Code No.	V – 2385

Common Entrance Examination for Admission to Four Year Under Graduate Programmes in the Teaching Departments of the University of Kerala, 2025

CSS

MATHEMATICS

For office use only

General Instructions

1. The Question Paper is having **40 Objective Questions**, each carrying **Four marks**.
2. The answers are to be (✓) 'tick marked' only in the "Response Sheet" provided.
3. **Negative marking : 1 mark will be deducted for each wrong answer.**

Time : 1 Hour **Max. Marks : 160**

To be filled in by the Candidate											
Register Number	in Figures										
	in words										

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Choose appropriate answer from the options in the questions.

(40 × 4 = 160 marks)

1. If a continuous function $f(x)$ does not have a root in the interval $[a, b]$, then which one of the following statements is TRUE?

   A. $f(a) \,.\, f(b) = 0$ B. $f(a) \,.\, f(b) \geq 0$

   C. $f(a) \,.\, f(b) > 0$ D. $f(a) \,.\, f(b) < 0$

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2. Which one among the following is a cube root of unity?

A. $\frac{1+i\sqrt{3}}{2}$

B. $1-i\sqrt{3}$

C. $\frac{-1+i\sqrt{3}}{2}$

D. $-1+i\frac{\sqrt{3}}{2}$

3. What is the radius of the circle $x^2+y^2+4x-6y-3=0$?

A. 4

B. 3

C. 6

D. 13

4. In a class of 40 students, 22 are good in Mathematics, 26 are good in Physics and 14 are good in both. How many students are weak in either of these subjects?

A. 7 B. 8

C. 6 D. 10

5. Consider $f(x)=\frac{\sqrt{2+x}-\sqrt{2}}{x}$. What will be $\lim_{x\to 0} f(x)$?

A. $\frac{1}{2}$

B. $\sqrt{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\frac{1}{2\sqrt{2}}$

6. Find the distance between the points $P(1,-4)$ and $P(4,-8)$ on the two dimensional plane.

A. $2\sqrt{5}$ B. 5

C. $\sqrt{5}$ D. $5\sqrt{5}$

7. What is the rate of change in area of a circle with respect to the diameter when the radius is $5m$?

A. $-5\pi m^2/m$

B. $10\pi m^2/m$

C. $-10\pi m^2/m$

D. $5\pi m^2/m$

8. What is the slope of the tangent to the circle $x^2 + y^2 = 25$ at the point $P(3, -4)$?

A. $\frac{3}{4}$

B. $-\frac{3}{4}$

C. $\frac{4}{3}$

D. $-\frac{4}{3}$

9. If $\tan^2 \alpha - 6\tan\alpha + 9$, $0 < A < 90°$, what is the value of $6\cot\alpha + 8\sqrt{10}\cos\alpha$?

A. $7\sqrt{10}$ B. $9\sqrt{10}$

C. $11\sqrt{10}$ D. 10

10. If $\sec^2 \alpha + \tan^2 \alpha = \frac{5}{3}$, then what is the value of $\tan 2\alpha$?

A. $4\sqrt{3}$ B. $\frac{3}{\sqrt{3}}$

C. $\frac{1}{\sqrt{3}}$ D. $5\sqrt{3}$

11. Which one among the following curves has slope of its tangent at the point (x, y) is $3x^2$ and passes through the point $P(1, -1)$?

