RAVI MATHS TUITION CENTER ,GKM COLONY, CH- 82. PH: 8056206308

QUARTERLY EXAM MODEL PAPER 1

Date : 13-Aug-19

12th Standard 2019 EM

Business Maths

Reg.No. : | | | | | | |

Time : 02:30:00 Hrs

Total Marks : 90

20 x 1 = 20

1) If A=(1 2 3), then the rank of AA^T is

(a) 0 (b) 2 (c) 3 (d) 1

2) if T=$_{B}$ $\begin{pmatrix} \overset{A}{0.4} & \overset{B}{0.6} \\ 0.2 & 0.8 \end{pmatrix}$ is a transition probability matrix, then at equilibrium A is equal to

(a) $\frac{}{4}$ (b) $\frac{}{5}$ (c) $\frac{}{6}$ (d) $\frac{}{8}$

3) The rank of the matrix $\begin{pmatrix} & & \\ & & \\ 1 & 4 & 9 \end{pmatrix}$ is

(a) 0 (b) 1 (c) 2 (d) 3

4) IfA = $\begin{pmatrix} \\ \\ 3 \end{pmatrix}$ then the rank of AA^T is

(a) 0 (b) 1 (c) 2 (d) 3

5) $\int \frac{}{x^3}$ dx is

(a) $\frac{}{x^2}+c$ (b) $\frac{}{2x^2}+c$ (c) $\frac{}{3x^2}+c$ (d) $\frac{}{x^2}+c$

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

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

7) $\int \frac{}{cos3x}$ dx

(a) −cos2x + c (b) −cos2x + c (c) $-\frac{}{4}$ cos2x c (d) −4cos2x + c

8) $\int \frac{}{x}$ dx , x > 0 is

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

9) Area bounded by the curve y = $\frac{}{x}$ between the limits 1 and 2 is

(a) log2 sq.units (b) log5 sq.units (c) log3 sq.units (d) log 4 sq.units

10) If the marginal revenue function of a firm is MR = $e^{\frac{}{10}}$, then revenue is

(a) $-10e^{\frac{}{10}}$ (b) $1-e^{\frac{}{10}}$ (c) $10\left(1-e^{\frac{}{10}}\right)$ (d) $e^{\frac{}{10}}+10$

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

(a) P = ∫(MR − MC) dx + k (b) P = ∫(MR + MC) dx + k (c) P = ∫(MR)(MC)dx + k (d) P = ∫(R −C)dx + k

12) 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

13) The degree of the differential equation $\frac{d\ y}{dx^4} - \left(\frac{d\ y}{dx^2}\right)^4 + \frac{}{dx} = 3$

(a) 1 (b) 2 (c) 3 (d) 4

14) The order and degree of the differential equation $\sqrt{\frac{d\ y}{dx^2}} = \frac{}{dx} + 5$ are respectively

(a) 2 and 3 (b) 3 and 2 (c) 2 and 1 (d) 2 and 2

15) The differential equation $\left(\frac{}{dy}\right)^3 + 2y^{\frac{}{2}}$ = x is

(a) of order 2 and degree 1 (b) of order 1 and degree 3 (c) of order 1 and degree 6 (d) of order 1 and degree 2

16) The integrating factor of the differential equation $\frac{dx}{dy} + Px = Q$

(a) $e^{\int Pdx}$ (b) $e^{\int Pdx}$ (c) $\int Pdy$ (d) $e^{\int Pdy}$

17) $\Delta^2 y_0$ =

(a) $y_2 - 2y_1 + y_0$ (b) $y_2 + 2y_1 - y_0$ (c) $y_2 + 2y_1 + y_0$ (d) $y_2 + y_1 + 2y_0$

18) $\Delta f(x)$ =

(a) f(x+ h) (b) f(x) − f(x+h) (c) f(x + h) − f(x) (d) f (x) − f(x−h)

19) E ≡

(a) $1 + \Delta$ (b) $1 - \Delta$ (c) $1 + \nabla$ (d) $1 - \nabla$

20) If c is a constant then Δc =

(a) c (b) Δ (c) Δ^2 (d) 0

7 x 2 = 14

21) Find the rank of the matrix A = $\begin{pmatrix} 4 & 5 & 2\,2 \\ 3 & 2 & 1\,6 \\ 4 & 4 & 8\,0 \end{pmatrix}$

22) Find k if the equations x+y+z=1,3x−y−z=4,x+5y+5z=k are inconsistent.

