COMMON SECOND REVISION TEST – 2023

Standard XI Reg.No.:

MATHEMATICS

Time: 3.00 hrs. **Part - I** **Marks: 90**

I. Choose the correct answer: **20 x 1 = 20**

1. If A is a square matrix, then which of the following is not symmetric?
   a) $A+A^T$ b) AA^T c) A^TA d) $A-A^T$

2. The vectors $\vec{a}-\vec{b}$, $\vec{b}-\vec{c}$, $\vec{c}-\vec{a}$ are
   a) parallel to each other b) unit vectors
   c) mutually perpendicular vectors d) coplanar vectors

3. The sequence $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}+\sqrt{2}}, \frac{1}{\sqrt{3}+2\sqrt{2}}$ .... forms an
   a) AP b) GP c) HP d) AGP

4. The range of the function $f(x)=\frac{1}{1-2\sin x}$ is
   a) $(-\infty,-1)\cup\left(\frac{1}{3},\infty\right)$ b) $\left(-1,\frac{1}{3}\right)$
   c) $\left[-1,+\frac{1}{3}\right]$ d) $(-\infty,-1]\cup\left[\frac{1}{3},\infty\right)$

5. The value of $\log_3 11\ \log_{11} 13\ \log_{13} 15\ \log_{15} 27\ \log_{27} 81$ is
   a) 1 b) 2 c) 3 d) 4

6. If $a \neq b$, b, c satisfy $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix}=0$ then abc =
   a) $a+b+c$ b) 0 c) b^3 d) $ab+bc$

7. If $\vec{a}+2\vec{b}$, $3\vec{a}+m\vec{b}$ are parallel then the value of m is
   a) 3 b) $\frac{1}{3}$ c) 6 d) $\frac{1}{6}$

8. $\lim\limits_{x\to 0}\frac{a^x-b^x}{x}=$
   a) $\log(ab)$ b) $\log\left(\frac{a}{b}\right)$ c) $\log\left(\frac{b}{a}\right)$ d) $\frac{a}{b}$

9. $\int e^{-7x}\sin 5x\,dx$ = ______.
   a) $\frac{e^{-7x}}{74}\left[-7\sin 5x-5\cos 5x\right]+c$ b) $\frac{e^{-7x}}{74}\left[7\sin 5x+5\cos 5x\right]+c$
   c) $\frac{e^{-7x}}{74}\left[7\sin 5x-5\cos 5x\right]+c$ d) $\frac{e^{-7x}}{74}\left[-7\sin 5x+5\cos 5x\right]+c$

10. Number of sides of a polygon having 44 diagonals
    a) 4 b) 4! c) 11 d) 22
11. 1 + 3 + 5 + 7 + ... + 17 is equal to
    a) 101 b) 81 c) 71 d) 61
12. If the point (8,−5) lies on the locus $\frac{x^2}{16}-\frac{y^2}{25}=k$, then the value of k is
    a) 0 b) 1 c) 2 d) 3
13. The image of the point (2,3) in the line y = −x is
    a) (−3, −2) b) (−3,2) c) (−2,−3) d) (3,2)
14. If f(x) = x $\tan^{-1}x$ then f′(1) is
    a) $1+\frac{\pi}{4}$ b) $\frac{1}{2}+\frac{\pi}{4}$ c) $\frac{1}{2}-\frac{\pi}{4}$ d) 2
15. For any vector $\vec{a}$, the value of $(\vec{a}\times\hat{i})^2+(\vec{a}\times\hat{j})^2+(\vec{a}\times\hat{k})^2$ is equal to
    a) $3\vec{a}^2$ b) $\vec{a}^2$ c) $2\vec{a}^2$ d) $4\vec{a}^2$
16. $\int\frac{\cos 2x-1}{\cos 2x+1}dx=$
    a) $\tan x - x + c$ b) $\tan x + x + c$ c) $x - \tan x + c$ d) $-x - \cot x + c$
17. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel is
    a) $\frac{2}{11}$ b) $\frac{3}{11}$ c) $\frac{4}{11}$ d) $\frac{5}{11}$
18. It is given that the events A and B are such that $P(A)=\frac{1}{4}$, $P(A/B)=\frac{1}{2}$ and $P(B/A)=\frac{2}{3}$. Then P(B) is
    a) $\frac{1}{6}$ b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) $\frac{1}{2}$
19. The derivative of f(x) = x |x| at x = −3 is
    a) 6 b) −6 c) does not exist d) 0
20. In a triangle ABC $\sin^2A+\sin^2B+\sin^2C=2$, then the triangle is
    a) equilateral triangle b) isosceles triangle
    c) right angled triangle d) scalene triangle

