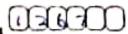
Virudhunagar District

Common Half Yearly Examination - December 2024



Standard 12 **BUSINESS MATHEMATICS AND STATISTICS**

Time: 3	3.00 Hrs.	•		Marks: 90				
·		PAR	T-I					
	the correct ans			20×1=20				
1	$ \text{ If } \rho(A) = \rho(A,B)$) = the number o	f unknowns, then t	he System is				
		d has infinitely m						
	b) Consistent an	d has a unique so	olution					
		d) Inconsisten						
2	If A = 3 and	i adj A = 243 ti	hen the value of n	is				
	a) 4	b) 5	c) 6	d) 7				
_	last de							
3) Je ux is	·						
	a) 0	b) 1	c) 2	d) 1/2				
	a) 0	-,-		-7-4				
4) Itanxdx is = _	·	*-					
			c) log √2					
5) Area bounded b	y the curve y =	x(4 - x) between	the limits 0 and 4 with				
	x-axis is	<u>.</u>						
	a) 30 sq. units	b) $\frac{31}{2}$ sq. units	c) $\frac{32}{3}$ sq.units	d) 15 sq units				
	-	_	-	•				
6) For a demand fo		= $k \int \frac{dx}{x}$ then k is eq					
	a) n _d	b) -n _d	c) $\frac{-1}{\eta_d}$	d) $\frac{1}{\eta_d}$				
7) The order and	degree of the d	lifferential equatio	n, $\sqrt{\frac{d^2y}{dx^2}} = \sqrt{\frac{dy}{dx} + 5}$ are				
	a) 2 and 3	b) 3 and 2	c) 2 and 1	d) 2 and 2				
	-,		dx.	()				
8) A homogeneous	differential equa	tion of the form div	= f 🛫 can be solved				
	A homogeneous differential equation of the form $\frac{dx}{dy} = f\left(\frac{y}{x}\right)$ can be solved by making substitution.							
			c) x = Vy	d) x = V				
9) If h = 1, then 4(x^2) =	- , ,					
	a) 2x	b) 2x-1 .	c) 2x+1	d) 1				
10) E f(x) =			THE NAME OF THE PARTY OF THE PA				
	a) f(x - h)	b) f(x)	c) f(x + h)	d) $f(x + 2h)$				
11				negative values will have				
	a) positive proba		b) negative pr					
	c) constant prob	abilities	d) difficult to	tell				
12			ls a random variab					
	a) discrete rando			random variable				
	c) both (a) and		d) neither (a)					
13		distribution the n	nean is greater than	variance is				
	a) binomial	b) normal		d) all the above				
14				lard normal distribution)?				
	a) -0.48	b) 0.48		d) 1.04				
15				on is called				
			n c) universe	a) census				
16	Errors in samplii		types.	4) 5				

MB	2
	and the second cities can be compared with the help of
	Cost of living at two different cities can be compared with the help of a) Consumer price index
	The quantitites that can be numerically measured can be plotted on a
19)	The transportation problem is said to be unbalanced if a) Total supply * Total demand b) Total supply * Total demand d) m+n-1
201	to an assignment problem involving four workers and three jobs, total number

PART-II Answer any SEVEN questions, Q.No.30 is compulsory. 7×2=14

d) 12

21) Find the rank of matrix: (1 4)

22) Evaluate: $\int \frac{1}{\sqrt{x+2}-\sqrt{x-2}} dx$

23) Determine the cost of producing 200 air conditions if the marginal cost (is per unit) is $C(x) = \frac{x^2}{200} + 4$.

24) Find the differential equation of the family of all straight lines passing through the origin.

25) Evaluate: Alogx

26) What are the properties of mathematical expectation?

27) Find the sample size for the given standard deviation 10 and the standard error with respect of sample mean is 3.

28) Fit a trend line by the method of semi-averages for the given data.

Fit a trend line by	the me	thoa or	Seim-d	verage.		T	2006
Year	2000	2001	2002	2003	2004	2005	2006
	105	115	120	100	110	125	135
Production	105	113	120	100			

29) Given the following pay-off (profit) matrix action states.

Action	States					
	S,	5,	5,	S		
Α,	5	10	18	25		
A,	8	7	8	23		
Α,	21	18	12	21		
A	30	22	19	15		

Determine best action using each of the following rule (i) Maximin (ii) Minimax.

30) The mean of binomials distribution is 20 and standard deviation is 4. Find the parameter 'n' of the distribution.

PART - III

Answer any SEVEN questions. Q.No.40 is Compulsory.

