Vivekanand College Kolhapur (An Empowered Autonomous Institute)

B.Sc. II Semester IV

Unit Test

Paper: Probability Distributions II

Date: 14/02/2026 **Total Marks: 20M**

Instruction:

Attempt all questions

Q 1 Define gamma distribution with parameter (Θ, n). Hence find its mean and variance. **10 M**

Q 2. Derive an expression for mgf of $G(\Theta, n)$ hence find first four raw moments. **10 M**

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Tejas Prakash Patil

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- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

14/2/24

विवेकानंद कॉलेज
(अधिकारप्रदत्त स्वायत्त)
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20/20

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प्र. क्र.
Q. No.

Q.1) Define gamma distⁿ with parameter θ, n. Hence find it's mean & varience.

Q.2) Derive an expression for m.g.f of gamma distribution. Hence find first raw moments.

Q. 1

→ • Gamma distribution :-

defination : A continous random variable x taking non-negative values with scale parameter θ and ~~scale~~ shape parameter 'n'. If its pdf is given by,

$$f(x) = \frac{\theta^n}{\Gamma n} e^{\theta x} x^{n-1} \quad ; x > 0, \; n, \theta > 0$$

$$= 0 \quad ; \text{otherwise}$$

• Mean & Varience of $G(\theta, n)$...

By defination of mean,

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		Marks												

प्र. क्र.
Q. No.

$$E(X) = \int_x x\, f(x)\, dx$$

$$= \int_0^\infty x \, \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty x^{(n+1)-1} e^{-\theta x}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \frac{\Gamma n+1}{\theta^{n+1}} \quad \text{----} \quad (\because \text{By Property})$$

$$= \frac{\theta^n}{\Gamma n} \frac{n \Gamma n}{\theta^n \cdot \theta^1}$$

$$\boxed{E(x) = \frac{n}{\theta}}$$

Now

$$\text{var}(x) = E(x^2) - [E(x)]^2 \quad \text{———} \; (1)$$

Let

$$E(x^2) = \int_x x^2 f(x)\, dx$$

$$= \int_0^\infty x^2 \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty x^{(n+2)-1} e^{-\theta x}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \frac{\Gamma n+2}{\theta^{n+2}} \quad \text{---} \quad (\because \text{By property})$$

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Q. No.

$$= \frac{\theta^n}{\Gamma n} \frac{(n+1)\Gamma n+1}{\theta^n \cdot \theta^2}$$

$$= \frac{\theta^n}{\Gamma n} \frac{(n+1)n\Gamma n}{\theta^n \cdot \theta^2}$$

$$\boxed{E(x^2) = \frac{n(n+1)}{\theta^2}}$$

Puting this value in eqⁿ (1)
We get,

$$var(x) = E(x^2) - [E(x)]^2$$

$$var(x) = \frac{n(n+1)}{\theta^2} - \left(\frac{n}{\theta}\right)^2$$

$$var(x) = \frac{n^2+n}{\theta^2} - \frac{n^2}{\theta^2}$$

$$var(x) = \frac{n^2+n-n^2}{\theta^2}$$

$$\boxed{var(x) = \frac{n}{\theta^2}}$$

Hence,
∴ This is the required solutions.

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		Marks											

प्र. क्र.
Q. No.

Q. 2

$\rightarrow$ If $X \sim G(\theta, n)$, then its pdf is given by,

$$f(x) = \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} \quad ; \quad x > 0, \; \theta, n > 0$$

$$= 0 \quad ; \text{otherwise}$$

Now,

M.g.f of $G(\theta, n)$.

$$M_X(t) = E[e^{tx}]$$

$$= \int_x e^{tx} f(x)\, dx$$

$$= \int_0^\infty e^{tx} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty x^{n-1} e^{-(\theta + t)x}\, dx$$

$$= \frac{\theta^n}{\Gamma n} \cdot \frac{\Gamma n}{(\theta + t)^n}$$

$$= \frac{\theta^n}{(\theta + t)^n}$$

Yas Prakash Patil

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Centre	V.C.K

अ. क्र.
Sr. No.