23) Integrate the following with respect to x.

$\left(\sqrt{2x} - \frac{1}{\sqrt{2x}}\right)^2$

24) Integrate the following with respect to x.

$x^8(1+x^9)^5$

25) Find the area bounded by the lines y − 2x − 4 = 0, y = 1, y = 3 and the y-axis

26) The marginal cost function of a product is given by $\frac{dC}{dx}$ = $100 - 10x + 0.1x^2$ where x is the output. Obtain the total and the average cost function of the firm under the assumption, that its fixed cost is Rs. 500.

27) Solve: $y(1 - x) - x\frac{dy}{dx} = 0$

28) Solve the following differential equations $(3D^2 + D - 14)y = 13e^{2x}$

29) If h = 1 then prove that $(E^{-1}\Delta)x^3 = 3x^2 - 3x + 1$.

30) Evaluate $\Delta\left[\frac{1}{(x+1)(x+2)}\right]$ by taking '1' as the interval of differencing

7 x 3 = 21

31) Show that the equations x+y+z=6,x+2y+3z=14,x+4y+7z =30 are consistent and solve them.

32) Consider the matrix of transition probabilities of a product available in the market in two brands A and B.

$$\begin{matrix} A \\ B \end{matrix}\overset{\begin{matrix} A & \quad B \end{matrix}}{\begin{pmatrix} 0.9 & 0.1 \\ 0.3 & 0.7 \end{pmatrix}}$$

Determine the market share of each brand in equilibrium position.

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

34) Evaluate $\int \sqrt{x^2 - 4x + 3}$ dx

35) Evaluate $\int_0^{\frac{\pi}{2}} \frac{sinx}{sinx + cosx}$ dx

36) Find the area of the region bounded by the parabola $y = 4 - x^2$, x −axis and the lines x = 0, x = 2

37) Sketch the graph $y = |x + 3|$ and evaluate $\int_{-6}^{0} |x + 3|$ dx.

38) Find the particular solution of the differential equation $x^2 dy + y(x + y)dx = 0$ given that x=1, y=1

39) Solve $\frac{d^2y}{dt^2} - \frac{3dy}{dt} + 2x$ = 0 given that when t = 0, x = 0 and $\frac{dx}{dt}$ = 1

40) Given U = 1, U = 11, U = 21, U = 28 and U = 29 find Δ U_0

7 x 5 = 35

41) Solve by Cramer's rule x+y+z=4,2x−y+3z=1,3x+2y−z = 1

42) A new transit system has just gone into operation in a city. Of those who use the transit system this year, 10% will switch over to using their own car next year and 90% will continue to use the transit system. Of those who use their cars this year, 80% will continue to use their cars next year and 20% will switch over to the transit system. Suppose the population of the city remains constant and that 50% of the commuters use the transit system and 50% of the commuters use their own car this year,

(i) What percent of commuters will be using the transit system after one year?

(ii) What percent of commuters will be using the transit system in the long run?

43) Evaluate $\int \frac{3x^2+6x+1}{(x+3)(x^2+1)} dx$

44) Evaluate $\int_1^4 f(x)dx$, where $\begin{cases} 7x+3, if 1 \le x \le 3 \\ 8x, if 3 \le x \le 4 \end{cases}$

45) Using integrals as limit of sums, evaluate $\int_2^4 (2x-1)dx$

46) 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 $x = \frac{a}{b(p+c)} - b$.

47) 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.

48) Solve $3e^x \tan y dx + (1 + e^x)\sec^2 y dy = 0$ given $y(0) = \frac{\pi}{4}$

49) Solve $\cos^2 x \frac{dy}{dx} + y = \tan x$

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

51) 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.

