Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16, NEP 2020 (Autonomous)

End Semester Examination: MAR / APR 2025

***Total No. of Questions**: 4/18* ***Total No. of Pages**:02*

SECOND YEAR (B.Sc.)
STA24203: Statistical Methods
(Semester IV)

Program: B.ScGen03 **Credits:** 2
Program Specific: B.Sc. General **Time:** 2 Hours
Course Type: DSC **Max. Marks: 30**
Paper: STA24203 **SET: A**

Instructions to the candidate:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw a well labelled diagram wherever necessary.*
4) *Use of Statistical calculator is allowed.*

Q1) Answer the following (Any 5): **[5 X 1= 5]**

a) State the formula of Paasche's price index number.
b) Define Vital Statistics.
c) Define Secular Trend
d) What is traffic density in a queuing model?
e) State any one limitation of index number of simple aggregate method.
f) Define: Index Number

Q2) Answer the following (Any 5): **[5 X 2 =10]**

a) State the models of time series with assumptions.
b) I) Define: Infant mortality rate.
II) The number of live births and number of deaths of children under one year of age in certain city in the certain year are reported as Number of births= 4721 and Number of deaths = 101. Calculate infant mortality rate.
c) At a certain petrol pump, customers arrive in a Poisson process with mean arrival time of 5 minutes (λ). The service time per customer is exponential with mean 10 minute (μ). Then
i) What would be the average queue length?
ii) What is the probability that an arriving customer can go directly to the space in front of the petrol filling station?
d) Define crude birth rate and standardized birth rate.
e) Splice the two series together as to give a continuous series with base year 2013:

Year	2010	2011	2012	2013	2014	2015	2016
Series A	100	125	140	160	-	-	-
Series B	-	-	-	100	130	150	170

f) For a departmental store, if arrival rate (λ) = 20 per hour and service rate (μ) =24 per hour, obtain the expected waiting time of customer in the system.
g) Explain the term :
i) Calling population
ii) Queuing discipline

Q3) Answer the following (Any 2): **[2 X 5 = 10]**

a) Explain the seasonal variation and cyclic variation.

b) Define a queuing model and explain the fundamental structure of it.

c) The female population and live births with age of mother in 1979 of a country are given below:

Age groups (Years)	Female population (in Lakhs)	Live births (in '000s)
15-19	1.16	1.05
20-24	1.13	1.70
25-29	1.03	1.25
30-34	0.93	0.71
35-39	0.74	0.35
40-44	0.68	0.11

Calculate General Fertility Rate (G.F.R) and Age Specific Fertility Rates (A.S.F.R.) for above data.

Q4) Answer the following (Any 1): **[1X 5 = 5]**

a) For the following data, calculate index number by Fisher's formula:

Commodity	Base year quantity	Base year price	Current year quantity	Current year price
A	12	10	15	12
B	15	7	20	5
C	24	5	20	9
D	5	16	5	14

b) For the following time series, compute 3-yearly moving averages:

t	1	2	3	4	5	6	7	8	9	10
$\mathbf{Y_t}$	31	37	39	41	41	39	33	29	27	29

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