$$= \frac{\theta^n}{(\theta+t)^n}$$

$$= \frac{\theta}{\theta(1-t/\theta)^n}$$

$$= \frac{1}{(1-t/\theta)^n}$$

$$M_x(t) = (1-t/\theta)^{-n}$$

$$\boxed{M_x(t) = (1-t/\theta)^{-n}}$$

Raw moments by m.g.f.
We know that,
$$M_x(t) = (1-t/\theta)^{-n}$$

The expanssion of $(1-t/\theta)^{-n}$

02	Section	Q. No.												
		Marks												

प्र. क्र. Q. No.

$$= 1 + \frac{nt}{\theta} + \frac{t}{2!}\frac{n(n+1)}{\theta^2} + \frac{t}{3!}\frac{n(n+1)(n+2)}{\theta^3} + \frac{t}{4!}\frac{n(n+1)(n+2)(n+3)}{\theta^4} + \ldots$$

Now ~~the~~ first four raw moments are

$\mu_1' =$ coefficient of $\frac{t}{1!} = \frac{n}{\theta} =$ mean

$\mu_2' =$ coefficient of $\frac{t}{2!} = \frac{n(n+1)}{\theta^2}$

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$\mu_3' =$ coefficient of $\frac{t}{3!} = \frac{n(n+1)(n+2)}{\theta^3}$

$\mu_4' =$ coefficient of $\frac{t}{4!} = \frac{n(n+1)(n+2)(n+3)}{\theta^4}$

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प्र. क्र.
Q. No.

Q.1] Define Gamma Distribution with Parameter θ, n. hence find it's mean & variance.

Q.2] Derive an Expression for mgf of Gamma Dist^n. hence find 1^{st} 4 Raw Moments.

* Solutions :-

Q.1] Gamma Distribution :-

A Continuous Random variable x taking Non-Negative values is said to be follows Gamma Dist^n with scale Parameter θ and shape Parameter n, then it's Pdf is Given by,

$$f(x) = \begin{cases} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} & ; x \geq 0, \; n, \theta > 0 \\ 0 & ; o.w \end{cases}$$

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02	Section	Q. No.											
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प्र. क्र. Q. No.

* Mean And Variance of Gamma Dist^n...

If $X \sim G(\theta, n)$, then it's Pdf is Given By,

$$f(x) = \begin{cases} \dfrac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} & ; \ x \geq 0, \ n, \theta > 0 \\ 0 & ; \ o.\omega \end{cases}$$

Now, By Defination of Mean is,

$$E(X) = \int_{-\infty}^{\infty} x\, f(x)\, dx$$

$$= \int_{0}^{\infty} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} . x \, dx$$

$$= \frac{\theta^n}{\Gamma n} \int_{0}^{\infty} e^{-\theta x} x^{n-1} . x^1 \, dx$$

$$= \frac{\theta^n}{\Gamma n} \int_{0}^{\infty} e^{-\theta x} x^{(n+1)-1} \, dx$$

$$= \frac{\theta^n}{\Gamma n} \frac{\Gamma n+1}{\theta^{n+1}} \quad \text{— By Def}^n \text{ of Gamma Function}$$

$$= \frac{\cancel{\theta^n}}{\cancel{\Gamma n}} \frac{n \cancel{\Gamma n}}{\cancel{\theta^n} . \theta^1} = \frac{n}{\theta}$$

Q. No. Marks

$\therefore$ E

Now,

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Marks												

$$\therefore \boxed{E(x) = mean = \frac{n}{\theta}}$$

Now,
$$E(x^2) = \int_{-\infty}^{\infty} x^2 f(x)\,dx$$

$$= \int_0^{\infty} x^2 \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^{\infty} e^{-\theta x} x^{(n+2)-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \frac{\Gamma n+2}{\theta^{n+2}}$$

$$= \frac{\theta^n}{\Gamma n} \frac{(n+1)\Gamma n+1}{\theta^n \cdot \theta^2}$$

$$= \frac{\cancel{\theta^n}(n+1)\, n\cancel{\Gamma n}}{\cancel{\Gamma n}\,\cancel{\theta^n}\,\theta^2}$$

$$\therefore \boxed{E(x^2) = \frac{n(n+1)}{\theta^2}}$$

We know that,

$$Var(x) = E(x^2) - [E(x)]^2$$

$$= \frac{n(n+1)}{\theta^2} - \left[\frac{n}{\theta}\right]^2$$

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		Marks											

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Q. No.

