \\ \sin\theta\sin\phi & r\cos\theta\sin\phi & r\sin\theta\cos\phi \\ \cos\theta & -r\sin\theta & 0 \end{vmatrix}$$

$$= \sin\theta\cos\phi(0 + r^2\sin^2\theta\cos\phi) - r\cos\theta\cos\phi(-r\sin\theta\cos\theta\cos\phi)$$
$$- r\sin\theta\sin\phi(-r\sin^2\theta\sin\phi - r\cos^2\theta\sin\phi)$$

$$= r^2\sin^3\theta\cos^2\phi + r^2\sin\theta\cos^2\theta\cos^2\phi + r^2\sin^3\theta\sin^2\phi + r^2\cos^2\theta\sin\theta\sin^2\phi$$

$$= r^2\sin^3\theta(\cos^2\phi + \sin^2\phi) + r^2\sin\theta\cos^2\theta(\cos^2\phi + \sin^2\phi)$$

$$= r^2\sin^3\theta + r^2\sin\theta\cos^2\theta$$
$$= r^2\sin\theta(\sin^2\theta + \cos^2\theta)$$
$$= \boxed{r^2\sin\theta}$$

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\phi + \cos^2\phi = 1$

Answer 3(b)

$$y_1 = \frac{x_2 x_3}{x_1}, \quad y_2 = \frac{x_3 x_1}{x_2}, \quad y_3 = \frac{x_1 x_2}{x_3}$$

$$J(y_1, y_2, y_3) = 4$$

$$J(y_1, y_2, y_3) = \frac{\partial(y_1, y_2, y_3)}{\partial(x_1, x_2, x_3)}$$

$$= \begin{vmatrix} \frac{\partial y_1}{\partial x_1} & \frac{\partial y_1}{\partial x_2} & \frac{\partial y_1}{\partial x_3} \\ \frac{\partial y_2}{\partial x_1} & \frac{\partial y_2}{\partial x_2} & \frac{\partial y_2}{\partial x_3} \\ \frac{\partial y_3}{\partial x_1} & \frac{\partial y_3}{\partial x_2} & \frac{\partial y_3}{\partial x_3} \end{vmatrix}$$

$$= \begin{vmatrix} -\frac{x_2 x_3}{x_1^2} & \frac{x_3}{x_1} & \frac{x_2}{x_1} \\ \frac{x_3}{x_2} & -\frac{x_3 x_1}{x_2^2} & \frac{x_1}{x_2} \\ \frac{x_2}{x_3} & \frac{x_1}{x_3} & -\frac{x_1 x_2}{x_3^2} \end{vmatrix}$$

$$= -\frac{x_2 x_3}{x_1^2}\left(\frac{x_1 x_2 x_3 x_1 \cdot x_1 x_3 x_2 - x_1^2}{x_2^2 \quad x_3^2 \quad x_3 x_2}\right) - \frac{x_3}{x_1}\left(\frac{-x_1 x_2 x_3^2 - x_1 x_2 x_3^2}{x_3^2 \cdot x_2 \quad x_3 x_2}\right)$$

$$+ \frac{x_2}{x_1}\left(\frac{x_1 x_3^2 + x_1 x_3^2}{x_3^2 x_2 \quad x_3 x_2}\right)$$

$$= = -\frac{x_2 x_3}{x_1^2}\left(\frac{x_1^2 - x_1^2}{x_2 x_3 \quad x_3 x_2}\right) - \frac{x_3}{x_1}\left(\frac{-x_1}{x_3} - \frac{x_1}{x_3}\right)$$

$$+ \frac{x_2}{x_1}\left(\frac{x_1}{x_2} + \frac{x_1}{x_2}\right) =$$

$$-\frac{x_2x_3}{x_1^2}\times\frac{x_1^2}{x_2x_3}+\frac{x_2x_3}{x_1^2}\times\frac{x_1^2}{x_2x_3}+\frac{x_3x_1}{x_1x_3}+\frac{x_3x_1}{x_1x_2}$$
$$+\frac{x_2^2}{x_1}\cdot\frac{x_1}{x_2}+\frac{x_2^2}{x_1^2}\cdot\frac{x_1^2}{x_2}$$

$$= -1+1-1+1+1+1$$
$$-1+1+1+1+1+1$$
$$= 4$$

$$\boxed{J(y_1,y_2,y_3)=4}$$

Part B Long Answer

Answer - 5(a)

