A-2675
Second Year B. Com. (Sem. III) Examination
March/April - 2015
Statistics : Paper - III

Time : Hours [Total Marks : 50]

1. नीचे दिखाए गए मासिक वित्तीय आयात व्यवस्था पर अध्ययन करें.
   Fill up strictly the details of signs on your answer book.
   Name of the Examination:
   SECOND YEAR B. COM. (SEM. 3)
   Name of the Subject:
   STATISTICS : PAPER - 3
   Subject Code No.: 2 6 7 5 Section No. (1, 2,.....): Nil

2. जबल्पुर स्थित एक प्रसिद्ध दुकान गुप्ता गुप्ता व्यापारी है.

3. सालू एकमात्र वापसी शक्ति.

1. नीचे दिखाए गए मात्रिक ज्ञान आपो :

(1) \( A = \begin{bmatrix} 2 & 1 \\ -2 & 0 \\ 1 & 3 \end{bmatrix} \)

(2) \( B = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & -1 \end{bmatrix} \)

(3) \( \ell_{30} = 29,533 \) अने \( \ell_{31} = 28,182 \)

(4) \( \ell_{30} = 9000 \) अने \( P_{30} \) नी दिनम शोधे.

(5) \( \ell_{30} = 20 \) अने \( \ell_{31} = 20 \) अने \( V(x) = 2 \) अने \( V(y) = 3 \) अने \( V(x+3y+2) \) अने \( V(2x+4y) \) नी दिनम शोधे.

A-2675] 1 [Contd...
(2) નીચેના શ્રેણિઓની વસ્તુભાષા આપો:

(1) સંમત શ્રેણિક
(2) વિકર્ષ શ્રેણિક
(3) અવસ્ત શ્રેણિક
(4) અચલ શ્રેણિક.

(5) જો \( A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \) છે તો શ્રેણિક \( B \) મેળવો કે જેથી \( A^2 + 2A + B = 0 \) હય. \( \therefore \)

(6) અવસ્ત શ્રેણિકની મહત્વની નીચેના સંખ્યાઓનો ઉપયોગ કાઢો:

\[
x + y + z = 3, \ x + 2y + 3z = 6, \ 3x + y + 2z = 6
\]

અથવા

(7) જો \( A = \begin{bmatrix} -1 & 2 \\ 0 & 8 \end{bmatrix}, B = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \) અને \( AB = \begin{bmatrix} -13 & 6 \\ -40 & 8 \end{bmatrix} \) હોય, તો \( a, b, c, d \) શોધો.

(8) એક વિષ્ણુ 2 પાઈનેપલ, 3 કરી અને 4 સકરદન પર રહી છે. \( \therefore \)

(9) ગાણિતિક અપેક્ષાની વસ્તુભાષા આપો. ગાણિતિક અપેક્ષાના ગુણાત્મક પ્રકારો.

(10) એક પાસાને અંબેદી રીતે જાણવા માટે \( x \) થી જયારે એક વાર ત્યારા પાસાને \( x \) થી જયારે તે પાસાને તેની સંબંધના તે બાંધ પરની સંબંધના પ્રમાણાં છે. જો \( \) ઉપરની બાહુની સંબંધને \( x \) વચ્ચે દર્શાવીને તો \( x \) નું મધ્યક અને વિવારણની કિંમત શોધો.

(11) યદિક ગચ્છ \( x \) માટે સંબંધના વિવારણ પ્રકૃત્િયની મુખ્ય છે તો અને \( k \) તથા \( p(k) \) ગચ્છ \( x \) ના મધ્યક અને વિવારણની આસપાસની સ્થિતિ:

\[
\begin{array}{c|cccc}
\hline
x_i & -2 & -1 & 0 & 1 & 2 & 3 \\
\hline
P(x_i) & k & \frac{2}{15} & \frac{2k}{15} & \frac{4}{15} & 3k & \frac{1}{5} \\
\hline
\end{array}
\]

\( \therefore \)
(३) अ) असतत पहला चरण की आपं आयो. असतत पहला चरण को संभावना वितरण करो.

(४) अ) एक उदाहरण ३ चरण अने २ सकेह दशाए छे. तेमांधी दो दशा पहला रीते बेवामान आयो छे. वींद्रा क्षणाना प्रत्येक चरण क्षण क्षण २. २२ मूल्या क्षेत्र अने जो समतः समतोच माध्यमे क्षेत्र तो प्रत्येक सकेह क्षण क्षण क्षेत्र विभाग वृक्ष पाठी जोडको?

(५) पहला रचना रूपम संभावना वितरण नीवे मुख्य छे:

<table>
<thead>
<tr>
<th>$x_i$</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x_i)$</td>
<td>0.04</td>
<td>0.16</td>
<td>0.33</td>
<td>0.29</td>
<td>0.11</td>
<td>0.7</td>
</tr>
</tbody>
</table>

शोध: (०) $E(3x+5)$ (१) $V(2x-3)$ (२) $E(9x+9)$ अने (३) $V(5x-5)$.

