21/3/16 OP3AGE SYBA

Time : 2 ½ hours. Stats III Max.Marks : 75

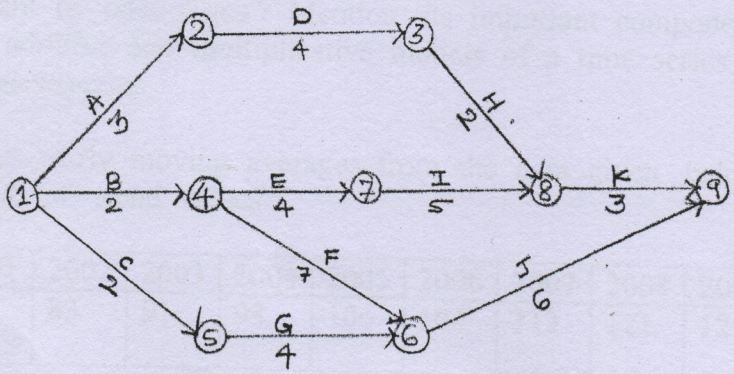
Note : 1) All questions are compulsory
2)Attempt any two sub questions out of four in question numbers 1,2 & 3
3) Attempt any three sub questions out of four in question number 4.
4) Graph papers will be provided on request.
5) Calculators are allowed .
6) Figures to the right indicate marks.

Q.1

a) What is network analysis and what are its objectives? (10)

b) What is a float ? What are the different types of floats? (10)

c) For the following PERT diagram :- (10)



(i) Compute earliest event time and latest event time.
(ii) Critical path and total project duration.
(iii) Total , free and independent float for each activity.

d) A project has the following characteristics :- (10)

	Time	Estimates	(in weeks)
Events	optimistic	Most likely	Pessimistic
1-2	2	2	14
1-3	2	8	14
1-4	4	4	16
2-5	2	2	2
3-5	4	10	28
4-6	4	10	16
5-6	6	12	30
6-7	2	4	6

i) Draw the PERT network diagram.
ii) Find the critical path .

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iii) What is the expected project completion time ?
iv) What is the probability that the project is completed in 40 weeks?

Q.2

a) What is a sample survey ? In what respect is it superior to a census survey ? (10)

b) (i) What are the different sources of errors in a sample survey ? (10)
(ii) Explain the lottery method of drawing a random sample.

c) In selecting three units with simple random sampling without replacement from a population having 5 units with the values 1,5,8,12 and 15. Show that the sample mean is an unbiased estimator of the population mean enumerating all possible samples . (10)

d) Consider a population of four units with values 3,4,5 and 6. Write down all possible samples of size 2 (with replacement) from the given population units and verify whether the sample mean is an unbiassed estimator of the population mean (10)

Q.3

a) What is meant by time-series ? Mention its important components . Explain the additive and multiplicative models of a time series stating clearly the assumptions. (10)

b) Calculate four yearly moving averages from the data given below and plot the graph of trend values . (10)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Export (in '00s)	75	83	91	98	106	104	113	121	125

c) The following figures are the production data of a certain factory manufacturing air – conditions .:- (10)

Year:-	1990	1991	1992	1993	1994	1995	1996
Production in '00 units	17	20	19	26	24	40	35

Fit the second degree parabolic trend curve and estimate the production for the year 1997.

d) Using the ratio to trend method , determine the quarterly seasonal indices from the following data :- (10)

year	I^{st} quarter	II^{nd} quarter	III^{rd} quarter	IV^{th} quarter
1.	65	60	61	63
2.	70	58	56	60
3.	68	63	68	67
4.	65	59	56	62
5.	60	55	51	58

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Q.4

a) i) Draw the network diagram .
ii) Find critical path and project completion time. (5)

Activity	Preceeding Activity	Time (days)
A	-	4
B	A	3
C	A	5
D	B	1
E	B & C	2
F	D & E	2
G	E	3

b) Write a short note on :- (5)
(p)Stratified random sampling .
(q) Systematic sampling .

c) Following are the random numbers of two digits each is provided to the field investigator :- (5)

35, 97, 61, 85, 49, 78, 50, 02, 27, 13.

How should he use these numbers to make a random selection of 5 plots out of 40 plots.?

d) Below are given the figures of production (in thousand tons) of a sugar factory :- (5)

Year :-	1999	2000	2001	2002	2003	2004	2005
Production :-	77	88	94	85	91	98	90

Fit a straight line by the method of least squares . Estimate the trend for the year 2006.