RAVI MATHS TUITION CENTER CHENNAI - 82. PH - 8056206308

12BM HALF YEARLY MODEL 3 Date : 21-Oct-19

12th Standard

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

Exam Time : 02:30:00 Hrs Total Marks : 90

20 x 1 = 20

1) The rank of an n x n matrix each of whose elements is 2 is

(a) 1 (b) 2 (c) n (d) n^2

2) $\Gamma(1)$ is

(a) 0 (b) 1 (c) n (d) n!

3) The anti-derivative of $f(x) = \sqrt{x} + \frac{1}{\sqrt{x}}$ is _____ +c

(a) $\frac{2}{3}x^{\frac{3}{2}} + \frac{2}{x^{\frac{1}{2}}}$ (b) $\frac{3}{2}x^{\frac{3}{2}} + 2x^{\frac{1}{2}}$ (c) $\frac{2}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}}$ (d) none

4) The value of $\int_0^{\frac{\pi}{2}} cosxe^{sinx}dx =$

(a) 1 (b) e-1 (c) 0 (d) -1

5) The marginal revenue and marginal cost functions of a company are MR = 30 − 6x and MC = −24 + 3x where x is the product, then the profit function is

(a) $9x^2 + 54x$ (b) $9x^2 - 54x$ (c) $54x - \frac{9x^2}{2}$ (d) $54x - \frac{9x^2}{2} + k$

6) For a demand function p, if $\int \frac{dp}{p} = k \int \frac{dx}{x}$ then k is equal to

(a) η d (b) $-\eta$ d (c) $\frac{-1}{\eta d}$ (d) $\frac{1}{\eta d}$

7) The area unded by the curves $y = 2^x$, x = 0 anx=2 is_____sq.units.

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

8) The are bounded by the demand curve xy = 1, the X-axis, x = 1 and x = 2 is _____

(a) log 2 (b) $\log \frac{1}{2}$ (c) 2 log 2 (d) $\frac{1}{2}$ log 2

9) A homogeneous differential equation of the form $\frac{dy}{dx} = f\left(\frac{y}{x}\right)$ can be solved by making substitution,

(a) x = v y (b) y = v x (c) y = v (d) x = v

10) The differential equation obtained by eliminating a and b from $y = a e^{3x} + b e^{-3x}$ is

(a) $\frac{d^2y}{dx^2}$ +ay=0 (b) $\frac{d^2y}{dx^2}$ -9y=0 (c) $\frac{d^2y}{dx^2} - 9\frac{dy}{dx}$ (d) $\frac{d^2y}{dx^2}$ +9x=0

11) Integrating factor of $\frac{dy}{dx} + \frac{1}{xlogx}y = \frac{2}{x^2}$ is _____

(a) e^x (b) log x (c) $\frac{1}{x}$ (d) e^{-x}

12) The nationality of the mathemalician Joseph Louis Lagrange is _____

(a) German (b) Spain (c) Italian (d) French

13) ∇ = _____

(a) ∇ . Δ (b) $E^{-1}\Delta$ (c) E . Δ (d) $E^2\Delta$

14) In Newtons forward and backward interpolation formula, the first two terms will give the _____ interpolation

(a) linear (b) parabolic (c) quadratic (d) cubic

15) E[X-E(X)] is equal to

(a) E(X) (b) V(X) (c) 0 (d) E(X)-X

16)

The parameters of the normal distribution $f(x) = \left(\frac{1}{\sqrt{72\pi}}\right)\frac{e^{-(x-10)^2}}{72} \quad -\infty < X < \infty$

(a) (10,6) (b) (10,36) (c) (6,10) (d) (36,10)

17) If the area to the left of a value of z (z has a standard normal distribution) is 0.0793, what is the value of z?

(a) -1.41 (b) 1.41 (c) -2.25 (d) 2.25

18) A _____ is a statement or an assertion about the population parameter.

(a) hypothesis (b) statistic (c) sample (d) census

19) The upper control limit for $\bar{X}$ chart is given by

(a) $\bar{\bar{X}} + A_2\bar{R}$ (b) $\bar{\bar{X}} + A_2R$ (c) $\bar{\bar{X}} + A_2\bar{R}$ (d) $\bar{\bar{X}} + A_2\bar{R}$

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

ANY 7 7 X 2 = 14

21) Find the rank of the following matrices

$$\begin{pmatrix} 1 & -2 & 3 & 4 \\ -2 & 4 & -1 & -3 \\ -1 & 2 & 7 & 6 \end{pmatrix}$$

22) Integrate the following with respect to x.

$\frac{cos2x + 2sin^2x}{cos^2x}$

23) The cost of over haul of an engine is Rs. 10,000 The operating cost per hour is at the rate of 2x − 240 where the engine has run x km. Find out the total cost if the engine run for 300 hours after overhaul.

