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### COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2011

Roll	Number

## **STATISTICS**

		LOWE		ART	-I MCQs)	30 MINU	JTES S & 30 M	INITES				/ARKS: 20 /ARKS: 80
	кее п ГЕ: (i)	Firs	st attem		ART-I (MCQ							
	(ii) (iii) (iv)	Ove Stat	tistical	Table	tting of the o es will be pro e calculator i	ovided if r	equired.	not be g	iven c	eredit.		
					(PART	-I MCQs)	(COMPL	JLSORY	<u>)</u>			
Q.1.	Sele	ect the b	est opt	ion/ar	swer and fill	in the app	copriate bo	ox on the	Answ	er Sheet	. (1	1 x 20=20)
(i)	The n	nean of	X, follo	owing	a Binomial d	istribution	with para	meter n a	nd p i	s	variance o	f x.
	(a) E	Equal to	the	(b)	Less than th	ie (c)	Greater	than the				
	(d) E	Equal to	the squ	are ro	oot of the	(e)	None of	these				
(ii)	$(A \cap A)$	$B) \cup (A)$	$\cap B')=$									
	(a) A	A		(b)	В	(c)	A'		(d)	B'	(e)	None of these
(iii)	and C		en abou	ut the	g a vacancy of same chance	-				•		as B, and B are the chance
	(a)	1		(b)	$\frac{2}{9}$	(c)	$\frac{1}{3}$		(d)	4	(e)	None of thes
		$\frac{1}{2}$			9		3			9		
(iv)	0.21, and w	the prob vife will cogram?	ability watch	that tl that T	he wife will v V program is	vatch that '	<mark>FV pro</mark> gra at is the pr	<mark>m is</mark> 0.28	and t that a	h <mark>e pr</mark> oba t least or	bility that ie of them	<b>FV</b> program is both husband will watch tha None of thes
$(\mathbf{v})$				. ,								None of thes
(v)		t probab			ake the functi tion is:	011, f(x, y)	$) - \kappa x y = 10$	IX – 1, 2,	5 and	1 y — 1, 2	2, 3	
	(a)	1		(b)	1	(c)	$\frac{1}{2}$		(d)	$\frac{1}{36}$	(e)	None of these
	Ģ	$\frac{1}{9}$			$\frac{1}{3}$		$\overline{2}$			36		
(vi)					sity function y < 1/2 =	of X and Y	is given	by $f(x, y)$	)=2	for x>0	and y>0 ar	nd zero
	(a)	$\frac{1}{2}$		(b)	$\frac{1}{4}$	(c)	$\frac{3}{4}$		(d)	$\frac{2}{3}$	(e)	None of thes
(vii)	If V(x	x)=19 th	en V(2	x –5)	=							
	(a) 1	9		(b)	38	(c)	33		(d)	76	(e)	None of these
(viii)					ession betwe Given that z =				d the	regressio	on fitted be	etween
	(a)	$\beta_4 = \beta_2$				(b)	$\beta_4 = (3$	$(2)\beta_2$				
	(c)	$B_4 = (2/$	$(3)\beta_2$			(d)	$\beta_4 = (3)$ $\beta_4 = 4\mu$	$B_2$			(e)	None of these