$$= \frac{n(n+1)}{\theta^2} - \frac{n^2}{\theta^2}$$

$$= \frac{\cancel{n^2}+n-\cancel{n^2}}{\theta^2}$$

$$\boxed{V(X) = \frac{n}{\theta^2}}$$

$\therefore$ Mean $= \frac{n}{\theta}$ And Variance $= \frac{n}{\theta^2}$

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which is the solution..

Q.2] Mgf of $G(\theta, n)$

If $X \sim G(\theta, n)$, then it's Pdf is Given by,

$$f(x) = \begin{cases} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} & ; x \geq 0, \\ & \quad n, \theta > 0 \\ 0 & ; \text{o.w} \end{cases}$$

By Defination of MgF is,

$$M_X(t) = E[e^{tx}] = \int_0^\infty e^{tx} f(x)\, dx$$

Godane Poonam Sachin

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Q. No.

$$= \int_0^\infty e^{tx} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty e^{-(\theta - t)x} x^{n-1} dx$$

$$= \frac{\theta^n}{\cancel{\Gamma n}} \cdot \frac{\cancel{\Gamma n}}{(\theta - t)^n}$$

$$= \left(\frac{\theta}{\theta - t}\right)^n$$

$$= \left(\frac{1}{1 - t/\theta}\right)^n$$

$$= \left(1 - \frac{t}{\theta}\right)^{-n}$$

$$\therefore \boxed{M_x(t) = \left(1 - \frac{t}{\theta}\right)^{-n}}$$

Now Expanding $M_x(t)$ in terms of t. We Get first four Raw moments.

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$$M_x(t) = 1 + \frac{nt}{\theta} + \frac{n(n+1)}{2!}\left(\frac{t}{\theta}\right)^2 + \frac{n(n+1)(}{3!}$$

$$\left(\frac{t}{\theta}\right)^3 + \frac{n(n+1)(n+2)(n+3)}{4!}\left(\frac{t}{\theta}\right)^4 +$$

$$= 1 + \frac{t}{1!}\left(\frac{n}{\theta}\right) + \frac{t^2}{2!}\left(\frac{n(n+1)}{\theta^2}\right) + \frac{t^3}{3!}\left(\frac{n(n+1)(}{\theta^3}\right.$$

$$+ \frac{t^4}{4!}\left(\frac{n(n+1)(n+2)(n+3)}{\theta^4}\right) + \cdots$$

Now the Raw moments is,

$\mu_r' =$ Coefficient of $\frac{t^r}{r!}$ in $M_x(t)$

$\therefore$

$\mu_1' =$ Coefficient of $\frac{t^1}{1!}$ $= \boxed{\frac{n}{\theta}}$ = Mean

$\mu_2' =$ coefficient of $\frac{t^2}{2!}$ in $M_x(t) = \boxed{\frac{n(n+1)}{\theta^2}}$

$\mu_3' =$ coefficient of $\frac{t^3}{3!}$ in $M_x(t) =$

$$\boxed{\mu_3' = \frac{n(n+1)(n+2)}{\theta^3}}$$

$\mu_4' =$ coefficient of $\frac{t^4}{4!}$ in $M_x(t) =$

Q. No. | | | | | | | | | | | | 03
Marks

$$\mu_4' = \frac{n(n+1)(n+2)(n+3)}{\theta^4}$$

which is the Raw moments of Gamma Distribution with Parameter θ, n.

Hence, which is the Solution ...

Name :- Sakshi . D. Sakhedkar.   Date :- 14/2/26

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20/20

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Suppliment No. :	
	46683
Centre	VCK

प्र. क्र. Q. No.	
Q.1	Define Gamma Distribution with parameter (θ, n). Hence Find it's mean & variance.
Q.2.	Derive an expression for mgf of $G(\theta,n)$. Hence, find first 4 raw moments.

