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COMMON QUARTERLY EXAMINATION - SEPTEMBER 2018

STANDARD - Xi Reg. No. | | | | | | |

Time : 2.30 hours **BUSINESS MATHEMATICS & STATISTICS** *Marks: 90*

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.

SECTION - I

Note : i) Answer all the questions.
ii) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer. 20×1=20

1) If $\begin{vmatrix} 4 & 3 \\ 3 & 1 \end{vmatrix} = -5$ then the value of $\begin{vmatrix} 20 & 15 \\ 15 & 5 \end{vmatrix}$ is
a) -125 b) -5 c) 0 d) -25

2) If A and B non-singular matrix then, which of the following is incorrect?
a) $A^2 = I \Rightarrow A^{-1} = A$ b) $I^{-1} = I$ c) If $AX = B$ then $X = B^{-1}A$
d) If A is square matrix of order 3 then $|adj\ A| = |A|^2$

3) If A is square matrix of order 3 then $|KA|$ is
a) $K^3|A|$ b) $-K^3|A|$ c) $K|A|$ d) $-K|A|$

4) The value of $\begin{vmatrix} 1 & 3 & 4 \\ 105 & 14 & 28 \\ 15 & 2 & 4 \end{vmatrix}$ is
a) 0 b) 15 c) 14 d) -7

5) The value of $(5C_0 + 5C_1) + (5C_1 + 5C_2) + (5C_2 + 5C_3) + (5C_3 + 5C_4) + (5C_4 + 5C_5)$ is
a) $2^6 - 2$ b) $2^5 - 1$ c) 2^8 d) 2^7

6) The last term in the expansion of $(3+\sqrt{2})^8$ is
a) 81 b) 16 c) $8\sqrt{2}$ d) $27\sqrt{3}$

7) If $\frac{kx}{(x+4)(2x-1)} = \frac{4}{x+4} + \frac{1}{2x-1}$ then k is equal to
a) 11 b) 5 c) 9 d) 7

8) If $42C_{2r} = 42C_{r+3}$ then the value of r is
a) 3 b) 13 c) 42 d) 21

9) The equation of the circle with centre (3, -4) and touches the x - axis is
a) $(x-3)^2 + (y-4)^2 = 4$ b) $(x-3)^2 + (y-4)^2 = 16$
c) $(x-3)^2 + (y+4)^2 = 16$ d) $x^2 + y^2 = 16$

10) The length of the tangent from (4, 5) to the circle $x^2 + y^2 = 16$ is
a) 16 b) 4 c) 5 d) 25

11) Length of the latus rectum of the parabola $y^2 = -25X$
a) 25 b) -5 c) 5 d) -25

12) The locus of the point P which moves such that P is always at equidistance from the line $3x + 2y + 5 = 0$ is
a) $3x - 2y + 7 = 0$ b) $3x + 2y + 8 = 0$ c) $3x - y + 2 = 0$ d) $2x + 3y + 5 = 0$

13) If $\sin A + \cos A = 1$ then $\sin 2A$ =
a) 2 b) 0 c) 1/2 d) 1

14) The value of $4\cos^3 40^\circ - 3\cos 40^\circ$ is
a) $\sqrt{3}/2$ b) -1/2 c) 1/2 d) $1/\sqrt{2}$

15) $\left[\frac{\cos x}{\operatorname{cosec} x}\right] - \sqrt{1-\sin^2 x}\sqrt{1-\cos^2 x}$ is
a) $\cos^2 x - \sin^2 x$ b) $\sin^2 x - \cos^2 x$ c) 0 d) 1

16) The value of $\sin[\cos^{-1}(4/5)]$ is
a) 4/5 b) 2/5 c) $1/\sqrt{10}$ d) 3/5

17) The minimum value of the function $f(x) = |x|$ is
a) -1 b) 0 c) +1 d) ∞

18) If $y = \log x$ then y_2 =
a) $1/x$ b) $-1/x^2$ c) $-2/x^2$ d) e^2

19) Which of the following function is neither odd nor even?
a) $f(x) = x^5$ b) $f(x) = \sin^2$ c) $f(x) = x^2 - |x|$ d) $f(x) = \sin x + \cos x$

20) For what value of x, $f(x) = \frac{x+2}{2x-1}$ is not continuous?
a) -2 b) 1 c) 1/2 d) 0

SECTION -II

Note : Answer any 7 questions. Q.No. 30 is Compulsory. **7×2=14**

21) Find λ if the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 2 & \lambda & 4 \\ 9 & 7 & 11 \end{bmatrix}$ has no inverse.