24) Solve the following:

$\frac{dy}{dx} - \frac{y}{x} = x$

25) Find the order and degree of the following differential equations.

$(2 - y'')^2 = y''^2 + 2y'$

26) Using graphic method, find the value of y when x = 48 from the following data:

x	40	50	60	70
y	6.2	7.2	9.1	12

27) Distinguish between discrete and continuous random variable.

28) A person tosses a coin and is to receive Rs. 4 for a head and is to pay Rs. 2 for a tail. Find the expectation and variance of his gains.

29) In a sample of 400 population from a village 230 are found to be eaters of vegetarian items and the rest non-vegetarian items. Compute the standard error assuming that both vegetarian and non-vegetarian foods are equally popular in that village?

30) State the uses of Index Number.

ANY 7 7 X 3 = 21

31) Find k, if the equations x+2y−3z= −2,3x−y−2z=1,2x+3y−5z=k are consistent.

32) Evaluate $\int \frac{5 + 5e^{2x}}{e^x + e^{-x}} dx$

33) Using integration find the area of the circle whose center is at the origin and the radius is a units.

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

35) Solve: $\cos^2 x\, dy + y.e^{\tan x}\, dx = 0$

36) Given $y_3 = 2$, $y_4 = -6$, $y_5 = 8$, $y_6 = 9$ and $y_7 = 17$ Calculate $\Delta^4 y_3$

37) Verfy the following statement:

The mean of a Binomial distribution is 12 and its standard deviation is 4.

38) The standard deviation of a sample of size 50 is 6.3. Determine the standard error whose population standard deviation is 6?

39) Calculate the seasonal index for the monthly sales of a product using the method of simple averages.

Months / Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2001	15	41	25	31	29	47	41	19	35	38	40	30
2002	20	21	27	19	17	25	29	31	35	39	30	44
2003	18	16	20	28	24	25	30	34	30	38	37	39

40) Obtain an initial basic feasible solution to the following transportation problem using Vogel's approximation method.

Ware houses	Stores I	II	III	IV	Availability (a_i)
A	5	1	3	3	34
B	3	3	5	4	15
C	6	4	4	3	12
D	4	1	4	5	19
Requirement (b_j)	21	25	17	17	

7 X 5 = 35

41) a) Evaluate $\int \frac{3x+2}{(x-2)^2(x-3)}dx$

(OR)

b) Consider the problem of assigning five jobs to five persons. The assignment costs are given as follows. Determine the optimum assignment schedule.

Person \ Job	1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

42) a) For what values of k, the system of equations kx+ y+z = 1,x+ ky+z= 1,x+ y+kz= 1 have

(I) Unique solution

(ii) More than one solution

(iii) no solution

(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.

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

(OR)

b) Construct the Laspeyre's , Paasche's and Fisher's price index number for the following data. Comment on the result.

Commodities	Base Year	Current Year

	Price	Quantity	Price	Quantity
Rice	15	5	16	8
Wheat	10	6	18	9
Rent	8	7	15	8
Fuel	9	5	12	6
Transport	11	4	11	7
Miscellaneous	16	6	15	10

44) a) The normal lines to a given curve at each point(x,y) on the curve pass through the point (1,0). The curve passes through the point (1,2). Formulate the differential equation representing the problem and hence find the equation of the curve.

(OR)

b) Determine the mean and variance of the random variable Xhaving the following probability distribution.

X=x	1	2	3	4	5	6	7	8	9	10
P(x)	0.15	0.10	0.10	0.01	0.08	0.01	0.05	0.02	0.28	0.20

45) a) Calculate the value of y when x = 7.5 from the table given below

x	1	2	3	4	5	6	7	8
y	1	8	27	64	125	216	343	512

(OR)

b) Calculate the cost of living index number for the year 2015 with respect to base year 2010 of the following data.

Commodities	Number of Units (2010)	Price (2010)	Price (2015)
Rice	5	1500	1750
Sugar	3.5	1100	1200
Pulses	3	800	950
Cloth	2	1200	1550
Ghee	0.75	550	700
Rent	12	2500	3000
Fuel	8	750	600
Misc	110	3200	3500

46) a) A firm has the marginal revenue function given by MR = $\frac{a}{(x+b)^2}$ - c where x is the output and a, b, c are constants. Show that the demand function is given by $x = \frac{a}{b(p+c)} - b$.

(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 2,000 individuals (a) exactly 3, and (b) more than 2 individuals will suffer a bad reaction.

47) a) Solve: $(D^2 + 14D + 49)y = e^{-7x} + 4$.

(OR)

b) Estimate the production for 1962 and 1965 from the following data

year	1961	1962	1963	1964	1965	1966	1967
Production in tonnes	200	-	260	306	-	390	430

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