Page 1 of 4

# **STATISTICS**

normality and must hold. (a) Consistency (b) Unbiasedness (c) Homogeneity of population variables (d) Efficient estimators (e) None of these (x) In traditional sampling theory the finite population correction factor is denoted by (a) $(N - n)/(N - 1)$ (b) $(N - n)/N$ (c) $N(N - 1)$ (c) $N(N - 1)$ (e) None of these (x) A random sample of size n is drawn from a population following exponential distribution with probability density function, $f(x) = \frac{1}{\lambda} e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator $d$ is given by (a) $\overline{x}$ (b) $1/\overline{x}$ (c) $\frac{n}{\sum_{i=1}^{n} x_i}$ (d) $\frac{n}{\sum_{i=1}^{n} x_i^2}$ (c) None of these (xii) An estimator $\hat{d}$ is said to be consistent if (a) $E(\hat{q}) - \theta$ (b) $E(\hat{q}) - V(\hat{\theta})$ (c) $V(\hat{q}) \rightarrow 0$ as $n \rightarrow \infty$ (d) $V(\hat{q}) - [E(\hat{\theta})]^2$ (e) None of these (xiii) If b is constant and the moment generating function of x is $M_+(1)$ then $M_{+,b}(1) =$ (a) $M_+(1)$ (b) $M(b)$ (c) $M(0) + b$ (d) $e^{bt} M_{-x}(1)$ (c) None of these (xiii) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between two variables x is distributed normality. N(105, 50) (d) N(105, 36) (e) None of these (x) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between $2 = x + b$ and $w = x - 4 $ will be equal to (a) $(a + bd)r$ (b) $(acbd)r$ (c) $r = r_{x}r_{x}i/\sqrt{\sqrt{1-r_{x}^{2}}}$ (c) $(r_{x} - r_{x})/\sqrt{\sqrt{(1-r_{x}^{2})}}$ (b) $(r_{x} - r_{x}r_{x}i)/\sqrt{\sqrt{1-r_{x}^{2}}}$ (c) $(r_{x} - r_{x})/\sqrt{\sqrt{(1-r_{x}^{2})}}$ (b) $(r_{x} - r_{x}r_{x}i)/\sqrt{\sqrt{1-r_{x}^{2}}}$ (c) $(r_{x} - r_{x})/\sqrt{\sqrt{1-r_{x}^{2}}}\sqrt{\sqrt{1-r_{x}^{2}}}$ (d) $(r_{x} - r_{x})/\sqrt{\sqrt{(1-r_{x}^{2})}}\sqrt{\sqrt{1-r_{x}^{2}}}$ (e) None of these (xvi) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be- (a) $x + r' r!$ (b) $t^{P} r' (c) t^{P} (d) t^{P} (d) r^{P} (e) None of these (xvi) A ssume that$				•	f variance to test th	he equ	ality of mear	is, thre	e con	ditions nan	nely, ind	lependence,
(c) Homogeneity of population variances (d) Efficient estimators (c) None of these (x) In traditional sampling theory the finite population correction factor is denoted by (a) $(N - n)/(N - 1)$ (b) $(N - n)/N$ (c) $N(N - 1)$ (c) None of these (xi) A random sample of size n is drawn from a population following exponential distribution with probability density function, $f(x) = \frac{1}{4}e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator of $\lambda$ is given by (a) $\frac{x}{x}$ (b) $1/\overline{x}$ (c) $\frac{n}{\sum i} x_i$ (d) $\frac{n}{\sum i = 1} x_i^2$ (e) None of these (xii) An estimator $\hat{b}$ is said to be consistent if (a) $E(\hat{\phi}) = 0$ (b) $E(\hat{\phi}) = V(\hat{\phi})$ (c) $V(\hat{\phi}) \rightarrow 0$ as $n \rightarrow \infty$ (d) $V(\hat{\phi}) = [E(\hat{\phi})]^{1}$ (e) None of these (xiii) If b is constant and the moment generating function of x is M, (t) then $M_{i,et}(t) =$ (a) $M_i(t)$ (b) $M_i(bt)$ (c) $M_i(t) + b$ (d) $e^{br} M_{i,t}(t)$ (e) None of these (xiii) If the random variable x is distributed normally, N(105,36) then $w = (x - 105)/6$ will follow a normal distribution. (a) N(105,1) (b) N(0,1) (c) N(105,0) (d) N(105,36) (e) None of these (xv) Assuming x, y and z are three variables, then using the usual notations, the partial correlation coefficient. $R_{m,i}$ is given by (a) $(r_m - r_m)/\sqrt{\sqrt{(1-r_m)}} \sqrt{(1-r_m)} \left[ (b) (r_m - r_m r_m)/\sqrt{(1-r_m)} \right]$ (e) None of these (xvi) A stock may result in profit of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these (viii) While expanding the moment generating function the coefficient of correlation to efficient. $R_{m,i}$ is given by (a) $(r_m - r_m)/\sqrt{(1-r_m)} \sqrt{(1-r_m)} \left] (b) (r_m - r_m r_m)/\sqrt{(1-r_m)} (c) N(10-r_m) (d) (ac)r+bd (e) None of these (viii) A stock may result in profit of $1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) $1.0 (b) $0.4 (c) $0.25 (d) $0.1 (e) None of these (viii) While expanding the mo$			-									