Sol^n:

Q.1 Def^n :- A continous random variable X is taking non-negative values is said to follow gamma distribution with scale parameter θ & shape parameter n then it's pdf is given as,

$$\therefore \cancel{f(x)} = \begin{cases} \dfrac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} dx & ; \theta, n \geq 0, x \geq 0 \\ 0 & ; \text{o.w.} \end{cases}$$

Denoted as $X \sim G(\theta, n)$

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प्र. क.
Q. No.

By def^n of mean,

$$\text{Mean} = E(X) = \int_0^\infty x \cdot f(x)\,dx$$

$$= \int_0^\infty x \cdot \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty x e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty e^{-\theta x} x^{(n+1)-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \cdot \frac{\Gamma n+1}{\theta^{n+1}}$$

$$= \frac{\cancel{\theta^n}}{\cancel{\Gamma n}} \frac{n \cancel{\Gamma n}}{\cancel{\theta^n} \cdot \theta}$$

$$\therefore \boxed{E(X) = \frac{n}{\theta}}$$

Now, $E(X^2) = \int_0^\infty x^2 f(x)\,dx$

$$= \int_0^\infty x^2 \cdot \frac{\theta^n}{\Gamma n} \cdot e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty e^{-\theta x} x^{(n+2)-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \cdot \frac{\Gamma n+2}{\theta^{n+2}}$$

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$$= \frac{\theta^n}{\Gamma n} \cdot \frac{(n+1)\Gamma n+1}{\theta^n \cdot \theta^2}$$

$$= \frac{\cancel{\theta^n}}{\cancel{\Gamma n}} \cdot \frac{(n+1)\, n \cancel{\Gamma n}}{\cancel{\theta^n} \cdot \theta^2}$$

$$\therefore \boxed{E(X^2) = \frac{n(n+1)}{\theta^2}}$$

Now, $Var(X) = E(X^2) - [E(X)]^2$

$$= \frac{n(n+1)}{\theta^2} - \left(\frac{n}{\theta}\right)^2$$

$$= \frac{\cancel{n^2} + n - \cancel{n^2}}{\theta^2}$$

$$\therefore \boxed{Var(X) = \frac{n}{\theta^2}}$$

Thus, if $X \sim G(\theta, n)$ then its mean $= E(X) = \frac{n}{\theta}$ &

10

variance $= Var(X) = \frac{n}{\theta^2}$

Q. 2 Mgf of $G(\theta, n)$:-

If $X \sim G(\theta, n)$ then it's pdf is,

$$f(x) = \begin{cases} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1} dx & ; x, n, \theta \geq 0 \\ 0 & ; o.w. \end{cases}$$

04	Section	Q. No.										
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प्र. क्र. Q. No.

By def^n of mgf,

$$M_X(t) = E(e^{tx})$$

$$= \int_0^\infty e^{tx} f(x)\,dx$$

$$= \int_0^\infty e^{tx} \frac{\theta^n}{\Gamma n} e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \cdot \int_0^\infty e^{tx} \cdot e^{-\theta x} x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \int_0^\infty e^{-(\theta-t)x} \cdot x^{n-1}\,dx$$

$$= \frac{\theta^n}{\Gamma n} \cdot \frac{\Gamma n}{(\theta-t)^n}$$

$$= \frac{\theta^n}{\cancel{\Gamma n}} \cdot \frac{\cancel{\Gamma n}}{(\theta-t)^n}$$

$$= \left[\frac{\theta}{(\theta-t)}\right]^n$$

$$= \left[\frac{1}{\left(\frac{\theta-t}{\theta}\right)^n}\right]$$

$$\boxed{M_X(t) = \left(1 - \frac{t}{\theta}\right)^{-n}}$$

which is the mgf of $G(\theta, n)$

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प्र. क्र. Q. No.

To find raw moments using mgf.