(६) अ) आयुष्य क्रोड़ अटवे हुं? आयुष्य क्रोड़की रचना समजायो.

(७) अ) एक श्रेणी वस्त्री २,००,००० अने जातिप्रभाव परमाणू=52:48 छ. नीवे भाषी वर्गीय क्रोडे जनमत्र, साधो जनत्रनवर, कुल जनत्रनवर अने कुल पुन:प्रजनत्रस्थापन शोधे.
(d) નીચેની માહતી પર્વશી એ દેશોના પ્રમાણિત મૂલ્યદર શોધો અને તમારું 
મંત્ર જયારો : 

<table>
<thead>
<tr>
<th>ઉમેર નાણી</th>
<th>મૂલ્યદર હર કલક્તે</th>
<th>પ્રમાણિત પસ્તી</th>
</tr>
</thead>
<tbody>
<tr>
<td>(લાભમાં)</td>
<td>દેશ-A</td>
<td>દેશ-B</td>
</tr>
<tr>
<td>0-5</td>
<td>10.0</td>
<td>5.0</td>
</tr>
<tr>
<td>5-15</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>15-35</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>35-55</td>
<td>10.3</td>
<td>7.5</td>
</tr>
<tr>
<td>55-75</td>
<td>27.7</td>
<td>23.3</td>
</tr>
<tr>
<td>75ની વડુ</td>
<td>120.0</td>
<td>110.0</td>
</tr>
</tbody>
</table>

અધયાય

(4) (a) વસ્તીલિસિયાક આંકડાઓનો અંદાજ અને ઉપયોગિતા વિવેચન તથા તેની 
સંપન્ન્ના ધબો.

(b) નીચેના છવનાંકનને પૂર્ણ કરો : 

<table>
<thead>
<tr>
<th>x</th>
<th>$l_x$</th>
<th>$d_x$</th>
<th>$P_x$</th>
<th>$q_x$</th>
<th>$L_x$</th>
<th>$T_x$</th>
<th>$e_x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>85,000</td>
<td>500</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>47,60,000</td>
<td>?</td>
</tr>
</tbody>
</table>

(5) નીચેની માહતી પર્વશી GRR અને NRRની દ્રામતશોધી તથા પવસ્તી 
પરિસ્થિતિ અનુસાર કરો : 

<table>
<thead>
<tr>
<th>ઉમરશારણી</th>
<th>સ્થિરોની પર્વશી</th>
<th>માધ્યમક જ્ઞાન</th>
<th>જાણીલાંકડ સુધારક</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-15</td>
<td>16.1</td>
<td>135</td>
<td>0.965</td>
</tr>
<tr>
<td>16-20</td>
<td>16.3</td>
<td>1135</td>
<td>0.966</td>
</tr>
<tr>
<td>21-25</td>
<td>15.7</td>
<td>970</td>
<td>0.962</td>
</tr>
<tr>
<td>26-30</td>
<td>15.3</td>
<td>660</td>
<td>0.958</td>
</tr>
<tr>
<td>31-35</td>
<td>14.8</td>
<td>470</td>
<td>0.951</td>
</tr>
<tr>
<td>36-40</td>
<td>15.0</td>
<td>150</td>
<td>0.943</td>
</tr>
<tr>
<td>41-45</td>
<td>14.5</td>
<td>80</td>
<td>0.928</td>
</tr>
</tbody>
</table>

A-2675] 4 [Contd...
ENGLISH VERSION

Instructions:
1. As per the instruction no. 1 of page no. 1.
2. Figures to the right indicate full marks of the questions.
3. Simple calculator can be used.

1. Answer the following questions:

(1) If \( A = \begin{bmatrix} 2 & 1 \\ -2 & 0 \\ 1 & 3 \end{bmatrix} \) and \( B = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & -1 \end{bmatrix} \), then find \( AB \).

(2) Let the common fertility rate is 30 per thousand women and there are 960 females against 1000 males in a particular city. Suppose that 60% women of the women - population are in the fertility age-group. If the total population of the city is 4,40,000, then how many children will be born in a year?

(3) If \( \ell_{30} = 29,533 \) and \( \ell_{31} = 28,182 \), then find value of \( d_{30} \) and \( P_{30} \).

(4) There are 9000 new born children in a city. If 20 children die in a year, then find infant mortality rate of city for that year.

(5) For two independent variables \( x \) and \( y \) if \( V(x)=2 \) and \( V(y)=3 \) then find \( V(x+3y+2) \) and \( V(2x+4y) \).

2. (a) Define the following matrices:

1. Symmetric matrix
2. Diagonal matrix
3. Inverse matrix
4. Unit matrix.

(b) If \( A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \) find \( B \) such that \( A^2 + 2A + B = 0 \).
(c) Solve the following equations by using inverse of a matrix: 
\[ x + y + z = 3, \quad x + 2y + 3z = 6, \quad 3x + y + 2z = 6 \]

OR

2 (a) If \( A = \begin{bmatrix} -1 & 2 \\ 0 & 8 \end{bmatrix}, B = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \) and \( AB = \begin{bmatrix} -13 & 6 \\ -40 & 8 \end{bmatrix} \), then find \( a, b, c, d \).