(x) In traditional sampling theory the finite population correction factor is denoted by (a) $(N - n)'(N - 1)$ (b) $(N - n)/N$ (c) $N/(N - 1)$ (d) $n'(N - 1)$ (e) None of these (xi) A random sample of size n is drawn from a population following exponential distribution with probability density function, $f(x) = \frac{1}{\lambda} e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator of $\lambda$ is given by (a) $\frac{1}{x}$ (b) $1/\overline{x}$ (c) $\prod_{x=1}^{n} x_i$ (d) $\prod_{i=1}^{n} x_i^2$ (e) None of these (xiii) An estimator $\hat{\theta}$ is said to be consistent if (a) $E(\hat{\theta}) = \theta$ (b) $E(\hat{\theta}) = V(\hat{\theta})$ (c) $V(\hat{\theta}) \rightarrow 0$ as $n \rightarrow \infty$ (d) $V(\hat{\theta}) = [E(\hat{\theta})]^2$ (e) None of these (xiii) If b is constant and the moment generating function of x is M, (t) then $M_{xib}(0) =$ (a) $M_x(1)$ (b) $M_x(bh)$ (c) $M_x(1) + b$ (d) $e^{br}M_{xib}(0) =$ (a) $M_x(1)$ (b) $N(0, 1)$ (c) $N(105, 6)$ (d) $N(105, 36)$ (e) None of these (xiv) If the random variable x is distributed normally, N(105, 36) then $w = (x - 105)^{26}$ will follow a normal distribution. (a) $N(105, 1)$ (b) $N(0, 1)$ (c) $N(105, 6)$ (d) $N(105, 36)$ (e) None of these (xv) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between $x = ax - b$ and $w - cy - d$ will be equal to (a) $(ac+bd)r$ (b) $(acbd)r$ (c) $r$ (d) $(ac)r+bd$ (e) None of these (xvi) A stock may result in profit of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) $51.0$ (b) $50.4$ (c) $50.25$ (d) $50.1$ (e) None of these (viii) A stock may result in profit of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) $51.0$ (b) $50.4$ (c) $50.25$ (d) $50.1$ (e) None of these (viii) While expanding the moment generating function the coefficient of $\mu_i^r$ (signen by (a) $r_r^r r_1$ (b) $r^r r_r$ (c) $r^r$ (d) $r_1t^r$ (c) None of these (xii) A souce that x and y are two independent random variables then th			•	. ,		(d)	Efficient e	etimato	vrc		(e)	None of these
(a) $(N - n)/(N - 1)$ (b) $(N - n)/N$ (c) $N/(N - 1)$ (c) $N(n - 1)$ (e) None of these (xi) A random sample of size n is drawn from a population following exponential distribution with probability density function, $f(x) = \frac{1}{\lambda} e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator of $\lambda$ is given by (a) $\frac{\pi}{x}$ (b) $1/\overline{x}$ (c) $\frac{n}{x} x_i$ (d) $\frac{n}{x} x_i^2$ (e) None of these $\sum_{i=1}^{r} x_i$ (d) $\sum_{i=1}^{n} x_i^2$ (e) None of these (xii) An estimator $\hat{\partial}$ is said to be consistent if (a) $E(\hat{\theta}) = \theta$ (b) $E(\hat{\theta}) = V(\hat{\theta})$ (c) $V(\hat{\theta}) \to 0$ as $n \to \infty$ (d) $V(\hat{\theta}) = [E(\hat{\theta})^{\text{B}}$ (e) None of these (xiii) If b is constant and the moment generating function of x is $M_x$ (t) then $M_{x,tb}$ (t) = (a) $M_x(t)$ (b) $M_x$ (b) (c) $M_x(t) + b$ (d) $e^{bt}M_x(t)$ (e) None of these (xiv) If the random variable x is distributed normally, N(105,36) then $w = (x - 105)/6$ will follow a normal distribution, (a) N (105, 1) (b) N (0, 1) (c) N (105, 6) (d) N (105, 36) (e) None of these (xv) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between $z = ax + b$ and $w = cy+d$ will be equal to (a) $(ac+bd)r$ (b) $(acbd)r$ (c) $r$ (c) $r$ (d) $(ac)r+bd$ (e) None of these (xvi) Assuming x, y and z are three variables, then using the usual notations, the partial correlation coefficient, $R_{xx,i}$ is given by (a) $(r_x - r_x)/\sqrt{(1-r_x^2)} \sqrt{(1-r_x^2)}$ (b) $(r_x - r_x r_x)/\sqrt{1-r_x^2}$ (c) $(r_x - r_x)/\sqrt{(1-r_x^2)} \sqrt{(1-r_x^2)}$ (c) None of these (xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) $s0.4$ (c) $$0.25$ (d) $$0.1$ (c) None of these (xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) $r/r_r$ (c) $r^r$ (d) $r_1^{t}r$ (e) None of these (xvii) A suck may are two i			<b>.</b>			. ,				oted hy		None of these
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(xi) A random sample of size n is drawn from a population following exponential distribution with probability density function, $f(x) = \frac{1}{x} e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator of $\lambda$ is given by (a) $\overline{x}$ (b) $1/\overline{x}$ (c) $\frac{n}{\sum x_i}$ (d) $\frac{n}{\sum x_i^2}$ (e) None of these $\sum_{i=1}^{n} x_i^i$ (d) $\frac{n}{\sum i=1} x_i^2$ (e) None of these (xii) An estimator $\hat{\theta}$ is said to be consistent if (a) $E(\hat{\theta}) = \theta$ (b) $E(\hat{\theta}) = V(\hat{\theta})$ (c) $V(\hat{\theta}) \rightarrow 0$ as $n \rightarrow \infty$ (d) $V(\hat{\theta}) = [E(\hat{\theta})]^2$ (e) None of these (xiii) If b is constant and the moment generating function of x is $M_x$ (t) then $M_{xih}$ (t) = (a) $M_x$ (t) (b) $M_x$ (b) (c) $M_x$ (i) + b (d) $e^{bt} M_x$ (t) (e) None of these (xiii) If the random variable x is distributed normally, N(105,36) then w = (x - 105)/6 will follow a normal distribution, (a) N (105, 1) (b) N (0, 1) (c) N (105, 6) (d) N (105, 36) (e) None of these (xv) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between $z = ax+b$ and $w = cy+d$ will be equal to (a) $(ac+bd)r$ (b) $(acbd)r$ (c) $r$ (d) $(ac)r+bd$ (e) None of these (xvi) Assuming $x_i$ y and $z$ are three variables, then using the usual notations, the partial correlation coefficient, $R_{oxi}$ is given by (a) $(r_{oy} - r_{xy})/\sqrt[3]{\sqrt{1-r_{oy}^2}}$ (b) $(r_{oy} - r_{xy}r_{oy})/\sqrt{1-r_{oy}^2}$ (c) $(r_{oy} - r_{xy})/\sqrt[3]{\sqrt{1-r_{oy}^2}}\sqrt[3]{\sqrt{1-r_{oy}^2}}$ ] (d) $(r_{xy} - r_{xy}r_{yy})/[\sqrt[3]{\sqrt{1-r_{oy}^2}}\sqrt[3]{\sqrt{1-r_{oy}^2}}$ ] (e) None of these (xvii) Assuming x, vand z are three variables then using the usual notations, the partial correlation coefficient, $R_{oxi}$ is given by (a) $(r_{oy} - r_{xy}r_{yy})/[\sqrt[3]{\sqrt{1-r_{oy}^2}}}$ ] (b) $(r_{xy} - r_{xy}r_{xy})/[\sqrt[3]{\sqrt{1-r_{oy}^2}}}$ (c) $(r_{yy} - r_{xy}r_{yy})/[\sqrt[3]{\sqrt{1-r_{oy}^2}}\sqrt[3]{\sqrt{1-r_{oy}^2}}}$ (c) None of these (xiii) Astock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the averag											(a)	No. of those
density function, $f(x) = \frac{1}{\lambda} e^{-x/\lambda}$ , for x>0. Then the maximum likelihood estimator of $\lambda$ is given by (a) $\frac{1}{x}$ (b) $1/\overline{x}$ (c) $\frac{n}{\sum_{i=1}^{n} x_i^i}$ (d) $\frac{n}{i=1} x_i^2$ (e) None of these $\sum_{i=1}^{n} x_i^i$ (i) $\frac{n}{i=1} x_i^i$ (e) None of these (xii) An estimator $\hat{\theta}$ is said to be consistent if (a) $E(\hat{\theta}) = \theta$ (b) $E(\hat{\theta}) = V(\hat{\theta})$ (c) $V(\hat{\theta}) \to 0$ as $n \to \infty$ (d) $V(\hat{\theta}) = [E(\hat{\theta})]^2$ (e) None of these (xiii) If b is constant and the moment generating function of x is $M_x(1)$ then $M_{x+\hat{\theta}}(1) =$ (a) $M_x(1)$ (b) $M_x(b)$ (c) $M_x(1) + b$ (d) $e^{bt}M_{x-t}(0)$ (e) None of these (xiv) If the random variable x is distributed normally, N(105,36) then $w = (x - 105)/6$ will follow a normal distribution, (a) N(105, 1) (b) N(0, 1) (c) N(105, 6) (d) N(105, 36) (e) None of these (xiv) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between $z = ax+b$ and $w = cy-d$ will be equal to (a) $(ac+bd)r$ (b) $(acbd)r$ (c) r (d) $(ac)r+bd$ (e) None of these (xvi) Assuming x, y and z are three variables, then using the usual notations, the partial correlation coefficient, $R_{w,x}$ is given by (a) $(r_w - r_w)/(\sqrt{1-r_w^2})\sqrt{1-r_w^2})$ (b) $(r_w - r_w r_w)/(\sqrt{1-r_y^2})$ (c) $(r_w - r_w)/(\sqrt{1-r_w^2})\sqrt{1-r_w^2})$ (b) $(r_w - r_w r_w)/(\sqrt{1-r_w^2})$ (d) $(r_w - r_w r_w)/(\sqrt{1-r_w^2})\sqrt{1-r_w^2})$ (c) None of these (xvi) Assuming x, y and z are three variables of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) $t'/r_1$ (b) $t'/r$ (c) $t'$ (d) $r_1t'$ (e) None of these (xii) Assume that x and y are two independent random variables then the V(xy) is equal to (a) $xy$ (b) zero (c) $x/y$ (d) $x+y$ (e) None of these (xii) If A and B are two independent variables then the conditional probability $P(B A) =$				· ·			· · · ·		- 4.	· · · · · · · · · · · · · · · · · · ·		
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(xv) If the coefficient of correlation between two variables x and y is given by r, then the coefficient of correlation between z = ax+b and w=cy+d will be equal to (a) (ac+bd)r (b) (acbd)r (c) r (d) (ac)r+bd (e) None of these (xvi) Assuming x, y and z are three variables, then using the usual notations, the partial correlation coefficient, $R_{xy,z}$ is given by (a) $(r_{xy} - r_{xz})/\sqrt{(1 - r_{xy}^2)}$ (b) $(r_{xy} - r_{xz}r_{yz})/\sqrt{1 - r_{xy}^2}$ (c) $(r_{xy} - r_{xz})/[[\sqrt{1 - r_{xy}^2}]\sqrt{(1 - r_{yz}^2)}]$ (d) $(r_{xy} - r_{xz}r_{yz})/[[\sqrt{1 - r_{xz}^2}]\sqrt{(1 - r_{yz}^2)}]$ (e) None of these (xvii; A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these (xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^{P}/r$ (b) $t^{P}/r$ (c) $t^{P}$ (d) $r!t^{P}$ (e) None of these (xii) Assume that x and y are two independent random variables then the V(xy) is equal to (a) $xy$ (b) zero (c) $x/y$ (d) $x+y$ (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$			,	(b)	N (0, 1)	(c)	N (105, 6)	(	d) ]	N (105, 36)	(e)	None of these
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(xvi) Assuming x, y and z are three variables, then using the usual notations, the partial correlation coefficient, $R_{xy,z}$ is given by (a) $(r_{xy} - r_{xz})/\sqrt{\sqrt{(1 - r_{xy}^2)}}$ (b) $(r_{xy} - r_{xz}r_{yz})/\sqrt{1 - r_{xy}^2}$ (c) $(r_{xy} - r_{xz})/[(\sqrt{1 - r_{xz}^2})(\sqrt{1 - r_{yz}^2})]$ (d) $(r_{xy} - r_{xz}r_{yz})/[(\sqrt{1 - r_{xz}^2})(\sqrt{1 - r_{yz}^2})]$ (e) None of these (xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (c) None of these (xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^r/r!$ (b) $t^r/r$ (c) $t^r$ (d) $r!t^r$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) xy (b) zero (c) $x/y$ (d) $x+y$ (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$		bety	ween z = ax+b an	nd w=c	cy+d will be equal	l to						
$R_{xy,z} \text{ is given by}$ (a) $(r_{xy} - r_{xz})/\sqrt{(1 - r_{xy}^2)}$ (b) $(r_{xy} - r_{xz}r_{yz})/\sqrt{1 - r_{xy}^2}$ (c) $(r_{xy} - r_{xz})/[\sqrt{(1 - r_{xy}^2)}\sqrt{(1 - r_{yz}^2)}]$ (e) None of these (d) $(r_{xy} - r_{xz}r_{yz})/[(\sqrt{1 - r_{xz}^2})\sqrt{(1 - r_{yz}^2)}]$ (e) None of these (xvii A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these (xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^{P}/r!$ (b) $t^{P}/r$ (c) $t^{P}$ (d) $r!t^{P}$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) $xy$ (b) zero (c) $x/y$ (d) $x+y$ (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$										`´´		
