SIR CV RAMAN COACHING CENTRE,IDAPPADI,SALEM.

X – MATHEMATICS – PUBLIC MODEL EXAM [FULL PORTION]-2024

TOTAL MARK : 100 M TIME : 3 HRS

SECTION –A (14 X 1=14 M)

CODE: THIRU-PH.D, M9

CHOOSE THE CORRECT BEST ANSWER

1. If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is

a) 1 b) 4 c) 5 d) 3

2. If $g = \{(1,1),(2,3),(3,5),(4,7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are

a) (-1,2) b) (2,-1) c) (5,4) d) (-3,7)

3.Euclid's division lemma states that for positive integers *a* and *b*, there exist unique integers *q* and *r* such that $a = bq + r$, where *r* must satisfy

(A) $1 < r < b$ (B) $0 < r < b$ (C) $0 \le r < b$ (D) $0 < r \le b$

4. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is

a) 7 b) 12 c) 5 d) 11

5. The solution of $(2x-1)^2 = 9$ is equal to

a) 8 b) -1,3 c) -1,2 d) 0

6. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives

(A) $\frac{x^2-7x+40}{(x-5)(x+5)}$ (B) $\frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$

(C) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$ (D) $\frac{x^2+10}{(x^2-25)(x+1)}$

7. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar,

(A) $\angle B = \angle E$ (B) $\angle A = \angle D$ (C) $\angle B = \angle D$ (D) $\angle A = \angle F$

In a ΔABC, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm.

8. The length of the side AC is

a) 4 cm b) -4 cm c) 5cm d) 10 cm

9. The area of triangle formed by the points (-5,0) , (0,-5) and (5,0) is

a) -25 Sq.units b) -15 Sq.units c) 25 Sq.units d) 0 Sq.units

10. The straight line given by the equation $x = 11$ is

(A) parallel to *X* axis (B) parallel to *Y* axis

(C) passing through the origin (D) passing through the point (0,11)

11. $(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)$ is equal to

a) 2 b) 11 c) -2 d) infinity

12. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, then the angle of elevation of the sun has measure

(A) 45° (B) 30° (C) 90° (D) 60°

13. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is

(A) $\frac{9\pi h^2}{8}$ sq.units (B) $24\pi h^2$ sq.units (C) $\frac{8\pi h^2}{9}$ sq.units (D) $\frac{56\pi h^2}{9}$ sq.units

14. The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 = 1:2$ then $r_2 : r_1$ is

(A) 1 : 3 (B) 1 : 2 (C) 2 : 1 (D) 3 : 1

Section – B (10 x 2 = 20 m)

Answer any ten questions .compulsory Q.no 20

11. If $f(x)=x^2-1$, $g(x)=x-2$ find a, if $g\circ f(a)=1$.

12. Find the sum of first six terms of the G.P. 5, 15, 45, ...

13. If a polynomial $p(x)=x^2-5x-14$ is divided by another polynomial $q(x)$ we get $\frac{x-7}{x+2}$, find $q(x)$.

14 If a matrix has18elements, what are the possible orders it can have? What if it has6elements?

15

The hypotenuse of a right triangle is 6 m more than twice of the

shortest side. If the third side is 2 m less than the hypotenuse, find the sides of the triangle.

16. If the points $A(2,2)$, $B(-2,-3)$, $C(1,-3)$ and $D(x, y)$ form a parallelogram then find the value of x and y.

17. State menelaus theorem (without proof)

18. Show that $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right)=\left(\frac{1-\tan A}{1-\cot A}\right)^2$

19. Show that the points $(-2,5)$, $(6,-1)$ and $(2,2)$ are collinear.

20. Find the volume of a cylinder whose height is 2 m and whose base area is 250 m^2

21. If the total surface area of a cone of radius 7cm is 704 cm^2, then find its slant height.

22. The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

23.Write the sample space for selecting two balls at a time from a bag containing 6 balls numbered 1 to 6 (using tree diagram)

24. *A* and *B* are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both *A* and *B* getting selected is 0.3. Prove that the probability of *B* being selected is atmost 0.8

Section – C (10 x 5 = 50 m)

Answer any ten questions .compulsory Q.no 34

25

A function $f:[-5,9]\to\mathbb{R}$ is defined as follows:

$$f(x)=\begin{cases}6x+1; & -5\le x<2\\ 5x^2-1; & 2\le x<6\\ 3x-4; & 6\le x\le 9\end{cases}$$

Find (i) $f(-3)+f(2)$ (ii) $f(7)-f(1)$ (iii) $2f(4)+f(8)$ (iv) $\dfrac{2f(-2)-f(6)}{f(4)+f(-2)}$

26

Prove that $2^n+6\times 9^n$ is always divisible by 7 for any positive integer n.