(b) A person buys 2 pineapples, 3 mangoes and 4 apples in Rs. 43. Another person buys 1 pineapple, 4 mangoes and 2 apples in Rs. 34. And a third person buys 5 pineapples, 2 mangoes and 3 apples in Rs. 66. Find the price of each fruit using inverse of a matrix.

3 (a) Define Mathematical Expectation. State the characteristics of mathematical expectation.

(b) A cubical die is prepared in such a way that the face coming upper side has a probability proportional to the number of points on it. If the upper side value is denoted by \( x \), then find mean and variance of \( x \).

(c) The probability distribution of a random variable \( x \) is as follows:

\[
\begin{array}{c|cccccc}
 x_i & -2 & -1 & 0 & 1 & 2 & 3 \\
 P(x_i) & k & 2k & 4k & 3k & 1/5 \\
\end{array}
\]

OR

A-2675] [Contd...]
3  (a) Define discrete random variable. Write probability distribution of discrete random variable.

(b) These are 3 black and 2 white balls in a box, 2 balls are taken from it. Rs. 24 is given for each black ball taken. What amount should be charged for each white ball so that the game is fair?

(c) The probability distribution of a random variable $x$ is as follows.

\[
\begin{array}{c|cccccc}
 x_i & -1 & 0 & 1 & 2 & 3 & 4 \\
 P(x_i) & 0.04 & 0.16 & 0.33 & 0.29 & 0.11 & 0.7 \\
\end{array}
\]

Find: (i) $E(3x+5)$ (ii) $V(2x-3)$ (iii) $E(9x+9)$ and (iv) $V(5x-5)$.

4  (a) What is life table? Explain the construction of life table.

(b) The total population of the city is 2,00,000 and proportion of male and female is 52 : 48. Find crude birth rate, general fertility rate, total fertility rate and gross reproduction rate from the following data:

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of Women(in thousand)</th>
<th>No. of live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>34</td>
<td>1100</td>
</tr>
<tr>
<td>20-24</td>
<td>33</td>
<td>3700</td>
</tr>
<tr>
<td>25-29</td>
<td>26</td>
<td>2950</td>
</tr>
<tr>
<td>30-34</td>
<td>24</td>
<td>2050</td>
</tr>
<tr>
<td>35-39</td>
<td>15</td>
<td>600</td>
</tr>
<tr>
<td>40-44</td>
<td>10</td>
<td>180</td>
</tr>
<tr>
<td>45-49</td>
<td>8</td>
<td>16</td>
</tr>
</tbody>
</table>
(c) Find the standardised death rate for following information given for two countries and state your opinion:

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>Death rate per thousand</th>
<th>Standard Population (in lacs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Country-A</td>
<td>Country-B</td>
</tr>
<tr>
<td>0-5</td>
<td>10.0</td>
<td>5.0</td>
</tr>
<tr>
<td>5-15</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>15-35</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>35-55</td>
<td>10.3</td>
<td>7.5</td>
</tr>
<tr>
<td>55-75</td>
<td>27.7</td>
<td>23.3</td>
</tr>
<tr>
<td>Above 75</td>
<td>120.0</td>
<td>110.0</td>
</tr>
</tbody>
</table>

OR

4 (a) Explain the meaning and utility of demographic statistics. Also write its defects.

(b) Complete the given life table:

<table>
<thead>
<tr>
<th>$x$</th>
<th>$l_x$</th>
<th>$d_x$</th>
<th>$p_x$</th>
<th>$q_x$</th>
<th>$l_x$</th>
<th>$T_x$</th>
<th>$e_x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>85,000</td>
<td>500</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>47,60,000</td>
<td>?</td>
</tr>
</tbody>
</table>

(c) Find GRR and NRR from the following information. Also interpret population trend.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Female population (1000)</th>
<th>No. of female births</th>
<th>Survival rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-15</td>
<td>16.1</td>
<td>135</td>
<td>0.965</td>
</tr>
<tr>
<td>16-20</td>
<td>16.3</td>
<td>1135</td>
<td>0.966</td>
</tr>
<tr>
<td>21-25</td>
<td>15.7</td>
<td>970</td>
<td>0.962</td>
</tr>
<tr>
<td>26-30</td>
<td>15.3</td>
<td>660</td>
<td>0.958</td>
</tr>
<tr>
<td>31-35</td>
<td>14.8</td>
<td>470</td>
<td>0.951</td>
</tr>
<tr>
<td>36-40</td>
<td>15.0</td>
<td>150</td>
<td>0.943</td>
</tr>
<tr>
<td>41-45</td>
<td>14.5</td>
<td>80</td>
<td>0.928</td>
</tr>
</tbody>
</table>