

Seat No. : _____

AA-113

April-2018

S.Y. M.B.A. Integrated, Sem.-IV

Business Statistics

Time : 3 Hours]

[Max. Marks : 100

- Instruction :** (1) Non-prg. scientific calculator can be used.
(2) Statistical table will be provided on request.

1. Attempt Any **two** :

20

1. The screws produced by a certain machine were checked by examining samples of 128 when each sample contained 7 items. The following table shows the distributions of 128 samples according to the number of defective items they contained.

No. of defectives in one sample of 7 items	0	1	2	3	4	5	6	7
No. of samples	7	6	19	35	30	23	7	1

Fit a binomial distribution and find the expected frequencies if the chance of the machine being defective is $\frac{1}{2}$. Find the mean and variance of the fitted distribution.

2. M/s. R.K. Verma company having a large number of employees on its roll records that over a period of time, the average absentee rate is 3 workers per shift. Calculate the probability that on a given shift.
- (a) Exactly 2 workers will be absent.
(b) More than 4 workers will be absent.
(c) At least 3 workers will be absent.
3. A company produces and ships 16 personal computers knowing that 4 of them have defective wiring. The company that purchased the computers is going to thoroughly test three of the computers. The purchasing company can detect the defective wiring. What is the probability that the purchasing company will find the following ?
- (a) No defective computers
(b) Exactly three defective computers
(c) Two or more defective computers
(d) One or fewer defective computer

2. Attempt Any **two** :

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1. The weekly wages of 2000 workmen are normally distributed with mean wage of ₹ 70 and wage standard deviation of ₹ 5. Estimate the number of workers whose weekly wages are
 - (a) between ₹ 70 and ₹ 71
 - (b) between ₹ 69 and ₹ 73 more than ₹ 72 and
 - (c) Less than ₹ 70. Also estimate the lowest weekly wages of the 100 highest paid workers.
2. The average fill volume of a regular Can of soft drink is 12 ounces. Suppose the fill volume of these Cans ranges from 11.97 to 12.03 ounces and is uniformly distributed. What is the height of this distribution ? What is the probability that a randomly selected Can contains more than 12.01 ounces of fluid ? What is the probability that the fill volume is between 11.98 and 12.01 ounces ?
3. During the summer at a small private airport in western Nebraska, the unscheduled arrival of airplanes is Poisson distributed with an average arrival rate of 1.12 planes per hour.
 - (a) What is the average inter arrival time between planes ?
 - (b) What is the probability that at least 2 hours will elapse between plane arrivals ?
 - (c) What is the probability of two planes arriving less than 10 minutes apart ?

3. (A) Attempt Any **two**.

10

1. Calculate the coefficient of correlation and find its probable error from the following data :

X	7	6	5	4	3	2	1
Y	18	16	14	12	10	6	8

2. The value of Spearman's rank correlation coefficient for certain pairs of number of observations was found to be $\frac{2}{3}$. The sum of squares of the difference between corresponding ranks was 55. Find the number of pairs.
3. Obtain the coefficient of correlation between price of rice and rainfall from the data given below by means of concurrent deviations.

Year	Price of Rice (in ₹)	Annual rainfall in cm.	Year	Price of Rice (in ₹)	Annual rainfall in cm.
2005	175	315	2011	196	353
2006	160	340	2012	190	333
2007	158	350	2013	191	390
2008	200	350	2014	195	340
2009	198	330	2015	196	380
2010	195	335	2016	204	340

- (B) Calculate Karl Pearson's Coefficient of correlation from the data given below. **10**

		Persons Employed						
		10-14	15-19	20-24	25-29	30-34	35-39	Total
Power Consumed in units	50-59	5	7	-	-	-	-	12
	60-69	10	4	5	-	-	-	19
	70-79	-	2	6	3	-	-	11
	80-89	-	-	3	8	5	-	18
	90-99	-	-	-	3	6	2	11
	100-109	-	-	-	-	3	1	4
	Total	15	13	16	14	14	3	75

4. Attempt any **two** : **20**

1. The following data give the experience of machine operators and their performance ratings as given by the number of good parts turned out per 100 pieces :

Operator	1	2	3	4	5	6	7	8
Experience (in years) (X)	16	12	18	4	3	10	5	12
Performance Ratings (Y)	87	88	89	68	78	80	75	83

Calculate the regression line of performance ratings on experience and estimate the probable performance if an operator has 7 and 20 years of experience.

2. The equations of two regression lines between two variable are expressed as $2x - 3y = 0$ and $4y - 5x - 8 = 0$.
- (1) Identify which of the two can be called regression of y on x , and of x on y .
- (2) Find \bar{x} and \bar{y} .
- (3) Correlation coefficient (r) from the equations.
3. The following results were worked out from scores in Statistics and Mathematics in a certain examination :

	Scores in Statistics (X)	Scores in Mathematics (Y)
Mean	39.5	47.5
Standard Deviation	10.8	17.8
Karl Pearson's Correlation coefficient between X and Y = +0.42		

Find both the regression lines. Use these regressions and estimate the value of Y for $X = 50$ and also estimate value of X for $Y = 30$.

5. Attempt any **two** :

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- (1) The sales of a company (in thousands of rupees) for the years 2011 to 2017 are given in the following table.

Year	2011	2012	2013	2014	2015	2016	2017
Sales ('000 ₹)	32	47	65	92	132	190	275

Fit the exponential trend equation $= ab^x$, to the given data and estimate the sales for 2020.

- (2) The ruling prices of standard gold in ₹ Per 10 gm are given below for the first 15 days of a recent month. Using a 4-day moving average, estimate the trend in gold price.

4350	4360	4370	4350	4360	4370	4370	4360
4350	4340	4330	4350	4350	4360	4360	

- (3) Apply method of link relatives to the following data and calculate seasonal indices.

Quarter	2011	2012	2013	2014	2015
I	6.0	5.4	6.8	7.2	6.6
II	6.5	7.9	6.5	5.8	7.3
III	7.8	8.4	9.3	7.5	8.0
IV	8.7	7.3	6.4	8.5	7.1
