RAVI MATHS TUITION CENTER, CHENNAI – 82. PH - 8056206308

12TH BM MODEL PAPER 10 Date : 29-Nov-19

12th Standard

Business Maths Reg.No. : | | | | | | |

Instructions : (1) check the question paper for fairness of printing. if there is any lack of fairness, inform the hall supervisor immediately.(2) use blue or black ink to write and underline and pencil to draw diagrams

Exam Time : 03:00:00 Hrs Total Marks : 90

PART – I 20 x 1 = 20

ANSWER ALL THE QUESTIONS.

1) if $\rho(A) = \rho(A, B)$ then the system is

(a) Consistent and has infinitely many solutions (b) Consistent and has a unique solution (c) Consistent (d) inconsistent

2) $\int \frac{sin2x}{2sinx} dx$ is

(a) sin x + c (b) $\frac{1}{2}$ sin x + c (c) cos x + c (d) $\frac{1}{2}$ cos x + c

3) $\int \frac{2x^3}{4+x^4}$ dx is

(a) $log\left|4+x^4\right| + c$ (b) $\frac{1}{2}log\left|4+x^4\right| + c$ (c) $\frac{1}{4}log\left|4+x^4\right| + c$ (d) $log\left|\frac{2x^3}{4+x^4}\right| + c$

4) $\Gamma\left(\frac{3}{2}\right)$

(a) $\sqrt{\pi}$ (b) $\frac{\sqrt{\pi}}{2}$ (c) $2\sqrt{\pi}$ (d) $\frac{3}{2}$

5) If MR and MC denotes the marginal revenue and marginal cost functions, then the profit functions is

(a) $P = \int (MR - MC)\, dx + k$ (b) $P = \int (MR + MC)\, dx + k$ (c) $P = \int (MR)(MC) dx + k$ (d) $P = \int (R - C) dx + k$

6) Area bounded by y = x between the lines y = 1, y = 2 with y = axis is

(a) $\frac{1}{2}$ sq.units (b) $\frac{5}{2}$ sq.units (c) $\frac{3}{2}$ sq.units (d) 1 sq.unit

7) Area bounded by $y = e^x$ between the limits 0 to 1 is

(a) (e −1) sq.units (b) (e +1) sq.units (c) $\left(1 - \frac{1}{e}\right)$ sq.units (d) $\left(1 + \frac{1}{e}\right)$ sq.units

8) If m and n are positive integers then $\Delta^m \Delta^n f(x) =$

(a) $\Delta^{m+n} f(x)$ (b) $\Delta^m f(x)$ (c) $\Delta^n f(x)$ (d) $\Delta^{m-n} f(x)$

9) Given E(X) = 5 and E(Y) = -2, then E(X – Y) is

(a) 3 (b) 5 (c) 7

10) $\int_{-\infty}^{\infty} f(x) dx$ is always equal to

(a) zero (b) one (c) E(X) (d) f(x)+1

11) In a parametric distribution the mean is equal to variance is :

(a) binomial (b) normal (c) poisson (d) all the above

12) The starting annual salaries of newly qualified chartered accountants (CA's) in South Africa follow a normal distribution with a mean of Rs.180,000 and a standard deviation of Rs. 10,000. What is the probability that a randomly selected newly qualified CA will earn between Rs.165,000 and Rs.175,000 per annum?

(a) 0.819 (b) 0.242 (c) 0.286 (d) 0.533

13) If P(Z > z) = 0.5832 what is the value of z (z has a standard normal distribution)?

(a) -0.48 (b) 0.48 (c) 1.04 (d) -0.21

14) In _____ the heterogeneous groups are divided into homogeneous groups.

(a) Non-probability sample (b) a simple random sample (c) a stratified random sample (d) systematic random sample

15) Type II error is

(a) Accept H_0 when it is wrong (b) Accept H_0 when it is true (c) Reject H_0 when it is true (d) Reject H_0 when it is false

16) Least square method of fitting a trend is

(a) Most exact (b) Least exact (c) Full of subjectivity (d) Mathematically unsolved

17) The quantities that can be numerically measured can be plotted on a

(a) p - chart (b) c – chart (c) x bar chart (d) np – chart

18) A decline in the sales of ice cream during November to March is associated with

(a) Seasonal variation (b) Cyclical variation (c) random variation (d) Secular trend

19) The Penalty in VAM represents difference between the first _____

(a) Two largest costs (b) Largest and Smallest costs (c) Smallest two costs (d) None of these

20) Decision theory is concerned with

(a) analysis of information that is available (b) decision making under certainty (c) selecting optimal decisions in sequential problem (d) All of the above

PART II

7 x 2 = 14

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 30 IS COMPULSORY.

21) Integrate the following with respect to x.

$(4x + 2)\sqrt{x^2 + x + 1}$

22) Evaluate the following

$\int_0^\infty e^{-4x}x^4dx$

23) Calculate consumer's surplus if the demand function $p = 122 - 5x - 2x^2$ and $x = 6$

24) Form the differential equation by eliminating α and β from $(x - \alpha)^2 + (y - \beta)^2 = r^2$

25) $(D^2 - 3D + 2)y = e^{3x}$ which shall vanish for $x = 0$ and for $x = \log 2$

26) A second degree polynomial passes though the point (1,-1) (2,-1) (3,1) (4,5). Find the polynomial.

27) The discrete random variable X has the following probability function

$P(X=x)=\{kx \quad x = 2, 4, 6k(x - 2) \quad x = 80 \quad otherwisde$ where k is a constant. Show that $k=\frac{1}{18}$

28) State the properties of distribution function.