We know that $M_x(t) = \left(1 - \frac{t}{\theta}\right)^{-n}$

By expansion of $M_x(t)$,

$$M_x(t) = 1 + \frac{n}{1!}\left(\frac{t}{\theta}\right) + \frac{n(n+1)}{2!}\left(\frac{t}{\theta}\right)^2 + \frac{n(n+1)(n+2)}{3!}\left(\frac{t}{\theta}\right)^3 + \frac{n(n+1)(n+2)(n+3)}{4!}\left(\frac{t}{\theta}\right)^4 + \dots$$

$$\boxed{M_x(t) = 1 + \frac{n}{\theta}\left(\frac{t}{1!}\right) + \frac{n(n+1)}{\theta^2}\cdot\left(\frac{t^2}{2!}\right) + \frac{n(n+1)(n+2)}{\theta^3}\cdot\left(\frac{t^3}{3!}\right) + \frac{n(n+1)(n+2)(n+3)}{\theta^4}\cdot\left(\frac{t^4}{4!}\right) + \dots}$$

To find r^{th} raw moments,

$\therefore$ ~~$M_x(t)$~~, $\mu_r' =$ coefficient of $\frac{t^r}{r!}$ in expansion of $M_x(t)$

Now, to find first 4 raw moments,
Put, $r = 1, 2, 3, 4$,

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Q. No.

① $r = 1$, $\mu_1' = \frac{n}{\theta}$ = (Mean)

② $r = 2$, $\mu_2' = \frac{n(n+1)}{\theta^2}$

③ $r = 3$, $\mu_3' = \frac{n(n+1)(n+2)}{\theta^3}$

④ $r = 4$, $\mu_4' = \frac{n(n+1)(n+2)(n+3)}{\theta^4}$

10 Thus, are the first 4 raw moments

Absharke

10/10

VIVEKANAND COLLEGE, KOLHAPUR (An Empowered Autonomous Institute)

B.Sc. Part- I (Statistics) (Sem-I)

Unit Test

Course Name: Descriptive Statistics I

Paper I

Date: 15/10/2025 Marks : 10

Name of the Student Siddhi Bajirao patil

Q. 1. Select correct alternative

i) Data collected from government publications, journals, or previous research is called

A) Primary data B) Secondary data

C) Qualitative data D) Interval data

ii) If every observation is multiplied by a constant K, then mean is multiplied by ________.

A) K^2 B) K

C) 1/K D) None of these

iii) G.M. of ratio of two series is equal to ________ of their G.M.'s.

A) Ratio B) Product

C) Sum D) Difference

iv) Percentiles divide the data into ________ equal parts.

A) 100 B) 10

C) 4 D) 50

v) Mean deviation is minimum when it is taken from …..

A) Mean B) Median

C) Mode D) None of these

vi) The variance of the observations 7,7,7,7,7 is…..

A) 7 B) 49

C) 1 D) 0

vii) If $\beta_2 = 3$, the distribution is:

A) Platykurtic B) Mesokurtic

C) Leptokurtic D) Symmetric

viii) Bowley's coefficient of skewness is based on:

A) Quartiles B) Moments

C) Mean and S. D. D) Median only

ix) The sum of absolute deviations of observations taken from median is always …

A) zero B) one C) minimum D) maximum

x) Histogram can be used to locate ……

A) median B) mean C) mode D) All of these

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B.Sc. Part- I (Statistics) (Sem-I)

Unit Test

Course Name: Descriptive Statistics I

Paper I

9/10 Ashwin

Date: 15/10/2025 Marks : 10

Name of the Student Sakshi A. Patil

Q. 1. Select correct alternative

i) Data collected from government publications, journals, or previous research is called

A) Primary data B) Secondary data

C) Qualitative data D) Interval data

ii) If every observation is multiplied by a constant K, then mean is multiplied by ________.

A) K^2 B) K

C) 1/K D) None of these

iii) G.M. of ratio of two series is equal to ________ of their G.M.'s.

A) Ratio B) Product

C) Sum D) Difference

iv) Percentiles divide the data into ________ equal parts.

A) 100 B) 10

C) 4 D) 50

v) Mean deviation is minimum when it is taken from …..

A) Mean B) Median

C) Mode D) None of these

vi) The variance of the observations 7,7,7,7,7 is…..

