PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION MAY 2025
(Third Semester)

Branch- STATISTICS

DEMOGRAPHIC TECHNIQUES

Time: Three Hours   Maximum: 75 Marks

SECTION-A (10 Marks)
Answer ALL questions
ALL questions carry EQUAL marks   (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The Demographic Transition Theory explains changes in which of the following over time? (a) Economic growth (b) Fertility and mortality rates (c) Migration patterns (d) Cultural practices	K1	CO1
	2	Neonatal Mortality Rate (NMR) refers to the number of deaths of infants during: (a) The first year of life (b) The first 6 months of life (c) The first 28 days of life (d) The first 24 hours of life	K2	CO2
2	3	Which of the following life table measures is most directly used to calculate survival probability? (a) l_x (b) L_x (c) q_x (d) T_x	K1	CO1
	4	The mathematical expression for Gompertz's law of mortality is typically written as: (a) $\mu(x) = A + Bx$ (b) $\mu(x) = A.x^2$ (c) $\mu(x) = A + B.e^{Cx}$ (d) $\mu(x) = A.e^{Bx}$	K2	CO2
3	5	The relationship between GFR and ASFR can be described as: (a) GFR is the sum of all ASFRs across different age groups (b) GFR is a specific age-group ASFR (c) GFR is the weighted average of all ASFRs (d) GFR is an age-adjusted measure of ASFR	K1	CO2
	6	In Dandekar's modified models, which of the following best describes how fertility is treated? (a) As a deterministic process (b) As a stochastic process (c) As a constant function over time (d) As an age-dependent function	K2	CO2
4	7	Migration rates are often expressed per: (a) 10,000 people (b) 100,000 people (c) 1,000 people (d) 100 people	K1	CO1
	8	Which assumption is made in both the Leslie matrix and Frejka's component method of projection? (a) Fertility rates increase over time (b) The total population remains constant over time (c) Mortality rates decrease with age (d) Constant fertility and mortality rates over the projection Period	K2	CO1
5	9	Which equation describes the death process in demographic models? (a) $\frac{dP(t)}{dt} = \mu P(t)$ (b) $\frac{dP(t)}{dt} = -\mu P(t)$ (c) $\frac{dP(t)}{dt} = \lambda P(t)$ (d) $\frac{dP(t)}{dt} = \lambda P(t) - \mu P(t)$	K2	CO1
	10	In a population governed by a birth-death-migration model, extinction is certain if: (a) $\mu > \lambda + m$ (b) $\lambda > \mu + m$ (c) $m > \lambda + \mu$ (d) $\mu = \lambda$	K1	CO2

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks   (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Elaborate the details of demographic transition theory.	K5	CO3
		(OR)		
	11.b.	Explain the following: (i) Infant mortality (ii) Neo-natal mortality (iii) Parinatal mortality	K5	CO3
2	12.a.	What is the sampling distribution of life table functions, and why is it important in demographic studies?	K1	CO1
		(OR)		
	12.b.	Illustrate the Makeham's and Gompertz models of mortality and their application in demographic studies.	K2	CO4
3	13.a.	Calculate the general fertility rate and total fertility rate from the following data, assuming that for every 100 girls 106 boys are born. {table below}	K3	CO3
		(OR)		
	13.b.	Explain the key indices of fertility measures and discuss their uses in demographic studies.	K5	CO3
4	14.a.	A region has a population of 50,000. During a particular year, the number of incoming migrants is 3,500, and the number of outgoing migrants is 2,000. Additionally, the population decreased by 1,500 due to natural decrease (more deaths than births). Using Hamilton's rates, estimate the net migration rate.	K3	CO3
		(OR)		
	14.b.	Elaborate the details of Frejka's component method of projection.	K5	CO3
5	15.a.	Evaluate the impact of migration on birth and death processes in demographic modeling.	K5	CO4
		(OR)		
	15.b.	Illustrate the concept of extinction probability in demographic models.	K2	CO4

Table for 13.a.:

Age of Women	15-19	20-24	25-29	30-34	35-39	40-44	45-49	15-19
Number of Women	212619	198732	162800	145362	128109	106211	86753	212619
Age-SFR per 1000	98	169.6	158.2	139.7	98.6	42.8	16.9	98

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks   (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Discuss the definition, nature, and scope of demography, and highlight its significance in population studies.	K4	CO3
2	17	Fill in the blanks in a portion of life table given below: {table below}	K3	CO3
3	18	Illustrate Dandekar's modified Binomial model of fertility and its application in demographic studies.	K2	CO4
4	19	Explain the structure and function of the Leslie Matrix in demographic modeling.	K5	CO3
5	20	Illustrate the application of stochastic models in demographic studies, specifically focusing on extinction probabilities.	K2	CO4

Table for Q.17:

Age (in Years)	l_x	d_x	p_x	q_x	L_x	T_x	e_x^0
4	95000	500	-	-	-	850300	-
5	-	400	-	-	-	-	-

Z-Z-Z   END