

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BVoc DEGREE EXAMINATION DECEMBER 2023  
(Second Semester)

Branch – BANKING, STOCK & INSURANCE

MATHEMATICS FOR BUSINESS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Find the simple interest on the sum of Rs.6,000 at 10% p.a. for 3 years.  
(i) Rs.1,700 (ii) Rs.1,600  
(iii) Rs.1,800 (iv) Rs.1,900
- 2 What is banker's gain on a bill of Rs.2,000 for 4.5 months at 4% p.a.  
(i) Rs.30.00 (ii) Rs. 44  
(iii) Rs.0.30 (iv) Rs.0.44
- 3 The solution of the transportation problem with m rows and n columns is feasible if number positive allocations are  
(i)  $m + n + 1$  (ii)  $m \times n$   
(iii)  $m + n$  (iv)  $m + n - 1$
- 4 What happens when maximin and minimax values of the game are same?  
(i) no solution exist (ii) solution is mixed  
(iii) saddle point exists (iv) value of the game is zero
- 5 Calling population is assumed to be finite when?  
(i) arrivals are independent of each other  
(ii) the capacity of the system is infinite  
(iii) service rate is faster than the arrival rate  
(iv) the capacity of the system is finite

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Calculate the total amount that will be received from the debtor when the principal Rs.10,000 is lent to him on interest for 4 years at 9% p.a.  
OR  
b Show that the present value of Rs.500 due in 4 years at 3% compounded semi annually is Rs.444 approximately.
- 7 a Mr. X borrows Rs. 20,000 at 4% compound interest and agrees to pay both the principal and the interest in 10 equal instalments at the end of each year. Calculate the amount of these instalments.  
OR  
b Calculate the rate of interest of a bill of Rs.12,937.50 whose true discount for the unexpired period of 4 months is Rs.437.50.
- 8 a Determine the initial basic feasible solution to the following transportation problem using the north-west corner rule:

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

OR

- b Obtain an initial basic feasible solution to the following transportation problem using the matrix minima method.

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Capacity
O <sub>1</sub>	1	2	3	4	6
O <sub>2</sub>	4	3	2	0	8
O <sub>3</sub>	0	2	2	1	10
Demand	4	6	8	6	

Cont...

- 9 a For the game with the following payoff matrix, determine the optimum strategies and the value of the game:

		Non-matching Player	
		H	T
Matching Player	H	8	-3
	T	-3	1

OR

- b Solve the following  $2 \times 2$  game graphically:

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	2	1	0	-2
	A <sub>2</sub>	1	0	3	2

- 10 a A T.V. repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?

OR

- b New Delhi Railway Station has a single ticket counter. During the rush hours, customers arrive at the rate of 10 per hour. The average number of customers that can be served is 12 per hour. Find out the average number of customers in the queue.

**SECTION -C (30 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

- 11 a Mr. Somasundaram deposits a total of Rs.45,000 in two different banks which give 10% and 15% interest respectively. If the amounts repayable by the two banks at the end of 10 years are to be equal, determine the individual amounts of deposit.

OR

- b A sum of money invested at compound interest amounts to Rs.21,632.00 in 2 years and to Rs.22,497.28 in 3 years. Find the rate of interest and the sum invested.

- 12 a Mr. Guru acquired a plant delivered on January 1, 1990 on the following terms:

- (i) Initial payment of Rs.40,000 immediately and  
(ii) 4 half-yearly installments of Rs.30,000 each commencing June 30, 1990.  
Interest is 10% with yearly rests. Discover the cash price.

OR

- b A bill drawn on 20<sup>th</sup> June 2000 at 3 months sight was accepted on 24<sup>th</sup> June 2000. The banker's gain while discounting the bill on 28<sup>th</sup> July 2000 at 6%p.a. was Rs.1 Find the face value.

- 13 a Use Vogel's Approximation Method to obtain an initial basic feasible solution of the transportation problem:

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

OR

- b Explain the steps in MODI method.

- 14 a Two firms are competing for business under the condition so that one firm's gain is another firm's lose. Firm A's payoff matrix is given below:

		Firm B		
		No ad	Medium ad	Heavy ad
Firm A	No advertising	10	5	-2
	Medium advertising	13	12	15
	Heavy advertising	16	14	10

Suggest optimum strategies for the two firms and the net outcome thereof.

OR

Cont...

14 Cont...

b Solve the following game:

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

15 a Discuss about the elements of a queuing system.

OR

b On an average 96 patients per 24-hour day require the service of an emergency clinic. Also on an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minutes of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from one and one-third patients to half patient.

Z-Z-Z

END