Part - II

II. Answer any 7 questions. (Q.No.30 is compulsory) **7 x 2 = 14**

21. Compute |A| using Sarrus rule if $A=\begin{bmatrix}3 & 4 & 1\\ 0 & -1 & 2\\ 5 & -2 & 6\end{bmatrix}$

22. Find the projection of the vector $\hat{i}+3\hat{j}+7\hat{k}$ on the vector ...

23. Find the value of cos 330°.
24. Find the nearest point on the line 2x + y = 5 from the origin.
25. Find the positive integer n such that $\lim_{x \to 3} \frac{x^n - 3^n}{x - 3} = 27$
26. Differentiate y = cos(tan x)
27. If $\frac{6!}{n!} = 6$, then find the value of n.
28. If ρ(A) denotes the power set of A, then find n(ρ(ρ(ρ(ϕ)))).
29. Solve : $3x - 5 \le x + 1$ for x
30. A die is rolled. If it shows an odd number, then find the probability of getting 5.

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory) **7 x 3 = 21**

31. Solve $x = \sqrt{x + 20}$ for $x \in R$
32. Find the domain of $f(x) = \frac{1}{1 - 2\sin x}$
33. If $y = \sin^{-1}x$ then find y''.
34. Find the distance from a point (1,2) to the line 5x + 12y – 3 = 0
35. How many triangles can be formed by joining 15 points in which 7 of them lie on a line and the remaining 8 lie on another parallel line.
36. If $\sin\theta = \frac{3}{5}$ and θ lies in the II quadrant, find the values of other five trigonometric ratios.
37. Evaluate : $\int e^{3x} \cos 2x \, dx$
38. A year is selected at random, what is the probability that (i) it contains 53 Sundays (ii) it is a leap year which contains 53 Sundays.
39. Find $\sqrt[3]{65}$
40. Show that $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix}^2 = \begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ac & bc & a^2+b^2 \end{vmatrix}$

Part - IV

IV. Answer all the questions. **7 x 5 = 35**

41. a) Express the matrix A as the sum of symmetric and skew symmetric matrix where $A = \begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$

(OR)

b) For the curve $y = x$, draw

(i) $y = -x$ (ii) $y = 2x$ (iii) $y = x + 1$ iv) $y = \frac{1}{2}x + 1$ v) $2x + y + 3 = 0$

42. a) Resolve into partial fraction $\frac{2x}{(x^2+1)(x-1)}$

(OR)

b) State and prove Section formula (internal division)

43. a) If $A + B = 45°$, prove that $(1 + \tan A)(1 + \tan B) = 2$

(OR)

b) Show that $\lim_{x \to 0^+} \left[\left\lfloor \frac{1}{x} \right\rfloor + \left\lfloor \frac{2}{x} \right\rfloor + \ldots\ldots + \left\lfloor \frac{15}{x} \right\rfloor \right] = 120$

44. a) Prove that for any natural number n, $a^n - b^n$ is divisible by $a - b$ where $a > b$

(OR)

b) If $x^4 + y^4 = 16$, find y''.

45. a) Prove that $\sqrt[3]{x^3+7} - \sqrt[3]{x^3+4}$ is approximately equal to $\frac{1}{x^2}$ when x is large.

(OR)

b) Evaluate : $\int \sin^{-1} x \, dx$

46. a) If the equation $\lambda x^2 - 10xy + 12y^2 + 5x - 16y - 3 = 0$ represents a pair of straight lines (i) find the value of λ. (ii) point of intersection of the lines.

(OR)

b) One bag contains 5 white and 3 black balls. Another bag contains 4 white and 6 black balls. If one ball is drawn from each bag, find the probability that (i) both are white (ii) both are black and (iii) one white and one black

47. a) Show that the vectors $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$, $\vec{b} = 6\hat{i} + 2\hat{j} - 3\hat{k}$, $\vec{c} = 3\hat{i} - 6\hat{j} + 2\hat{k}$ are mutually orthogonal.

(OR)

b) Prove that $\frac{\cos(180° + \theta)\sin(90° - \theta)\cos(-\theta)}{\sin(270° + \theta)\tan(-\theta)\operatorname{cosec}(360° + \theta)} = \cos^2\theta \cot\theta$

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