Laplace transform of $\frac{\sinh t}{t}$

$$L\left[\frac{\sinh t}{t}\right] =$$

$$L[\sinh t] = \frac{a}{s^2-a^2} \qquad \boxed{L(\sinh t) = \frac{a}{s^2-a^2}}$$

by formula

$$L\left\{\frac{f(t)}{t}\right\} = \int_s^\infty f(x)\,dx \qquad \boxed{L\left\{\frac{f(t)}{t}\right\} = \int_s^\infty f(x)\,dx}$$

$$= \int_s^\infty \frac{x}{x^2-a^2}\,dx \qquad \int_s^\infty \frac{a}{x^2-a^2}\,dx$$

$$= a\int_s^\infty \frac{1}{x^2-a}\,dx$$

$$L\left[\frac{\sin ht}{t}\right] = a\int_{s}^{\infty} \frac{1}{(x-a)(x+a)}\,dx$$

$$= \frac{a}{2}\int_{s}^{\infty}\left(\frac{1}{x-a} - \frac{1}{x+a}\right)dx$$

$$= \frac{a}{2}\left[\int_{s}^{\infty}\frac{dx}{x-a} - \int_{s}^{\infty}\frac{1}{x+a}\,dx\right]$$

$$= \frac{a}{2}\Big[\log(x-a) - \log(x+a)\Big]_{s}^{\infty}$$

$$= \frac{a}{2}\log\left(\frac{x-a}{x+a}\right)_{s}^{\infty}$$

$$= \frac{-a}{2}\log\left(\frac{x-a}{x+a}\right) \qquad \log\infty = \infty$$

$$= \frac{a}{2}\log\left(\frac{x+a}{x-a}\right)$$

$$= \boxed{\frac{a}{2}\log\left(\frac{x+a}{x-a}\right)}$$

important formula -

$$\int \frac{dx}{x-a} = \log(x-a)$$

$$\int \frac{dx}{x+a} = \log(x+a)$$

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Answer - 5(b)

Solve - $y'' - 6y' + 9y = t^2 e^{3t}$ If $y(0) = 2$, $y'(0) = 6$

$y'' - 6y' + 9y = t^2 e^{3t}$

taking Laplace transform $L[t^2] = \frac{\lfloor 2+1}{s^{2+1}}$

$L(y'') - 6L(y') + 9L(y) = L(t^2 e^{3t})$

$= s^2 y(0) - s(y(0)) - y'(0) - 6(sy(0) - y'(0)) + 9y'(0) = \frac{\lfloor 2+1}{s^{2+1}} = \frac{6}{(s-3)^3}$

$= 2s^2 - 2s - 6 - 6(2s - 6) + 9(6) = \frac{6}{(s-3)^3}$

$= 2s^2 - 2s - 6 - 12s + 36 + 54 = \frac{6}{(s-3)^3}$

$= 2s^2 - 14s + 90 = \frac{6}{(s-3)^3}$

$s^2 - 7s + 45 = \frac{3}{(s-3)^3}$

~~$s(s-7)$~~ $s^2(s-7) + 1 = \frac{3}{(s-3)^3}$

~~$s^2 - 7s - 3 = \frac{-24}{(s-3)^3}$~~ ×

Important formula $L(y'') = s^2 y(0) - s(y(0)) - y'(0)$

$L(y') = s(y(0)) - y(0)$

P.t.O

$$2s^2 - 14s - \frac{6}{(s-3)^3} = -90$$

$$s(2s-7) - \frac{6}{(s-3)^3} = -90$$

taking

$$2s^2(s-3)^3 - 14s(s-3)^3 - 6 = -90(s-3)^3$$

$$= 2s^2(s^3-2$$

$$= 2s^2 - 14s - \frac{6}{(s-3)^3} = -90$$

$$2s(2s-7) - \frac{6}{(s-3)^3} = -90$$

$$2(s-7) - \frac{6}{2s(s-3)^3} \quad \frac{-90}{2s(s-7)}$$

taking inverse Laplace

$$= y(t) = 3 \cdot 1 \cdot t^2 e^{3t} + 45(e^{7t})$$

$$= y(t) = 3t^2 e^{3t} + 45 e^{7t}$$

$$\frac{1}{3}e^{3(t-u)}$$

put $t > 0$

$$y(0) = 45 \cdot e^{7t}$$

$$\boxed{y(0) = 45}$$

(convolution theorem $L\{f(s)g(s)\} = \int_0^t f(u)g(t-u)\,du$)

$$\frac{1}{s(s-3)^3} = \int_0^t 1 \cdot 1 \cdot e^{3(t-u)}\,du$$

$$= \frac{e^{3(t-u)}}{3(-u)} = \left[\frac{-1}{3}e^{3(t-u)}\right]_0^t$$

$$= \frac{-1}{3}e^{3(0)} + \frac{1}{3}e^{3t} \quad \frac{1}{3}e^{3t}$$

$$y(t) = \frac{1}{3}e^{3t} + 45e^{7t}$$

put $t > 0$

$$y(0) = \frac{1}{3} + 45$$

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Section-C
Long Answer

Part(A)