52) The population of a certain town is as follows

Year : x	1941	1951	1961	1971	1981	1991
Population in lakhs:y	20	24	29	36	46	51

Using appropriate interpolation formula, estimate the population during the period 1946.

53) Using Lagrange's interpolation formula find y(10) from the following table:

x	5	6	9	11
y	12	13	14	16

54) From the following data, calculate the value of $e^{1.75}$

x	1.7	1.8	1.9	2.0	2.1
e^x	5.474	6.050	6.686	7.386	8.166

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QUARTERLY EXAM MODEL PAPER 2

Date : 13-Aug-19

12th Standard 2019 EM

Business Maths

Reg.No. : | | | | | |

Time : 02:30:00 Hrs

Total Marks : 90

20 x 1 = 20

1) If $\rho(A)$ =r then which of the following is correct?

(a) all the minors of order r which does not vanish (b) A has at least one minor of order r which does not vanish (c) A has at least one (r+1) order minor which vanishes (d) all (r+1) and higher order minors should not vanish

2) IfA = $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ then the rank of AA^T is

(a) 0 (b) 1 (c) 2 (d) 3

3) Cramer's rule is applicable only to get an unique solution when

(a) $\triangle_z \neq 0$ (b) $\triangle_x \neq 0$ (c) $\triangle_{\neq} 0$ (d) $\triangle_y \neq 0$

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

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

5) $\int \frac{e^x}{e^x+1}$ dx

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

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

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

7) $\int_2^4 \frac{dx}{x}$ is

(a) log 4 (b) 0 (c) log 2 (d) log 8

8) $\int 3^{x+2}$ dx = _......................... +c

(a) $\frac{3^x}{log3}$ (b) $\frac{9(3^x)}{log3}$ (c) $\frac{3.3^x}{log3}$ (d) $\frac{3^x}{9log3}$

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

(a) P = ∫(MR − MC) dx + k (b) P = ∫(MR + MC) dx + k (c) P = ∫(MR)(MC)dx + k (d) P = ∫(R −C)dx + k

10) 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

11) The given demand and supply function are given byD(x) = 20 − 5x and S(x) = 4x + 8 if they are under perfect competition then the equilibrium demand is

(a) 40 (b) $\frac{41}{2}$ (c) $\frac{40}{3}$ (d) $\frac{41}{5}$

12) The profit of a function p(x) is maximum when

(a) MC − MR = 0 (b) MC = 0 (c) MR = 0 (d) MC + MR = 0

13) If $y=cx + c - c^3$ then its differential equation is

(a) $y=\frac{dy}{dx}+\frac{dy}{dx}-\left(\frac{dy}{dx}\right)^3$ (b) $y=\left(\frac{dy}{dx}\right)^3=x\frac{dy}{dx}-\frac{dy}{dx}$ (c) $\frac{dy}{dx}+y=\frac{dy}{dx}^3-x\frac{dy}{dx}$ (d) $\frac{d^3y}{dx^3}=0$

14) The complementary function of $(D^2+ 4)y = e^{2x}$ is

(a) $(Ax +B)e^{2x}$ (b) $(Ax +B)e^{-2x}$ (c) A cos 2x + B sin 2x (d) $Ae^{-2x}+ Be^{2x}$

15) If $\sec^2 x$ is an integrating factor of the differential equation $\frac{dy}{dx}$ + Py Q then P =

(a) 2 tan x (b) sec x (c) $\cos^2 x$ (d) $\tan^2 x$

16) The integrating factor of x $\frac{dy}{dx}$ - y = x^2 is

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

17) E f (x)=

(a) f(x− h) (b) f (x) (c) f(x+ h) (d) f(x+ 2h)

18) ∇ ≡

(a) 1+E (b) 1 - E (c) $1- E^{-1}$ (d) $1+ E^{-1}$

19) Lagrange's interpolation formula can be used for

(a) equal intervals only (b) unequal intervals only (c) both equal and unequal intervals (d) none of these.