27.

Find the LCM of each pair of the following polynomials

(i) $a^2+4a-12, a^2-5a+6$ whose *GCD is* $a-2$

(ii) $x^4-27a^3x, (x-3a)^2$ whose *GCD* is $(x-3a)$

28.

ABCD is a trapezium in which $AB \parallel DC$ and P, Q are points on AD and BC respectively, such that $PQ \parallel DC$ if $PD = 18$ cm, $BQ = 35$ cm and $QC = 15$ cm, find AD.

29.

Find the equation of a straight line joining the point of intersection of $3x+y+2=0$ and $x-2y-4=0$ to the point of intersection of $7x-3y=-12$ and $2y=x+3$

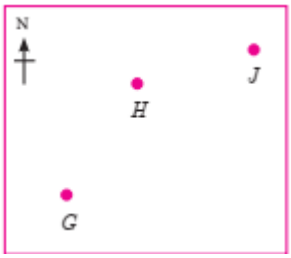
30.

An aeroplane sets off from *G* on a bearing of 24° towards *H*, a point 250 km away. At *H* it changes course and heads towards *J* deviates further by 55° and a distance of 180 km away.

(i) How far is *H* to the North of *G*? (ii) How far is *H* to the East of *G*?

(iii) How far is *J* to the North of *H*? (iv) How far is *J* to the East of *H*?

$$\begin{pmatrix}\sin 24^\circ = 0.4067 & \sin 11^\circ = 0.1908\\ \cos 24^\circ = 0.9135 & \cos 11^\circ = 0.9816\end{pmatrix}$$



31.Arul has to make arrangements for the accommodation of 150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by a cone. Each person occupies 4 sq. m of the space on ground and 40 cu. meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is 8 m?

32. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that

(i) The student opted for NCC but not NSS. (ii) The student opted for NSS but not NCC.(iii) The student opted for exactly one of them.

33. Find the excluded values of the following expressions (if any).

$$\text{(i)}\ \frac{x+10}{8x} \qquad \text{(ii)}\ \frac{7p+2}{8p^2+13p+5} \qquad \text{(iii)}\ \frac{x}{x^2+1}$$

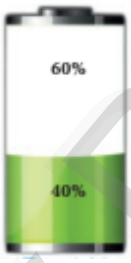
34.

$$\text{Simplify}\ \frac{\frac{1}{p}+\frac{1}{q+r}}{\frac{1}{p}-\frac{1}{q+r}} \times \left(1+\frac{q^2+r^2-p^2}{2qr}\right)$$

35.State and prove Baudhayana theorem

35. Show that in a triangle, the medians are concurrent.

36. A mobile phone is put to use when the battery power is 100%. The percent of battery power '*y*' (in decimal) remaining after using the mobile phone for *x* hours is assumed as $y = -0.25x + 1$ (i) Find the number of hours elapsed if the battery power is 40%. (ii) How much time does it take so that the battery has no power?



37. Find the least positive value of *x* such that

$$\text{(i)}\ \ 67 + x \equiv 1 \pmod 4 \quad \text{(ii)}\ 98 \equiv (x+4) \pmod 5$$

SECTION – C (2X 8 = 16 M)

ANSWER ALL QUESTIONS

38.

Construct a ΔABC such that $AB = 5.5$ cm, $\angle C = 25°$ and the altitude from C to AB is 4 cm.

(or)

Draw a triangle ABC of base $BC = 8$ cm, $\angle A = 60°$ and

the bisector of $\angle A$ meets BC at D such that $BD = 6$ cm.

39.

Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x = 9$ (ii) find x when $y = 7.5$.

(or)

Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$

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