Answer-7(a)

Fit a straight line

x	0	1	2	3	4		
y	3	8	12	18	24		

$y = a_0 + a_1 x$

$\Sigma y = a_0 n + a_1 \Sigma x$

$\Sigma xy = a_0 \Sigma n + a_1 \Sigma x^2$

x	y	xy	x^2
0	3	0	0
1	8	8	1
2	12	24	4
3	18	54	9
4	24	96	16
$\Sigma n = 10$	$\Sigma y = 65$	$\Sigma xy = 182$	$\Sigma n^2 = 30$

$65 = 5a_0 + a_1 10$

$182 = 10a_0 + a_1 30$

$\Sigma n = 10$
$\Sigma y = 65$
$\Sigma xy = 182$
$\Sigma n^2 = 30$

$= 2(5a_0 + 10a_1 = 65)$

$10a_0 + 30a_1 = 182$

$= 10a_0 + 20a_1 = 130$

$10a_0 + 30a_1 = 182$

$10a_1 = 52$

$a_1 = 5.2$

$5a_0 + 10a_1 = 65$
$5a_0 + 52 = 65$
$5a_0 = 65 - 52$
$5a_0 = 13$
$a_0 = \frac{13}{5} = 2.6$

Equation of fit a straight line

$y = 2.6 + 2x$

Answer - 7(b)

Find rank correlation -

x	y	Rank x	Rank y	$d_i(R_x - R_y)$	d_i^2
10	40	5	5	0	0
12	41	4	4	0	0
15	48	2	3	-1	1
14	60	3	1	2	4
19	50	1	2	-1	1
					$\Sigma d_i^2 = 6$

d_i = Rank of x - Rank of y

Rank correlation $= 1 - \frac{6\Sigma d_i^2}{n(n^2-1)}$

$= 1 - \frac{6 \times 6}{5(25-1)}$

$= 1 - \frac{36}{120} \quad \frac{3}{10}$

$= 1 - 0.3$

$= 0.7$

Rank of correlation $= 0.7 \leq 1$

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Part B

Answer - 8(a)

Binomial distribution = $\boxed{{}^{n}C_{r}\, p^{r}\, q^{n-r}}$

the mean of Binomial distribution = $\boxed{np}$
and Variance (σ^2) = $\boxed{npq}$

$np = 4$

$npq = 3$

$\frac{npq}{np} = \frac{3}{4}$

$\frac{1}{q} = \frac{4}{3}$

$\boxed{q = \frac{3}{4}}$

$p + q = 1$

$p = 1 - \frac{3}{4} = \frac{1}{4}$

the binomial distribution = $\boxed{(p+q)^n}$

$= \left(\frac{1}{4} + \frac{3}{4}\right)^{16}$

$n = \frac{4}{p} = \frac{4}{1/4} = 16$

$= \left(\frac{4}{4}\right)^{16}$

$= (1)^{16}$

$= 1$

Answer = $\left(\frac{1}{4} + \frac{3}{4}\right)^{16} = 1$

Answer - 8(b)

The mean of binomial distribution = $\boxed{np}$

variance = $\boxed{npq}$

$np = 2$

$npq = 1$

$\frac{np}{npq} = \frac{2}{1}$

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

$q = 1/2$

$p + q = 1$

$p = 1 - \frac{1}{2} = 1/2$

p = probability of truth
q = probability of false
p + q = 1

$n = \frac{2}{p} = 4$

$(p+q)^n = \left(\frac{1}{2} + \frac{1}{2}\right)^4$

$= 1$

$r = 1$

Probability $= {}^nC_r\, p^r\, q^{n-r}$

${}^4C_1 \left(\frac{1}{2}\right)^1 \left(\frac{1}{2}\right)^{4-1}$

$= {}^4C_1 \frac{1}{2}\left(\frac{1}{2}\right)^3$

$= \frac{\lfloor 4}{\lfloor 1 \lfloor 3} \times \frac{1}{2} \times \frac{1}{8}$

$= 4 \times \frac{1}{2} \times \frac{1}{8}$

$= \left(\frac{1}{4}\right)$

P.T.O.

Hence mean of binomial variate $= np$

Variance $(\sigma^2) = npq$

$$\beta_1 = \frac{\mu_3^2}{\mu_2^3}, \quad \beta_2 = \frac{\mu_4}{\mu_2^2}$$

$$\gamma_1 = \sqrt{\beta_1}, \quad \gamma_2 = \beta_2 - 3$$

for binomial $\mu_1 = 0$

$\mu_2 = npq$

$\mu_3 = npq(q-p)$

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Do Not Write anything in this Portion

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