20) If f (x)=x^2 + 2x + 2 and the interval of differencing is unity then Δf (x)

(a) 2x −3 (b) 2x +3 (c) x + 3 (d) x − 3

7 x 2 = 14

21) Solve the following equation by using Cramer's rule

5x + 3y = 17; 3x + 7y = 31

22) For what value of x, the matrix

$$A = \begin{vmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ x & 2 & -3 \end{vmatrix}$$ is singular?

23) If f ' (x) = $8x^3$ − 2x and f (2)= 8, then find f (x)

24) Integrate the following with rexpect to x

$\frac{a^x - e^{xlogb}}{e^{xloga} b^x}$

25) Evaluate $\int \frac{2^x+3^x}{5^x} dx$

26) 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.

27) The demand function for a commodity is p = $\frac{36}{x+4}$. Find the consumer's surplus when the prevailing market price is Rs. 6.

28) Solve: cosx(1 + cos y)dx − sin y(1 + sin x)dy = 0

29) Solve the following:

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

30) Find the missing entry in the following table

x	0	1	2	3	4
y_x	1	3	9	-	81

7 x 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.

32) Show that the equations x- 3y + 4z = 3, 2x - 5y + 7z = 6, 3x - 8y + 11z = 1 are inconsistent

33) Evaluate $\int \frac{x+2}{\sqrt{2x+3}} dx$

34) Evaluate $\int x^3 e^x dx$

35) Evaluate $\int \frac{dx}{\sqrt{x^2-3x+2}}$

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

37) Using integration find the area of the region bounded between the line x = 4 and the parabola y^2 = 16x.

38) The Marginal revenue for a commodity is MR=$\frac{e^x}{100} + x + x^2$, find the revenue function.

39) Solve : $(D^2-4D-1)y = e^{-3x}$

40) Evaluate $\Delta^2 \left(\frac{1}{x}\right)$ by taking '1' as the interval of differencing.

7 x 5 = 35

41) An automobile company uses three types of Steel S , S and S for providing three different types of Cars C , C and C . Steel requirement R (in tonnes) for each type of car and total available steel of all the three types are summarized in the following table.

Types of Steel	Types of Car			Total Steel available
	C_1	C_2	C_3	
S_1	3	2	1	28
S_2	1	1	2	13
S_3	2	2	2	14

Determine the number of Cars of each type which can be produced by Cramer's rule.

42) 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

43) Evaluate $\int \frac{3x^2+6x+1}{(x+3)(x^2+1)} dx$

44) Evaluate $\int \left[\frac{1}{\log\ x} - \frac{1}{(\log\ x)^2}\right]$ dx

45) −0.3t

-1.2 -1.5

46) The marginal cost and marginal revenue with respect to commodity of a firm are given by C'(x) = 8 + 6x and R'(x)= 24. Find the total Profit given that the total cost at zero output is zero.

47) 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.

48) The elasticity of demand with respect to price P for a commodity is $\frac{x-5}{x}$,x > 5, When the demand is x. Find demand function if the price is 2 when the demand is 7. Also, find the revenue function.

49) Solve: $(x^2+x+1)dx+(y^2-y+3)dy = 0$

50) Solve : x - y $\frac{dx}{dy} = a\left(x^2 + \frac{dx}{dy}\right)$

51) Solve: $x^2 \frac{dy}{dx} = y^2+2xy$ given that y =1, when x=1

52) From the following table find the number of students who obtained marks less than 45.

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

53) 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

54) 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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QUARTERLY EXAM MODEL PAPER 3 Date : 13-Aug-19

12th Standard 2019 EM

Business Maths

Reg.No. : | | | | | | |

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

20 x 1 = 20

1) Which of the following is not an elementary transformation?

