22BSB210N/22BSB210

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BVoc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch – **BANKING, STOCK AND INSURANCE**

MATHEMATICS FOR BUSINESS

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 amount borrowed by the debtor is called the ------ a) borrower b)principal c) drawee d)manager	K1	CO1
	2	The simple interest on the sum of Rs.6000 at 10% p.a. for 3 years ------ a) Rs.1800 b)Rs.1850 c) Rs.1875 d)Rs.1825	K2	CO1
2	3	------- of an annuity is the sum of the amounts of all the installment payments. a) interest b)amount c)principle d)cumulative interest	K1	CO2
	4	The difference between the face value and the present value is the ----- a) discount b) interest c) true discount d)selling	K2	CO2
3	5	The Transportation problems deals with the transportation of ---------- a) Single product from a sources to several destinations b) Several product from a sources to destinations c) single product from several sources to several destinations d) several product from several sources to several destinations	K1	CO3
	6	The dummy source or destination in a transportation problem is introduced to a) prevent solution to become degenerate b) to satisfy rim conditions c) ensure that total cost does not exceed a limit d) solve the balanced transportation problem	K2	CO3
4	7	Essential characteristics of a game theory model are a) pay-off b)decision alternatives c) state of nature d)all of the above	K1	CO4
	8	When sum of gains of one player is equal to sum of losses to another player, the situation is known as a) zero sum game b)fair game c)conflicting game d)negotiable game	K2	CO4
5	9	Multiple servers may be a)in parallel b) in series c) in combination of parallel and series d)all of the above	K1	CO5

Cont...

5	10	Queue can be formed only when a) arrivals exceed service capacity b)arrivals equals service capacity c) there are more than one service facilities d)service facility is capable to serve all the arrival at a time	K2	CO5

SECTION - B (35 Marks)

Answer **ALL** questions

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

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td rowspan="3">1</td><td>11.a.</td><td>A sum of money amounted to Rs.1,071 in 6 months and Rs.1,106 in 16 months. Calculate the rate of simple interest.</td><td rowspan="3">K1</td><td rowspan="3">CO1</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>11.b.</td><td>The difference between the compound interest and the simple interest for 3 years at 5% p.a. on a certain sum of money was Rs.610. Find the sum.</td></tr>
<tr><td rowspan="3">2</td><td>12.a.</td><td>A person deposits Rs.5,000 every year with a company which pays him interest at 12% p.a. He allows his deposits to accumulate with the company at compound interest. What would be the amount standing to his credit one year after he has made his deposit for 15th year?</td><td rowspan="3">K1</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td>Find the term of a bill of Rs.18,360 whose true discount at 8% p.a. is Rs.360.</td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td>Determine an initial basic feasible solution to the following transportation problem by least cost method.</td><td rowspan="3">K1</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td>Obtain an initial basic feasible solution to the following transportation problem, using Vogel's approximation method;
<table>
<tr><th rowspan="2">Warehouse</th><th colspan="4">Stores</th><th rowspan="2">Availability</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>A</td><td>5</td><td>1</td><td>3</td><td>3</td><td>34</td></tr>
<tr><td>B</td><td>3</td><td>3</td><td>5</td><td>4</td><td>15</td></tr>
<tr><td>C</td><td>6</td><td>4</td><td>4</td><td>3</td><td>12</td></tr>
<tr><td>D</td><td>4</td><td>-1</td><td>4</td><td>2</td><td>19</td></tr>
<tr><td>Requirement</td><td>21</td><td>25</td><td>17</td><td>17</td><td>80</td></tr>
</table></td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td>For the game with following pay-off matrix, determine the optimum strategies and value of the game;
<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Player B</td></tr>
<tr><td>B2</td><td></td></tr>
<tr><td rowspan="2">Player A</td><td>A1</td><td>3</td><td>-5</td></tr>
<tr><td>A2</td><td>-1</td><td>1</td></tr>
</table></td><td rowspan="3">K2</td><td rowspan="3">CO4</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td>Solve the following 2 × 2 game
$\begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix}$</td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td>Customers arrive at a sales counter manned by a single person according to Poisson process with mean rate of 20 per hour. The time required to serve a customer has an exponential distribution with mean at 100 seconds. Find the average waiting time of a customer.</td><td rowspan="3">K2</td><td rowspan="3">CO5</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td colspan="3"></td></tr>
</table>

5	15.b.	In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assume that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes. Calculate the following; a) The mean queue size b) The probability that the queue size exceeds 10.	K2	CO5

SECTION -C (30 Marks)

Answer **ANY THREE** questions

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

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td>1</td><td>16</td><td>A sum of money invested at compound interest amounts to Rs.21,362.00 in 2 years and to Rs.22,497.28 in 3 years. Find the rate of interest and the sum invested?</td><td>K1</td><td>CO1</td></tr>
<tr><td>2</td><td>17</td><td>Ina company a machine costs Rs.80,000 and its life is estimated to be 20 years. Sinking fund is created for replacing the machine at the end of its life time when its scrap realizes a sum of Rs.5,000 only. Calculate the amount which should be provided every year for the sinking fund if it accumulates at 9% p.a. compounded annually.</td><td>K1</td><td>CO2</td></tr>
<tr><td>3</td><td>18</td><td>Solve the following transportation problem;
<table>
<tr><td>From</td><td></td><td>To</td><td></td><td>Available</td></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td><td></td></tr>
<tr><td>I</td><td>50</td><td>30</td><td>220</td><td>1</td></tr>
<tr><td>II</td><td>90</td><td>45</td><td>170</td><td>3</td></tr>
<tr><td>III</td><td>250</td><td>200</td><td>50</td><td>4</td></tr>
<tr><td>Requirement</td><td>4</td><td>2</td><td>2</td><td></td></tr>
</table></td><td>K2</td><td>CO3</td></tr>
<tr><td>4</td><td>19</td><td>Use graphical method in solving the following game;
<table>
<tr><td rowspan="2">Player B</td><td></td><td colspan="4">Player A</td></tr>
<tr><td></td><td>A1</td><td>A2</td><td>A3</td><td>A4</td></tr>
<tr><td></td><td>B1</td><td>2</td><td>2</td><td>3</td><td>-2</td></tr>
<tr><td></td><td>B2</td><td>4</td><td>3</td><td>2</td><td>6</td></tr>
</table></td><td>K1</td><td>CO4</td></tr>
<tr><td>5</td><td>20</td><td>XYZ tailoring house has one tailor specialized in men's shirts. The number of customers requiring stitching of shirts appear to follow Poisson distribution with mean arrival rate of 12 per hour. Customers are attended by the tailor on a first come first service basis, and they are willing to wait for service, if there be queue. The time the tailor takes to attend a customer is exponentially distributed with a mean of 4 minutes.
Find the following;
a) The traffic intensity
b) The probability that the queuing system is idle
c) The average time the tailor is free on 8 hour working day
d) What is the expected number of customers in shop?
e) What is the expected number of customer's waiting for tailor's services?</td><td>K2</td><td>CO5</td></tr>
</table>

Z-Z-Z END