7×3=21

31) Akash bats according to the following traits. If he makes a hit (S), there is a 25% chance that he will make a hit his next time at bat. If he fails to hit (F), there is a 35% chance that he will make a hit his next time at bat. Find the transition probability matrix for the data and determine Akash's long-range batting average.

321 Evaluate: | x log x dx

33) Find the area bounded by y = x between the lines x = -1 and x = 2 with x-axis.

34) From the following table find the missing value.

×	2	3	4	5	6
f(x)	45.0	49.2	54.1	•	67.4

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The time to failure in thousands of hours of an important piece of electronic equipment used in a manufactured DVD player has the density function

$$f(*) = \begin{cases} 3e^{-3*} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$$
 find the expected life of the piece of equipment.

36) Write down any three chief characteristics of normal probability curve

373' A wholesaler in apples claims that only 4% of the applies supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Calculate the standard error concerning of good applies.

38) Construct the cost of living index number for 2011 on the basis of 2007 from

the given data using family budget method.

Commodities	Pr	ce	Weights
	2007	2011	
A	350	400	40
В	175	250	35
c	100	115	15
D	75	105	20
, E	60	80	25

39) Three jobs A, B and C are to be assigned to three machines U, V and W. The processing cost for each job machine combination is shown in the matrix given below. Determine the allocation that minimizes the overall processing cost.

Machine

	U	V	w
A	17	25	31
B	10	25	16
С	12	14	11

(cost is in ₹ per unit)

40) Solve: (1-x)dy - (1+y)dx = 0

PART - IV



Answer all questions: 41) a) The price of 3 Business Mathematics books, 2 Accountancy books and one Commerce book is ₹ 840. The price of 2 Business Mathematics books, one Accountancy book and one Commerce book is ₹ 570. The price of one Business Mathematics books, one Accountancy book and 2 Commerce books is ₹ 630. Find the cost of each book by using Cramer's Rule.

> (OR) b) A continuous random variable X has the following probability function.

Value of X = x	0	1	2	3	4	5	6	7
P(x)	0	ĸ	2K	2K	3K	K ₂	2K3	7K2+K

(i) Find K (ii) Evaluate P(X<6), P(X>6) and P(0<x<5) (iii) If P(X<x)> $\frac{1}{2}$, then find the minimum value of x.

b) Evaluate the integral as the limit of a sum: $\int_{-\infty}^{\infty} (2x + 1) dx$

43) a) Solve $\frac{dy}{dx}$ - 3y cot x = sin2x given that y = 2 when x = $\frac{\pi}{2}$.

(OR)

b) Solve: (3D2 + D - 14)y = 4 - 13e-1/3x

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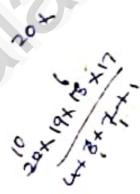
) Find f(2.8) from the following table:

×	0	1	2	3
f(x)	1	2	11	34
		-	- (OR)

- b) An ambulance service claims that it takes on the average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has then timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.6 minutes. What can they conclude at 5% level of significance.
- 45) a)-If 5% of the Items produced turn out to be defective, then find out the probability that out of 20 Items selected at random there are (i) exactly three defectives (ii) atleast two defectives (iii) exactly 4 defectives (iv) find the mean and variance.
 - (OR)
 b) If the probability that an individual suffers a bad reaction from injection of a given serum is 0.001, determines the probability that out of 2000 individuals. (i) exactly 3 (ii) more than 2 individuals will suffer a bad reaction.
- 46) a) Construct X and R charts for the following data:

Sample number	Obs	servati	ons
1	32	36	42
2	28	32	40
3	39	52	28
4	50	42	31
5	42	45	34
6	50	29	21
7	44	52	35
8	22	35	44

(Given $A_2 = 0.58$, $D_3 = 0$ and $D_4 = 2.115$)



b) Using the following data, construct Fisher's Ideal Index Number and show that it satisfied Factor Reversal Test and Time Reversal Test?

Commodities	Pri	ce	Quantity		
	Base year	Current year	Base year	Current year	
Wheat	6	10	50	56	
Ghee	2	2	100	120	
Firewood	4	6	60	60	
Sugar ·	10	12	30	24	
Cloth	. 8	12	40	36	

47) a) The demand and supply function if a commodity are $P_d = 18-2x-x^2$ and $P_s = 2x-3$. Find the consumer's surplus and producer's surplus at equilibrium price. (OR)

b) Find the initial basic feasible solution of the following transpertation problem

	1	п	ш	Deman
A	1	2	6	7
В	0	4	2	12
C	3	1	5	11
Supply	10	10	10	-

Using (i) North west corner rule (ii) Least cost method (ii) Vogel's approximation method.