(a) $R_i \leftrightarrow R_j$ (b) $R_i \to 2R_i + 2c_j$ (c) $R_i \to 2R_i - 4R_i$ (d) $_i \quad C_i \quad 5C_j$

2) if $\rho(A) \neq \rho(A,B),$ then the system is

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

3) In a transition probability matrix, all the entries are greater than or equal to

(a) 2 (b) 1 (c) 0 (d) 3

4) $|A_{n\times n}|$ =3 $|adjA|$ =243 then the value n is

(a) 4 (b) 5 (c) 6 (d) 7

5) The value of $\int_2^3 f(5-x)dx - \int_2^3 f(x)dx$ is

(a) 1 (b) 0 (c) -1 (d) 5

6) $\int_0^4 \left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)$ dx is

(a) $\frac{20}{3}$ (b) $\frac{21}{3}$ (c) $\frac{28}{3}$ (d) $\frac{1}{3}$

7) $\int_0^{\frac{\pi}{3}} tanxdx$ is

(a) log 2 (b) 0 (c) log$\sqrt{2}$ (d) 2 log 2

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

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

9) $\int_4^9 \frac{1}{\sqrt{2}}$ dx =

(a) 0 (b) 1 (c) 2 (d) 4

10) If the marginal revenue of a firm is constant, then the demand function is

(a) MR (b) MC (c) C(x) (d) AC

11) 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) $\frac{1}{e}$ sq.units

12) Area bounded by y = $|x|$ between the limits 0 and 2 is

(a) 1sq.units (b) 3 sq.units (c) 2 sq.units (d) 4 sq.units

13) The area above the supply curve p = g(x) and below the line p =P_o is _...............

(a) Producer's Surplus (b) Consumer's Surplus (c) $\int_0^{p0} g(x)dx$ (d) $\int_0^{x0} g(x)dx$

14) Profit function is maximum when $\frac{dp}{dx}$ =0 and $\frac{d^2p}{dx^2}$ is _................

(a) positive (b) negative (c) 0 (d) maximum

15) 2 2x

$\frac{x}{2}$ 2x 2x $\frac{x^2}{2}$ 2x 2x

16) The general solution of the differential equation $\frac{dy}{dx}$ = cos x is

(a) y = sinx + 1 (b) y = sinx - 2 (c) y = cos x + c, c is an arbitrary constant (d) y = sin x + c, c is an arbitrary constant

17) The order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2 - 3\frac{d^3y}{dx^2} + \frac{dy}{dx}$ =x+logx are _..........

(a) 1,3 (b) 3,1 (c) 2,3 (d) 3,2

18) Lagrange's interpolation formula can be used for

(a) equal intervals only (b) unequal intervals only (c) both equal and unequal intervals (d) none of these.

19) If f (x)=x^2 + 2x + 2 and the interval of differencing is unity then Δf (x)

(a) 2x −3 (b) 2x +3 (c) x + 3 (d) x − 3

20) Newton's backward interpolation formula is used when the value of y is required at the _.................. of the table.

(a) beginning (b) end (c) left (d) right

7 x 2 = 14

21) A commodity was produced by using 3 units of labour and 2 units of capital, the total cost is Rs 62. If the commodity had been produced by using 4 units of labour and one unit of capital, the cost is Rs 56. What is the cost per unit of labour and capital? (Use determinant method).

22) Two types of soaps A and B are in the market. Their present market shares are 15% for A and 85% for B. Of those who bought A the previous year, 65% continue to buy it again while 35% switch over to B. Of those who bought B the previous year, 55% buy it again and 45% switch over to A. Find their market shares after one year and when is the equilibrium reached?

23) Integrate the following with respect to x.

$\frac{x^4-x^2+2}{x-1}$

24) Integrate the following with respect to x.

$\frac{e^{3logx}}{x^4+1}$

25) Evaluate the following:

$\int_{-1}^{1} f(x)dx$ where f(x) = $\begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

26) The marginal cost of production of a firm is given by C'(x) = 5 + 0.13x , the marginal revenue is given by R'(x) = 18 and the fixed cost is Rs. 120. Find the profit function.

27) The marginal cost function is MC=$\frac{100}{x}$. Find the cost function C(x)if C(16)=100.