A) 7 B) 49

C) 1 D) 0

vii) If $\beta_2 = 3$, the distribution is:

A) Platykurtic B) Mesokurtic

C) Leptokurtic D) Symmetric

viii) Bowley's coefficient of skewness is based on:

A) Quartiles B) Moments

C) Mean and S. D. D) Median only

ix) The sum of absolute deviations of observations taken from median is always …

A) zero B) one C) minimum D) maximum

x) Histogram can be used to locate ……

A) median B) mean C) mode D) All of these

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B.Sc. Part- I (Statistics) (Sem-I)

Unit Test

Course Name: Elementary Probability Theory

Paper II

10/10

Day: 16/10/2025 Marks : 10

Name Of the Student : Avdhoot P. Thikane

Q. Select correct alternative

i) The set of all possible outcomes of a random experiment is called
A) Event B) Trial
C) Sample Space D) Random Variable

ii) If A is subset of B then P(B|A) =...
A) P(A) B) P(B)/P(A)
C) P(B) D) 1

iii) If the sample space contains 4 sample points, then its power set contains....elements.
A) 4 B) 8
C) 16 D) Noneo of these

iv) If A and B are two events such that $A \subset B$ then
A) $P(A) = P(B)$ B) $P(A) \geq P(B)$
C) $P(A) > P(B)$ D) $P(A) \leq P(B)$

v) If A and B are any two independent events defined on sample space with P(A) =0.2 and P(B) = 0.4 then $P(A \cap B^C)$ = ...
A) 0.2 B) 0.4
C) 0.08 D) None of these

vi) If F(x) is a c.d.f. of a random variable X then $F(\infty)$ =
A) 1 B) ∞
C) 0 D) None of these

vii) If X is a discrete random variable with the following p.m.f

X	1	2	3	4
P(x)	0.4	0.3	0.1	0.2

Then the median is
A) 1 B) 2
C) 3 D) 4

viii) Which of the following is true in case of mean of a random variable X?
A) E(X) B) E(X-E(X))
C) $E(X^2)$ D) None of these

ix) Expected value of a constant is ________
A) constant B) zero C) one D) none of these

x) Probability of an impossible event is......
A) 0 B) 1 C) -1 D) None of these

VIVEKANAND COLLEGE, KOLHAPUR (An Empowered Autonomous Institute)

B.Sc. Part- I (Statistics) (Sem-I)

Unit Test

Course Name: Elementary Probability Theory

Paper II

9/10

Day: 16/10/2025 Marks : 10

Name Of the Student : Samiksha A. Patil

Q. Select correct alternative

i) The set of all possible outcomes of a random experiment is called

A) Event B) Trial

C) Sample Space D) Random Variable

ii) If A is subset of B then $P(B|A) = \ldots$

A) P(A) B) P(B)/P(A)

C) P(B) D) 1

iii) If the sample space contains 4 sample points, then its power set contains….elements.

A) 4 B) 8

C) 16 D) Noneo of these

iv) If A and B are two events such that $A \subset B$ then

A) $P(A) = P(B)$ B) $P(A) \geq P(B)$

C) $P(A) > P(B)$ D) $P(A) \leq P(B)$

v) If A and B are any two independent events defined on sample space with P(A) =0.2 and P(B) = 0.4 then $P(A \cap B^C) = \ldots$

A) 0.2 B) 0.4

C) 0.08 D) None of these

vi) If F(x) is a c.d.f. of a random variable X then $F(\infty) =$

A) 1 B) ∞

C) 0 D) None of these

vii) If X is a discrete random variable with the following p.m.f

X	1	2	3	4
P(x)	0.4	0.3	0.1	0.2

Then the median is

A) 1 B) 2

C) 3 D) 4

viii) Which of the following is true in case of mean of a random variable X?

A) E(X) B) E(X-E(X))

C) $E(X^2)$ D) None of these

ix) Expected value of a constant is ________

A) constant B) zero C) one D) none of these

x) Probability of an impossible event is……

A) 0 B) 1 C) -1 D) None of these

VIVEKANAND COLLEGE, KOLHAPUR (An Empowered Autonomous Institute)

B.Sc. Part- I (Statistics) (Sem-II)
Unit Test
Course Name: Descriptive Statistics II
Paper III

$\frac{8}{10}$

Date: 13/02/2026 Marks : 10

Name of the Student Kartik B. Magdum.