29) How do you define variance in terms of Mathematical expectation?

30) Explain the stratified random sampling with a suitable example.

PART III

7 x 3 = 21

ANSWER ANY SIX QUESTIONS AND QUESTION NUMBER 40 IS COMPULSORY.

31) Solve: (3D2 + D - 14)y = 4 - 13$e^{\frac{-7}{3}x}$

32) A server channel monitored for an hour was found to have an estimated mean of 20 transactions transmitted per minute. The variance is known to be 4. Find the standard error.

33) Evaluate $\int_{-1}^{1} \frac{x^5 dx}{a^2 - x^2}$

34) Solve the differential equation $\frac{dy}{dx} = \frac{x-y}{x+y}$

35) Calculate four-yearly moving averages of number of students studying in a higher secondary school in a particular city from the following data.

Year	2001	2002	2003	2004	2005	2006	2007	2008
Sales	124	120	135	140	145	158	162	170

36) Determine an initial basic feasible solution to the following transportation problem using North West corner rule.

	D_1	D_2	D_3	D_4	Availability
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Requirement	6	10	15	4	35

Here O_i and D_j represent ith origin and jth destination.

37) A bank manager has observed that the length of time the customers have to wait for being attended by the teller is normally distributed with mean time of 5 minutes and standard deviation of 0.6 minutes. Find the probability that a customer has to wait

(i) for less than 6 minutes

(ii) between 3.5 and 6.5 minutes

38) Consider the following pay-off (profit) matrix Action States

Action	States			
	(s_1)	(s_2)	(s_3)	(s_4)
A_1	5	10	18	25
A_2	8	7	8	23
A_3	21	18	12	21
A_4	30	22	19	15

Determine best action using maximin principle.

39) 80% of students who do maths work during one study period, will do the maths work at the next study period. 30% of students who do english work during one study period, will do the english work at the next study period.

Initially there were 60 students do maths work and 40 students do english work.

Calculate,

(i) The transition probability matrix

(ii) The number of students who do maths work, english work for the next subsequent 2 study periods.

40) Show that the equations x + 2y = 3, Y - z = 2, x +y + z = 1 are consistent and have infinite sets of solution.

PART – I V 7 x 5 = 35

ANSWER ALL THE QUESTIONS.

41) a) In a Poisson distribution the first probability term is 0.2725. Find the next Probability term

(OR)

b)

The wages of the factory workers are assumed to be normally distributed with mean and variance 25. A random sample of 50 workers gives the total wages equal to Rs. 2,550. Test the hypothesis μ =52, against the alternative hypothesis μ =49 at 1% level of significance.

42) a) From the following table, estimate the premium for a policy maturing at the age of 58.

Age (x)	40	45	50	55	60
Premium (y)	114.84	96.16	83.32	74.48	68.48

(OR)

b) Solve the following assignment problem. Cell values represent cost of assigning job A, B, C and D to the machines I, II, III and IV.

		machines			
		I	II	III	IV
jobs	A	10	12	19	11
	B	5	10	7	8
	C	12	14	13	11
	D	8	15	11	9

43) a) The probability density function of a random variable X is

$f(x)=ke^{-|x|}$, $-\infty< x< \infty$

Find the value of k and also find mean and variance for the random variable.

(OR)

b) The followingdata relateto the life(inhours) of 10 samples of 6 electricbulbs each drawn at an intervalof one hour from a production process.Draw the controlchart for $\bar{X}$ and $\bar{R}$ and comment.

Sample No	Lifetime (inhour)					
	1	2	3	4	5	6
1	620	687	666	689	738	686
2	501	585	524	585	653	668
3	673	701	686	567	619	660
4	646	626	572	628	631	743
5	494	984	659	643	660	640
6	634	755	625	582	683	555
7	619	710	664	693	770	534
8	630	723	614	535	550	570
9	482	791	533	612	497	499
10	706	524	626	503	661	754

(For n = 6,A_2= 0.483,D_3 = 0,D_4 = 2.004)

44) a) Evaluate $\int_{\theta}^{\frac{\pi}{2}} x\sin x dx$

(OR)

b) If f'(x) = a sin x + b cos x and f'(0) = 4, f(0) = 3, $f\left(\frac{\pi}{2}\right)$ = 5, find f(x).

45) a)

A company receives a shipment of 200 cars every 30 days. From experience it is known that the inventory on hand is related to the number of days. Since the last shipment, I(x)=200 − 0.2x. Find the daily holding cost for maintaining inventory for 30 days if the daily holding cost is Rs. 3.5

(OR)

b) Solve $(x2 + 1)\frac{dy}{dx} + 2xy = 4x^2$

46) a) The demand and supply functions under pure competition are $P_d = 16 - x^2$ and $p_s = 2x^2 + 4$. Find the consumer's surplus and producer's surplus at the market equilibrium price.

(OR)

b) The demand and supply curves are given by $P_d = \frac{16}{x+4}$ and $P_s = \frac{x}{2}$. Find the Consumer's surplus and producer's surplus at the market equilibrium price.

47) a) Suppose that the quantity needed $Q_d = 42 -4p-4\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied Q_s=-6+8p where p is the price. Find the s equilibrium price for market clearance.

(OR)

b) The following data are taken from the steam table

Tempreture C^0	140	150	160	170	180
Pressure kg $flcm^2$	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature $t = 175^0$

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