28) Find the differential equation of all circles passing through the origin and having their centers on the y axis.

29) Solve the following:

$x\frac{dy}{dx} + 2y = x^4$

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

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

7 x 3 = 21

31) Show that the equations x+y+z=6,x+2y+3z=14,x+4y+7z =30 are consistent and solve them.

32) Find the rank of the matrix

$$A = \begin{pmatrix} 2 & 4 & 5 \\ 4 & 8 & 10 \\ -6 & -12 & -15 \end{pmatrix}$$

33) Evaluate $\int \frac{ax^2+bx+v}{\sqrt{x}} dx$

34) Evaluate $\int_2^5 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{7-x}}$ dx

35) Evaluate $\int e^x \left(\frac{1+sinxcosx}{cos^2x}\right) dx$

36) The demand function of a commodity is $y = 36 - x^2$. Find the consumer's surplus for $y_0 = 11$

37) Find the differential equation corresponding to $y=ae^{4x} + be^{-x}$ where a, b are arbitrary constants.

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

39) Suppose that the quantity demanded $Q_d = 29 - 2p - 5\frac{dp}{dt} + \frac{d^2p}{dt^2}$ and quantity supplied $Q_s = 5 + 4p$ where p is the price. Find the equilibrium price for market clearance.

40) Given $U_0 = 1, U_1 = 11, U_2 = 21, U_3 = 28$ and $U_4 = 29$ find $\Delta^2 U_0$

7 x 5 = 35

41) The price of 3 Business Mathematics books, 2 Accountancy books and one Commerce book is Rs840. The price of 2 Business Mathematics books, one Accountancy book and one Commerce book is Rs 570. The price of one Business Mathematics book, one Accountancy book and 2 Commerce books is Rs 630. Find the cost of each book by using Cramer's rule.

42) A new transit system has just gone into operation in a city. Of those who use the transit system this year, 10% will switch over to using their own car next year and 90% will continue to use the transit system. Of those who use their cars this year, 80% will continue to use their cars next year and 20% will switch over to the transit system. Suppose the population of the city remains constant and that 50% of the commuters use the transit system and 50% of the commuters use their own car this year,

(i) What percent of commuters will be using the transit system after one year?

(ii) What percent of commuters will be using the transit system in the long run?

43) Evaluate $\int \frac{x^2+5x^2-9}{x+2} dx$

44) If f(x) = $\begin{cases} x^2, & -2 \le x < 1 \\ x, & 1 \le x < 2 \\ x-4, & 2 \le x \le 4 \end{cases}$, then find the following

(i) $\int_{-2}^{1} f(x)dx$

(ii) $\int_{-2}^{1} f(x)dx$

(iii) $\int_{2}^{3} f(x)dx$

(iv) $\int_{-2}^{1.5} f(x)dx$

(v) $\int_{1}^{3} f(x)dx$

45) The elasticity of demand with respect to price p for a commodity is $\eta_d = \frac{p+2p^2}{100-p-p^2}$. Find demand function where price is Rs. 5 and the demand is 70.

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

47) Using Newton's formula for interpolation estimate the population for the year 1905 from the table:

Year	1891	1901	1911	1921	1931
Population	98.752	1,32,285	1,68,076	1,95,670	2,46,050

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QUARTERLY EXAM MODEL PAPER 4 — Date : 13-Aug-19

12th Standard 2019 EM

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

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

20 x 1 = 20

1) If $\rho(A) = \rho(A,B)$ = the number of unknowns, then the system is

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

2) In a transition probability matrix, all the entries are greater than or equal to

(a) 2 (b) 1 (c) 0 (d) 3

3) If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$ then x =

(a) 3 (b) ± 3 (c) ± 6 (d) 6

4) $\int \frac{dx}{\sqrt{x^2-36}}$ is

(a) $\sqrt{x^2-36}+c$ (b) $\log|x+\sqrt{x^2-36}|+c$ (c) $\log|x-\sqrt{x^2-36}|+c$ (d) $log\,|x^2+\sqrt{x^2-36}|+c$

