# 2021

## STATISTICS — HONOURS — PRACTICAL

### Paper : CC-6P

### Full Marks : 30

*The figures in the margin indicate full marks.*

*Answer **all** the questions.*

1. The following data relate to the United States in 2005.

| Age group | Women in age group (midyear population) | Live births to women in age group | Female (live) births to women in age group | Proportion of female babies Surviving to midpoint of age-group |
|---|---|---|---|---|
| 15 – 19 | 10,240,239 | 414,406 | 202,230 | 0.9889 |
| 20 – 24 | 10,150,079 | 1,040,399 | 507,715 | 0.9848 |
| 25 – 29 | 9,767,524 | 1,132,293 | 552,559 | 0.9801 |
| 30 – 34 | 9,906,365 | 952,013 | 464,582 | 0.9752 |
| 35 – 39 | 10,427,161 | 483,401 | 235,900 | 0.9691 |
| 40 – 44 | 11,475,863 | 104,644 | 51,066 | 0.9600 |
| 45 – 49 | 11,372,141 | 6,546 | 3,194 | 0.9462 |

   Calculate GFR, TFR, GRR and NRR. Interpret your findings accordingly. Do you think the sex-ratio at birth is more or less constant for different ages of the mothers?  3+4+4+3+2

2. Suppose our interest is to compare the size and proportion of the Older (age 60 and above) and Oldest-Old (age 80 and above) populations in China and the United States. For this purpose, observed and projected population figures are given for the United States, China and for the entire World as shown in the following table.

| World | | | |
|---|---|---|---|
| Year | Total | Older | Oldest-Old |
| 2000 | 5,995,544,836 | 591,389,484 | 68,259,980 |
| 2010 | 6,830,906,857 | 755,327,646 | 103,181,481 |
| 2020 | 7,561,076,957 | 1,018,949,740 | 136,919,697 |
| 2030 | 8,213,573,346 | 1,355,545,346 | 190,254,664 |
| 2040 | 8,809,366,772 | 1,663,858,895 | 284,553,277 |
| 2050 | 9,297,023,938 | 1,981,995,384 | 399,466,279 |

**Please Turn Over**

| China | | | |
|---|---|---|---|
| Year | Total | Older | Oldest-Old |
| 2000 | 1,268,985,201 | 128,215,415 | 11,069,279 |
| 2010 | 1,358,722,700 | 168,804,989 | 17,654,658 |
| 2020 | 1,422,937,380 | 240,217,728 | 24,018,400 |
| 2030 | 1,432,807,130 | 341,693,798 | 35,136,698 |
| 2040 | 1,410,644,753 | 395,615,825 | 57,409,084 |
| 2050 | 1,347,624,386 | 424,395,138 | 92,505,472 |
| United States | | | |
| Year | Total | Older | Oldest Old |
| 2000 | 272,639,608 | 44,947,333 | 8,930,406 |
| 2010 | 298,026,141 | 55,623,834 | 11,227,361 |
| 2020 | 323,051,793 | 73,769,020 | 12,400,055 |
| 2030 | 347,209,212 | 87,874,783 | 18,009,972 |
| 2040 | 370,289,996 | 93,088,015 | 26,216,372 |
| 2050 | 394,240,529 | 99,459,187 | 30,200,741 |

Compute ratios of Oldest-Old population to Older population and Oldest-Old population to Total population of the three regions for the given years. Compare the changes with time for the three regions separately. Comment on the changes of the United States and China in this regard. 8

3. The following table gives the census population of a country. Fit a Logistic Curve to the given data and comment on the nature of fit. Also estimate the population of the country for the year 2030. 6

| Year | Census population (in millions) | Year | Census population (in millions) |
|---|---|---|---|
| 1800 | 6.958 | 1900 | 77.005 |
| 1810 | 8.924 | 1910 | 94.192 |
| 1820 | 10.038 | 1920 | 107.11 |
| 1830 | 13.216 | 1930 | 124.38 |
| 1840 | 18.389 | 1940 | 133.87 |
| 1850 | 24.592 | 1950 | 152.68 |
| 1860 | 33.843 | 1960 | 181.22 |
| 1870 | 39.998 | 1970 | 184.43 |
| 1880 | 52.966 | 1980 | 191.51 |
| 1890 | 64.968 | 1990 | 194.92 |

_____