Q1 Select the most correct alternative (10 Marks)

1) If $\text{cov}(x,y) = 50$, $\text{cov}(10x + 10, 5y + 5)$ is ____
   i) 200 ii) 50 iii) 65 iv) 2500
2) The limits of Karl Pearson's coefficient of correlation are
   i) -1 and 0 ii) 0 and 1
   iii) -1 and 1 iv) 0 and ∞
3) The Spearman's Rank correlation coefficients lies between
   i) -1 and 0 ii) 0 and ∞
   iii) -1 and +1 iv) $-\infty$ and ∞
4) If correlation coefficient is +1, then the scatter diagram is _____
   i) A rising straight line ii) A falling straight line
   iii) a horizontal straight line iv) None of these
5) If the correlation coefficient is very close to zero, then the scatter diagram is _____
   i) A rising straight line ii) A falling straight line
   iii) a horizontal straight line iv) None of these
6) If the correlation coefficient between x and Y is -0.65, then the correlation coefficient between $4+2X$ and $3Y + 1$ is _____
   i) 0.65 ii) 0.35 iii) -0.65 iv) -0.35
7) If X, Y are uncorrelated variables, then $V(X-Y)$ is _____
   i) $V(X) + V(Y)$
   ii) $V(X) - v(Y)$
   iii) $V(X) + V(Y) - 2COV(X,Y)$
   iv) $V(X) + V(Y) + 2COV(X,Y)$
8) Karl Pearson's coefficient of correlation between x and Y is _____
   i) independent of change of origin
   ii) independent of change of scale
   iii) both (a) and (b)
   iv) None of these
9) If the two coefficients of regression are 0.9 and 0.4 then the coefficient of correlation is
   i) 0.9 ii) 0.4 iii) 0.6 iv) 0.8
10) coefficient of correlation is ____ between the coefficient of regression.
   i) Arithmetic Mean ii) Harmonic Mean
   iii) Geometric Mean iv) None of these

VIVEKANAND COLLEGE, KOLHAPUR (An Empowered Autonomous Institute)

B.Sc. Part- I (Statistics) (Sem-II)

Unit Test

Course Name: Descriptive Statistics II

Paper III

5/10 ABhn

Date: 13/02/2026

Marks : 10

Name of the Student Sandhya D. Sutar

Q1 Select the most correct alternative (10 Marks)

1) If cov(x,y) = 50, cov(10x + 10, 5y + 5) is ____
   i) 200 ii) 50 iii) 65 iv) 2500
2) The limits of Karl Pearson's coefficient of correlation are
   i) -1 and 0 ii) 0 and 1
   iii) -1 and 1 iv) 0 and ∞
3) The Spearman's Rank correlation coefficients lies between
   i) -1 and 0 ii) 0 and ∞
   iii) -1 and +1 iv) - ∞ and ∞
4) If correlation coefficient is +1, then the scatter diagram is _____
   i) A rising straight line ii) A falling straight line
   iii) a horizontal straight line iv) None of these
5) If the correlation coefficient is very close to zero, then the scatter diagram is _____
   i) A rising straight line ii) A falling straight line
   iii) a horizontal straight line iv) None of these
6) If the correlation coefficient between x and Y is -0.65, then the correlation coefficient between 4+2X and 3Y + 1 is _____
   i) 0.65 ii)0.35 iii) -0.65 iv) -0.35
7) If X, Y are uncorrelated variables, then V(X-Y) is _____
   i) V(X) + V(Y)
   ii) V(X) – v(Y)
   iii) V(X) + V(Y) -2COV(X,Y)
   iv) V(X) + V(Y) + 2COV(X,Y)
8) Karl Pearson's coefficient of correlation between x and Y is _____
   i) independent of change of origin
   ii) independent of change of scale
   iii) both (a) and (b)
   iv) None of these
9) If the two coefficients of regression are 0.9 and 0.4 then the coefficient of correlation is
   i) 0.9 ii) 0.4 iii) 0.6 iv) 0.8
10) coefficient of correlation is ____ between the coefficient of regression.
   i) Arithmetic Mean ii) Harmonic Mean
   iii) Geometric Mean iv) None of these