5) $\int_0^1 (2x+1)dx$ is

(a) 1 (b) 2 (c) 3 (d) 4

6) $\int \left(\frac{x}{m}+\frac{m}{x}\right)$ dx = _.......................... +c

(a) $\frac{x^2}{2m}+m\log|x|$ (b) $\frac{x}{m^2}+m\log|x|$ (c) $-\frac{1}{mx^2}+m\log|x|$ (d) $\frac{1}{m}-\frac{m}{x^2}$

7) $\int_1^e logx$ dx = _........................ +c

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

8) The profit of a function p(x) is maximum when

(a) MC − MR = 0 (b) MC = 0 (c) MR = 0 (d) MC + MR = 0

9) The producer's surplus when the supply function for a commodity is P = 3 + x and x_0 = 3 is

(a) $\frac{5}{2}$ (b) $\frac{9}{2}$ (c) $\frac{3}{2}$ (d) $\frac{7}{2}$

10) The Producer's surplus for the supply function P = g(x) for the quantity X_o and price P_o is

(a) $\int_0^{x0} g(x)dx - p_0x_0$ (b) $p_0x_0 - \int_0^{x0} g(x)dx$ (c) $\int_0^{x0} g(x)dx$ (d) $\int_0^{p0} g(x)dx$

11) 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

12) The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{2}} - \sqrt{\frac{dy}{dx}} - 4 = 0$ are respectively

(a) 2 and 6 (b) 3 and 6 (c) 1 and 4 (d) 2 and 4

13) If y=cx + c− c^3 then its differential equation is

(a) $y=\frac{dy}{dx}+\frac{dy}{dx}-\left(\frac{dy}{dx}\right)^3$ (b) $y=\left(\frac{dy}{dx}\right)^3=x\frac{dy}{dx}-\frac{dy}{dx}$ (c) $\frac{dy}{dx}+y=\frac{dy}{dx}^3-x\frac{dy}{dx}$ (d) $\frac{d^3y}{dx^3}=0$

14) The complementary function of $(D^2+4)y = e^{2x}$ is

(a) $(Ax+B)e^{2x}$ (b) $(Ax+B)e^{-2x}$ (c) A cos 2x + B sin 2x (d) $Ae^{-2x}+Be^{2x}$

15) The solution of the differential equation $\frac{dy}{dx}$ + Py = Q where P and Q are the function of x is

(a) $y = \int Qe^{\int Pdx}dx + c$ (b) $y = \int Qe^{-\int Pdx}dx + c$ (c) $ye^{\int Pdx} = \int Qe^{\int Pdx}dx + c$ (d) $ye\int Pdx = \int Qe^{-\int Pdx}dx + c$

16) The variable separable form of $\frac{dy}{dx}=\frac{y(x-y)}{x(x+y)}$ by taking y vx and $\frac{dy}{dx}=v+x\frac{dv}{dx}$

(a) $\frac{2v^2}{1+v}dv=\frac{dx}{x}$ (b) $\frac{2v^2}{1+v}dv=-\frac{dx}{x}$ (c) $\frac{2v^2}{1-v}dv=\frac{dx}{x}$ (d) $\frac{1+v}{2v^2}dv=-\frac{dx}{x}$

17) The I.F. of $\frac{dy}{dx}$ -y tan x = cos x is _ ....

(a) sec x (b) cos x (c) e^{tanx} (d) cot x

18) For the given points (x_0, y_0) and (x_1,y_1) the Lagrange's formula is

(a) $y(x) = \frac{x-x_1}{x_0-x_1} y_0 + \frac{x-x_0}{x_1-x_0} y_1$ (b) $y(x) = \frac{x_1-x_0}{x_0-x_1} y_0 + \frac{x_1-x_0}{x_1-x_0} y_1$ (c) $y(x) = \frac{x-x_1}{x_0-x_1} y_1 + \frac{x-x_0}{x_1-x_0} y_0$ (d) $y(x) = \frac{x_1-x}{x_0-x_1} y_1 + \frac{x-x_0}{x_1-x_0} y_0$

19) Lagrange's interpolation formula can be used for

(a) equal intervals only (b) unequal intervals only (c) both equal and unequal intervals (d) none of these.