22) Evaluate : $\begin{vmatrix} x & x+2 \\ x-2 & x \end{vmatrix}$

23) Find n, if $\frac{1}{9!} + \frac{1}{10!} = \frac{n}{11!}$

24) How many distinct words can be formed using all the letters of the word. MISSISSIPPI.

25) Find the angle between the pair of straight lines $3x^2 - 5xy - 2y^2 + 17x + y + 10 = 0$

26) Find the equation of the tangent of the circle $x^2 + y^2 - 4x + 4y - 8 = 0$ at (-2, -2)

27) Find the value of $\tan\left[\frac{\pi}{4} - \tan^{-1}\left(\frac{1}{8}\right)\right]$

28) Find the value of the following trigonometric ratio $\cos(-105^\circ)$.

29) If $\lim_{x \to a} \frac{x^9 + a^9}{x + a} = \lim_{x \to 3} (x + 6)$ find the values of a.

30) $f = \{(1,1), (2, 5)\}$ be a function described by the formula $f(x) = ax + b$. Determine a and b.

SECTION -III

Note : Answer any 7 questions. Q.No. 40 is Compulsory. **7×3=21**

31) If $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1} A^{-1}$

32) The technology matrix of an economic system of two industries is $\begin{bmatrix} 0.50 & 0.25 \\ 0.40 & 0.67 \end{bmatrix}$ Test whether the system is viable as per Hawkins - Simon conditions.

33) In how many ways can a cricket team of 11 players be chosen out of a batch of 15 players?

i) There is no restriction on the selection

ii) A Particular player is always chosen iii) A Particular player is never chosen

34) Find the rank of the word "HOPE" in dictionary.

35) If the lines $3x - 5y - 11 = 0$, $5x + 3y - 7 = 0$ and $x + ky = 0$ are concurrent, find the value of k.

36) The slope of one of the straight lines $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, show that $8h^2 = 9ab$.

37) If $\tan\alpha = 1/3$ and $\tan\beta = 1/7$ then prove that $(2\alpha + \beta) = \pi/4$.

38) Prove that $(\cos\alpha - \cos\beta)^2 + (\sin\alpha - \sin\beta)^2 = 4\sin^2\left[\frac{\alpha - \beta}{2}\right]$

39) If $f(x) = \frac{x+1}{x-1}$ then prove that $f(f(x)) = x$

40) Find $\frac{dy}{dx}$ of the following functions $x = \log t$, $y = \sin t$.

SECTION -IV

Note : Answer all the questions. **7×5=35**

41) The cost of 4kg onion, 3kg wheat and 2kg rice is Rs.320, The cost of 2kg onion, 4kg wheat and 6kg rice is Rs. 560, The cost of 6kg onion, 2kg wheat and 3kg rice is Rs. 380. Find the cost of each item per kg. by matrix inversion method.

(OR)

Suppose the inter - industry flow of the product of tw sectors X and Y are given as under:

Production Sector	Consumption Sector		Domestic demand	Gross output
	X	Y		
X	15	10	10	35
Y	20	30	15	65

Find the gross output when the domestic demand changes to 12 for X and 18 for Y.

42) By Mathamatical Induction, prove that $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$ for all $n \in N$.

(OR)

Resolve into partial fractions : $\frac{x+4}{(x^2-4)(x+1)}$

43) Find the equation of the circle passing through the points (0,0), (1, 2) and (2,0).

(OR)

Find the vertex, focus, axis, directrix and the length of latus rectum of the parabola $y^2 - 8y - 8x + 24 = 0$

44) Show that the pair of straight lines $4x^2 + 12xy + 9y^2 - 6x - 9y + 2 = 0$ represents two parallel straight lines and also find the separate equations of the straight lines.

(OR)

Show that $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = 3/16$.

45) Prove that : $\frac{\sin(180^\circ+A)\cos(90^\circ-A)\tan(270^\circ-A)}{\sec(540^\circ-A)\cos(360^\circ+A)\operatorname{cosec}(270^\circ+A)} = -\sin A \cos^2 A$

(OR)

Solve : $\tan^{-1}(x + 1) + \tan^{-1}(x - 1) = \tan^{-1}(4/7)$

46) Differentiate the following with respect to x $\sqrt{\frac{(x-1)(x-2)}{(x-3)(x^2+x+1)}}$

(OR)

Find $\frac{d}{dx}(e^{3x})$ from the first principle.

47) Show that the middle term in the expansion of $(1+X)^{2n}$ is $\frac{1.3.5.\ldots\ldots(2n-1)2^n x^n}{n!}$

(OR)

If $A + B = 45^\circ$ then prove that $(1 + \tan A)(1 + \tan B) = 2$. Hence deduce the value of $\tan 22\frac{1}{2}^\circ$.