(c) $(r_{xy} - r_{xz})/[(\sqrt{1 - r_{xy}^2})(\sqrt{1 - r_{yz}^2})]$ (d) $(r_{xy} - r_{xz}r_{yz})/[(\sqrt{1 - r_{xz}^2})(\sqrt{1 - r_{yz}^2})]$ (e) None of these (xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^r/r$ (b) $t^r/r$ (c) $t^r$ (d) $r!t^r$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) $xy$ (b) zero (c) $x/y$ (d) $x+y$ (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$	(xvi)			are th	ree variables, ther	ı using	g the usual no	tations	s, the	partial corr	elation	coefficient,
(a) $(r_{xy} - r_{xz}r_{yz})/[(\sqrt{1 - r_{xz}^2})(\sqrt{1 - r_{yz}^2})]$ (e) None of these (xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these (a) \$1.0 (b) $t^{r}/r$ (c) $t^{r}$ (d) $r!t^{r}$ (e) None of these (xviii) While expanding the moment generating function the coefficient of $\mu'_{r}$ is given by (a) $t^{r}/r!$ (b) $t^{r}/r$ (c) $t^{r}$ (d) $r!t^{r}$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) $xy$ (b) $zero$ (c) $x/y$ (d) $x+y$ (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$		(a)	$(r_{xy} - r_{xz}) / \sqrt{(1 - r_{xz})} $	$-r_{xy}^2$ )		(b)	$(r_{xy} - r_{xz}r_{yz})$	$)/\sqrt{1-}$	$-r_{xy}^2$			
(xvii) A stock may result in profit of \$1, loss of \$1 or breakeven (no gain no loss) with respective probabilities 0.4, 0.3 and 0.3 then the average profit will be (a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^r/r!$ (b) $t^r/r$ (c) $t^r$ (d) $r!t^r$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) xy (b) zero (c) x/y (d) x+y (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$		(c)	$(r_{xy} - r_{xz})/[\sqrt{1-}]$	$-r_{xy}^2\Big)$	$\sqrt{1-r_{yz}^2}$							
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(a) \$1.0 (b) \$0.4 (c) \$0.25 (d) \$0.1 (e) None of these xviii) While expanding the moment generating function the coefficient of $\mu'_r$ is given by (a) $t^r/r!$ (b) $t^r/r$ (c) $t^r$ (d) $r!t^r$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) xy (b) zero (c) x/y (d) x+y (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$			•	-		or bre	eakeven (no g	gain no	) loss)	with respe	ctive pr	obabilities 0.4,
(a) $t^{r}/r!$ (b) $t^{r}/r$ (c) $t^{r}$ (d) $r!t^{r}$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) xy (b) zero (c) x/y (d) x+y (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$		(a)	\$1.0	(b)	\$0.4	(c)	\$0.25		(d)	\$0.1	(e)	None of these
(a) $t^{r}/r!$ (b) $t^{r}/r$ (c) $t^{r}$ (d) $r!t^{r}$ (e) None of these (xix) Assume that x and y are two independent random variables then the V(xy) is equal to (a) xy (b) zero (c) x/y (d) x+y (e) None of these (xx) If A and B are two independent variables then the conditional probability $P(B A) =$	xviii)	Wh	ile expanding the	e mom	ent generating fur	nction	the coefficie	nt of $\mu$	<i>ı',</i> is gi	iven by		
(a) xy (b) zero (c) x/y (d) x+y (e) None of these $(xx)$ If A and B are two independent variables then the conditional probability $P(B A) =$		(a)	$t^r/r!$	(b)	$t^{r}/r$	(c)	$t^{r}$		(d)	r!t <sup>r</sup>	(e)	None of these
(xx) If A and B are two independent variables then the conditional probability $P(B A) =$	(xix)	Ass	sume that x and y	are tv	wo independent rai	، ndom	variables the	n the V	/(xy)	is equal to		
		(a)	ху	(b)	zero	(c)	x/y		(d)	x+y	(e)	None of these
	(xx)	If A	A and B are two in	ndeper	ndent variables the	en the	conditional r	orobabi	lity I	P(B A) =		
							<i>.</i> .				(e)	None of these