A. $x^3 + 2$ B. $x^3 - 4$

C. $x^3 - 2$ D. $x^3 + 4$

12. What is the value of the definite integral $\int_{-1}^{1} 3x^2\sqrt{x^3+1}\,dx$?

A. $\frac{2\sqrt{2}}{3}$

B. $\frac{3\sqrt{2}}{4}$

C. $\frac{4\sqrt{2}}{3}$

D. $\frac{8\sqrt{2}}{3}$

13. What is the area of the region enclosed by the parabola $y = 2 - x^2$ and the line $y = -x$?

A. $\frac{7}{2}$

B. $\frac{9}{2}$

C. $\frac{11}{2}$

D. $\frac{13}{3}$

14. How many two digit numbers can be formed using the digits 6,7 and 8 if the repetition of digits are allowed?

A. 9 B. 12

C. 24 D. 6

15. How many committees of 5 students can be selected from a class of 25?

A. 52120 B. 53130

C. 51230 D. 53410

16. How many 7 – digit telephone numbers can be formed if the first digit cannot be 0 or 1?

A. $8 \times 8 \times 10 \times 10 \times 10 \times 10 \times 10$

B. $8 \times 9 \times 10 \times 10 \times 10 \times 10 \times 10$

C. $10 \times 9 \times 10 \times 10 \times 10 \times 10 \times 10$

D. $8 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

17. Which of the following is the general solution of the differential equation $(x^2+1)\frac{dy}{dx} = y$?

A. $y = \frac{2x^3}{6} + 3x + c$

B. $ce^{\tan^{-1}x}$

C. $e^{\tan^{-1}x} + c$

D. ce^{x^2+1}

18. What is the integrating factor for the differential equation $\frac{dy}{dx} + 2y = x$?

A. e^{-3x}

B. e^{-x^2}

C. e^{2x}

D. e^{-2x}

19. Choose the correct value of $\int x^2 e^x dx$.

A. $x^2e^x + 2e^x + C$

B. $x^2e^x - 2xe^x + C$

C. $\left(x^2 - 2x + 2\right)e^x + C$

D. $\left(x^2 + 2x - 2\right)e^x + C$

20. What is the sum of the infinite series $\frac{1}{9}+\frac{1}{27}+\frac{1}{81}+....$?

A. $\frac{1}{11}$

B. $\frac{1}{6}$

C. $\frac{1}{17}$

D. $\frac{1}{91}$

21. $3x^2-6xy+3y^2+2x-7=0$ represents

A. an ellipse

B. a circle

C. a parabola

D. a hyperbola

22. What is the angle between the vectors $\hat{i}-2\hat{j}-2\hat{k}$ and $6\hat{i}+3\hat{j}+2\hat{k}$?

A. $\cos^{-1}\left(\frac{4}{21}\right)$

B. $\cos^{-1}\left(\frac{4}{23}\right)$

C. $\cos^{-1}\left(-\frac{4}{21}\right)$

D. $\cos^{-1}\left(-\frac{4}{23}\right)$

23. What is the value of the definite integral $\int_0^{\pi}\tan x\,dx$?

A. 1

B. 0

C. $\sqrt{3}$

D. $\sqrt{2}$

24. What is the area of the triangle with vertices $P(1, -1, 0)$, $Q(2, 1, -1)$ and $R(-1, 1, 2)$?

A. $6\sqrt{2}$

B. $4\sqrt{2}$

C. $6\sqrt{3}$

D. $3\sqrt{2}$

25. What is the value of the definite integral $\int_0^{\pi} \log_e(x)dx$?

A. $-\pi + \pi\log(\pi)$

B. $\pi - \pi\log(\pi)$

C. $-2\pi - \pi\log(\pi)$

D. $2\pi + \pi\log(\pi)$

26. What is the area of the region enclosed by the parabola $y = x^2$ and the line $y = x + 2$.

A. $\frac{7}{2}$

B. $\frac{9}{2}$

C. $\frac{11}{2}$

D. $\frac{11}{3}$

27. What is the determinant of the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & -1 & -2 \\ 2 & 3 & 1 \end{bmatrix}$?

A. 35

B. 36

C. 37

D. 38

28. Choose the solution of the system of equations $3x + y + z = 2$, $6x + y + 2z = 1$, $2x + 8y + 9z = -3$.

A. $x = \frac{18}{25}, y = 33, z = \frac{19}{25}$

B. $x = \frac{18}{25}, y = 3, z = \frac{-79}{25}$

C. $x = \frac{81}{25}, y = 13, z = \frac{-19}{25}$

D. $x = \frac{81}{25}, y = 3, z = \frac{19}{25}$

29. Which of following is the characteristic polynomial for the given matrix $A = \begin{pmatrix} 1 & 2 & -6 \\ 8 & 6 & -7 \\ 3 & -2 & 4 \end{pmatrix}$?

A. $x^3 + 11x^2 - 22x + 108$

B. $x^3 - 11x^2 + 22x - 108$

C. $2x^3 - 11x^2 - 22x + 108$

D. $-2x^3 + 11x^2 - 22x - 108$

30. What are the characteristic values of the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 3 & 0 \\ -6 & 3 & 2 \end{bmatrix}$?

A. – 2, 2, 3

B. 3, 2, 1

C. 0, 1, 3

D. 4. – 2, 6

31. In how many ways can you choose a president, secretary and treasurer for a club from 12 candidates, if each one eligible for each position and no candidate can hold two positions?

