INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examinations - June/July 2019

M. Tech. (Marine Engineering and Management)

Semester-I

Statistics for Business Managers

(PG13T1106)

Date :25.06.2019 **Maximum Marks: 100**

Time: 3Hrs **Pass Marks: 50**

Note: Answer any five questions.
All questions carry equal marks.

(5 X 20 Marks = 100)

1 (a) Derive the Moment Generating function of Binomial distribution. Hence find the first three moments of Binomial distribution.

(8)

(b) The mean monthly salary paid to all employees in a certain company was rupees 500/- . The mean monthly salaries paid to male and female employees were 520 and 420 rupees respectively. Obtain the percentage of male to female employees in the company.

(7)

(c) Prove that for a given set of observations the sum of the squares of deviations is the minimum, when deviations are taken from the arithmetic mean. (5)

2. (a) State and prove the Multiplicative Theorem of probability.

(6)

(b) A candidate applies for a job in 3 firms X,Y,Z. In firm X there are 4 applicants, in firm Y there are 7 and in firm Z there are 5. The candidates have equal qualifications. What is the probability that he will be selected by at least one of the firms?

(7)

(c) In a normal distribution 31% items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
[Given $\Phi(-0.496) = 0.31$ and $\Phi(1.405) = 0.92$;
where $\Phi(t) = \int_{-\infty}^{t} \frac{e^{\frac{-t^2}{2}}}{\sqrt{2\pi}}$]

(7)

3(a) Eleven Navy personnel were given a test in sailing. They were given a month's further training and a second test of equal difficulty was held at the end of it. Do the marks give evidence that the Navy personals have benefitted by the extra training?

Boys	1	2	3	4	5	6	7	8	9	10	11
Test I Marks	23	20	19	21	18	20	18	17	23	16	19
Test II	24	19	22	18	20	22	20	20	23	20	17

Marks											

(You may use the fact that at 5% value of t for 10 degrees of freedom is 2.228).

(10)

(b) The following figures show the distribution of digits in numbers chosen at random from a telephone directory:

Digits	0	1	2	3	4	5	6	7	8	9	Total
Frequency	1026	1107	997	996	1075	933	1107	972	964	853	10,000

Test whether the digits may be taken to occur equally frequently in the directory. (Given χ^2 = 16.919 for 9 d.f)

(10)

4. (a) Briefly describe two types of probabilistic sampling schemes and give some business applications in each case.

(8)

(b) Construct the sampling distributions of sample means for the following population when random samples of size two are drawn from it with replacement . Also find mean and standard error of sample mean.

Population unit :	1	2	3	4
Observation :	12	14	16	18

(7)

(c) A company makes ice-creams and sells it in 500 grms packs. Periodically a sample is taken to check whether, on an average, each pack contains 500 gms. A sample of 16 packs is taken and sample mean is found to be 480 gms ans a standard deviation of 30 gms. Does the sample differ significantly from the intended weight of 500 gms? [Given t at 5% for 15 d.f = 2.131] (5)

5. (a) The following table shows the test scores made by 10 salesmen on an intelligence test and their weekly sales:

Salesmen	1	2	3	4	5	6	7	8	9	10
Test Scores	50	70	50	60	80	50	90	50	60	60
Sales (`000rs.)	25	60	45	50	45	20	55	30	45	30

Calculate the Rank correlation coefficient between intelligence and efficiency in salesmanship.

(10)

(b) The following table gives the sample psychological health rating of executives in the Public Sector, Private Sector and Foreign

Departments.

	Psychological Health Rating				
Public	71	75	62	73	64
Private	84	79	72	76	73
Foeign	91	84	72	79	86

Using analysis of variance, test whether psychological health of executives of three sectors are equal or not.

[$F_{0.05;2,12} = 3.89$, $F_{0.01;2,12} = 6.93$]

(10)

6 (a) State the properties of Regression Coefficient and prove any two important properties of Regression coefficient

(10)

(b) The profits y (Rs.lakh) of a certain company in the X th year of its life are given by

X	1	2	3	4	5
Y	2.18	2.44	2.78	3.25	3.83

Fit a second degree parabola $y = a + bx + cx$ to the data.

(10)

7. (a) Fit a linear trend to the following figures and estimate imports for the year 1964.Values of Imports into India (in suitable units)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Value	159	179	184	194	200	210	219	208	241

(10)

(b) Using the method of single exponential smoothing estimate demand for 2009. Take smoothing coefficient $\alpha = 0.2$.

YEAR	2011	2012	2013	2014	2015	2016	2017	2018
DEMAND	280	267	275	291	288	295	285	278

(10)

8.(a) Define the following terms (any three):

a.1 Null Hypothesis
a.2 Type one error
a.3 Components of time series
a.4 Two person zero sum game
a.5 Dominance property

(6)

b) Consider a game having the following payoff matrix. Determine

whether it has a saddle point. If it does, determine the optimum strategy for each player according to the minimax criterion and find the value of the game.

	Player B			
Player A		B_1	B_2	B_3
	A_1	0	-4	-2
	A_2	3	-5	1
	A_3	-2	-1	6
	A_4	1	0	4

(6)

(C) The demand for a seasonal product is given below :

Demand	40	45	50	55	60	65
Probability	0.10	0.20	0.30	0.25	0.10	0.05

The product costs Rs.60 per unit and sells at Rs.80 per unit. If the units are not sold within the season, they will have no market value.

(i) Determine the optimum number of units to be produced.

(ii) Calculate EVPI and interpret it.

(8)

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