## **STATISTICS**

PART-II

NOT	E:(i) (ii) (iii)	Atter Extr	mpt AN	Y FIV		ions fr	om PA	RT-II.	All que			UAL mai vill not be		
Q.2.	(a)	Differentiate between independent, dependent and mutually exclusive events. Give a for each type of event.										one exa	ample ( <b>06</b> )	
	<b>(b)</b>		-	pment of 10 TV sets includes three that are defective. A store dealer purchases four TV andomly. Find: (06)										V (06)
		(i)	Proba	bility o	of getting	g exact	ly two c	lefectiv	e TV se	ets;				
		( <b>ii</b> )	Proba	bility o	of getting	at lea	st one d	efectiv	e TV se	t.				
	( <b>c</b> )	phon and c	e set is coloured	0.86 ar l mobil	nd 0.35, 1 e phone	espect set is (	ively. F ).29. A	urther family	the prob from thi	ability t is city is	hat the fa	ck or colou mily has b randomly, s.	ooth bla	ıck
Q.3.	(a)	<ul> <li>A delicate surgical operation is quite successful and the probability of its failure is 0.005. What is the probability that among next 1000 patients, having this surgical operation, (04 + 04)</li> <li>(i) Exactly five will not survive?</li> <li>(ii) At least two will not survive?</li> </ul>												
	<b>(b</b> )	Let x	, a rand	om vai	riable sho	owing	the num	ber of	calls arr	riving at	a telepho	ne exchan	ige duri	ing a
		speci	ific time	period	l, follow	s a pro	bability	distrib	oution gi	ven by f	$f(\mathbf{x}) = \frac{e^{-\lambda}}{x}$	$\frac{\lambda^x}{\lambda^x}$ for x =	= 0, 1, 2	2,
												ance of x.		
													4 + 02	í.
Q.4.	(a)	a nor	mal dist	tributio	on with p	robabi	lity den	sit <mark>y f</mark> ui		of a spe	cific type	of tube li	ght foll	.ows
		f(x)	$=\frac{1}{\sqrt{2\pi c}}$	$=e^{-\frac{1}{2\sigma^2}}$	$(x-\mu)^2$ , $W_1$	here –	$\infty < x < \infty$	o.						
		(i)	Show	that f(	x) is a pr	obabil	ity dens	ity fun	cti <mark>on</mark> .					<mark>(04</mark> )
		( <b>ii</b> )	Deter	mine n	naximum	likelil	nood es	timator	s of $\mu$ a	and $\sigma^2$ .				(06)
	(b)	1000 from	hours of the pro	of operation	ation bef	ore rec l testec	uiring s d. It was	service. s found	Twenty that thr	y productive of the	ets were so em require	will sustain elected ran ed service	ndomly	,
Q.5.	severe provid condu	headad les, on cted an ving tal d	che patio average d patien	ents. T , early its with	he comp recovery	any Al than t neadac	BC has he exist he were	annour ing me admin	ced that dicine E	t their m ExMed. '	edicine na To test the	early reco amed, Nev eir claim a n random	wMed a study	
		(i)		ne data						vel of si	gnificance	e, to accep	ot the cl	laim ( <b>06</b> )
		( <b>ii</b> )	Const	ruct a 9	90% con	fidence	e interva	al for $\mu$	New Mad	$\mu_{_{F_{X}Mod}}$ ,	and com	ment on th	ne resul	t.
		. /								LA MEU				(06)
		( <b>iii</b> )	Const	ruct a 9	99% con	fidence	e interva	al for c	$\sigma^2_{NewMed}$ a	nd com	ment on th	he finding		