20) The backward difference operator ∇ is

(a) Nepla (b) Alpha (c) Gamma (d) Delta

7 x 2 = 14

21) Find the rank of the matrix A = $\begin{pmatrix} 1 & -3 & 4 & 7 \\ 9 & 1 & 2 & 0 \end{pmatrix}$

22) Solve the following equation by using Cramer's rule

x + y + z = 6, 2x + 3y− z =5, 6x−2y− 3z = −7

23) Integrate the following with respect to x.

$\frac{e^{3x}+e^{5x}}{e^{x}+e^{-x}}$

24) Integrate the following with respect to x.

$\frac{1}{sin^2 x cos^2 x} [Hint : sin^2 + cos^2 x = 1]$

25) Evaluate the following integrals:

$\int \sqrt{9x^2 + 12x + 3}$ dx

26) Using Integration, find the area of the region bounded the line 2y + x = 8, the x axis and the lines x = 2, x = 4.

27) A firm's marginal revenue function is MR = $20e^{-x/10} \left(1 - \frac{x}{10}\right)$. Find the corresponding demand function.

28) Find the curve whose gradient at any point P(x, y) on it is $\frac{x-a}{y-b}$ and which passes through the origin.

29) Solve the following differential equations

$\frac{d^2y}{dx^2} - 2k\frac{dy}{dx} + k^2y$

30) Solve: $\log\left(\frac{dy}{dx}\right)$ = ax + by

7 x 3 = 21

31) Show that the equations x+y+z=6,x+2y+3z=14,x+4y+7z =30 are consistent and solve them.

32) Parithi is either sad (S) or happy (H) each day. If he is happy in one day, he is sad on the next day by four times out of five. If he is sad on one day, he is happy on the next day by two times out of three. Over a long run, what are the chances that Parithi is happy on any given day?

33) Two products A and B currently share the market with shares 60% and 40% each respectively. Each week some brand switching latees place. Of those who bought A the previous week 70% buy it again whereas 30% switch over to B. Of those who bought B the previous week, 80% buy it again whereas 20% switch over to A. Find their shares after one week and after two weeks.

34) Evaluate $\int (logx)^2 dx$

35) Evaluate $\int \frac{dx}{2+x-x^2}$

36) Evaluate the integral as the limit of a sum: $\int_1^2 x^2$ dx

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

38) Find the area of the region bounded by the line y = x - 5, the x-axis and between the ordinates x=3and x=7

39) Solve: cos^2x dy + $y.e^{tanx}$ dx=0

40) Prove that f(4) = f(3) + Δf(2) + $Δ^2$ f(1) + $Δ^3$ f(1) taking '1' as the interval of differencing.

7 x 5 = 35

41)

An automobile company uses three types of Steel S , S and S for providing three different types of Cars C , C and C . Steel requirement R (in tonnes) for each type of car and total available steel of all the three types are summarized in the following table.

Types of Steel	Types of Car			Total Steel available
	C_1	C_2	C_3	
S_1	3	2	1	28
S_2	1	1	2	13
S_3	2	2	2	14

Determine the number of Cars of each type which can be produced by Cramer's rule.

42) Evaluate $\int \frac{dx}{x(x^3+1)}$

43) If $\int_a^b dx = 1$ and $\int_a^b xdx = 1$, then find a and b

44) A company produces 50,000 units per week with 200 workers. The rate of change of productions with respect to the change in the number of additional labour x is represented as 300 - $5x^{1/2}$ If 64 additional labours are employed, find out the additional number of units, the company can produce.

45) Solve $ydx - xdy - 3x^2y^2e^{x3}dx = 0$

46) Using graphic method, find the value of y when x = 38 from the following data:

x	10	20	30	40	50	60
y	63	55	44	34	29	22

47) 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

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