(04)

### **STATISTICS**

- **Q.6.** (a) Considering the simple linear regression model,  $y_i = \beta_1 + \beta_2 x_i + e_i$ , for i = 1, 2, ..., n, state assumptions and derive least square estimators of the  $\beta_1$  and  $\beta_2$ . (02 + 06)
  - (b) Following table shows the income and saving of seven families residing at a specific locality.

Income (I) 9 11 13 15 17 19 21  
Saving (S) 5 6 9 11 12 14 15  
(i) Fit a regression model, 
$$\hat{S}_i = \hat{\beta}_1 + \hat{\beta}_2 I_i$$
 for  $i = 1, 2, ..., 7$ .

- (ii) Test the hypothesis  $H_0: \beta_2 = 1$  against  $H_0: \beta_2 < 1$  at 5% level of significance. (03)
- **Q.7.** (a) Assume that a random sample of size n is drawn from a population of size N. the population is further assumed to have a mean  $\mu$  and variance  $\sigma^2$ . Prove that,  $V(\bar{y}) = \frac{\sigma^2}{n} \left(\frac{N-n}{N}\right)$ .
  - (b) Draw all possible samples of size 3, without replacement, from the population: 12, 9, 15, 9 and 21 and prove that  $E(\bar{y}) = \mu$  (08)
- Q.8. (a) A study was conducted to establish relationship between the nature of crime and educational facilities available. The study was based on 291 respondents and the number of respondents found involved in various types of crimes were recorded as given below. Data collected during the study is also given below: (08)

	Nature of Crime					
Education Level	Low	Medium	High			
Low	17	22	47			
Medium	12	15	22			
High	32	21	14			
Very High	45	33	11			

Could it be concluded, at 1% level of significance, that there exists a significant association between the availability of education facility and nature of crime?

(b) A study was conducted to compare the lifespan of three types of batteries. Fifteen batteries, five of each type, were selected randomly from the production line and observed till they expired. Their lifespans, as recorded, are given below: (08)

Battery Type							
А	В	С					
23	23	54					
34	22	56					
44	21	55					
45	23	67					
44	34	65					

Test the hypothesis,  $H_0: \mu_A = \mu_B = \mu_C$  at 5% level of significance.

#### **Q.9.** Write short notes on the following topics:

- (a) Role of statistics in highlighting socio-economic problems of a society.
- (b) Comparison and advantages of Stratified and Systematic sampling schemes.
- (c) Partial and Multiple regression and correlations.
- (d) Importance of hypothesis testing in real life situations.

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(04 + 04 + 04 + 04 = 16)

(05)

(08)