A. 1230
B. 1023
C. 2024
D. 1320

32. What is the limit of sequence of partial sums of the series $\sum_{n=0}^{\infty} 3^{2+n}\, 2^{1-3n}$?

A. $\frac{124}{55}$
B. $\frac{142}{5}$
C. $\frac{144}{5}$
D. $\frac{242}{55}$

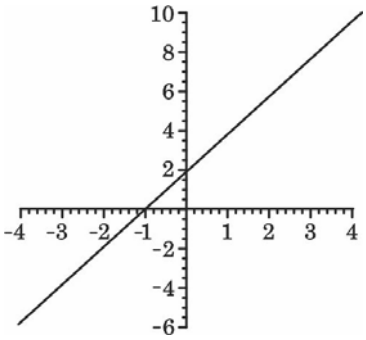
33. What is the area of the region between the x – axis and the graph of $f(x) = x^3 - x^2 - 2x$, $-1 \le x \le 2$?

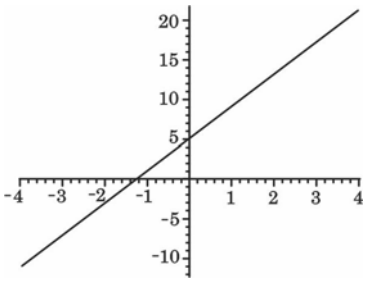
A. $\frac{13}{72}$
B. $\frac{73}{21}$
C. $\frac{37}{12}$
D. $\frac{17}{12}$

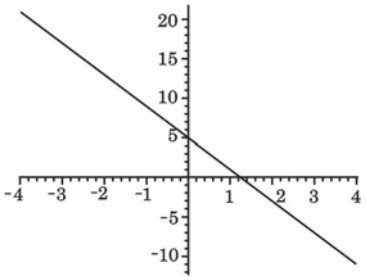
34. What is the derivative of x^x, $x > 0$?

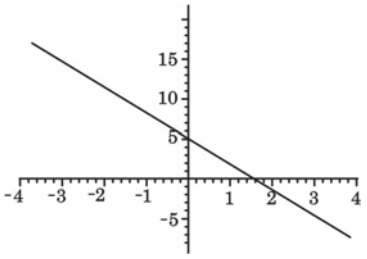
A. $x \times x^{\log x - 1}$
B. $x^x \left(\log x^x\right)$
C. $x^x (1 + \log x)$
D. $x^x \left(1 + \log x^x\right)$

35. Which of the following is the graph of the line $y = 4x + 5$ in the interval $[-4, 4]$?

A. 

B. 

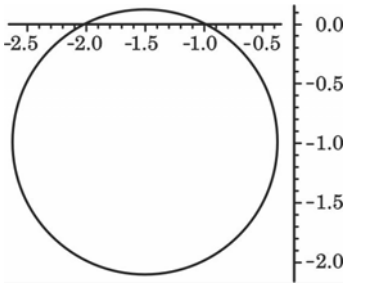
C. 

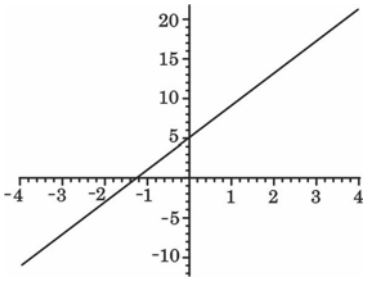
D. 

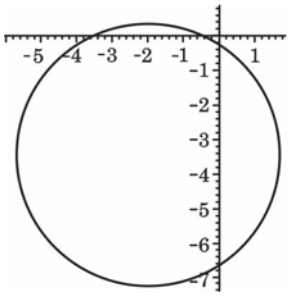
36. A basket contains 30 blue balls and 70 pink balls. What is the probability of getting exactly 10 blue balls in a sample of size 20 if the sampling is done with replacement?

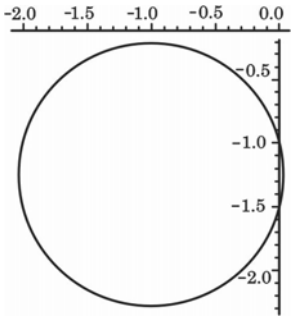
A. 0.0418
B. 0.0308
C. 0.0234
D. 0.2234

37. Identify the correct graph of the circle $x^2 + y^2 - x - 3y - 1 = 0$

A. 

B. 

C. 

D. 

38. What is the slope of the line $8x + 5y = 20$?

A. $\frac{20}{8}$

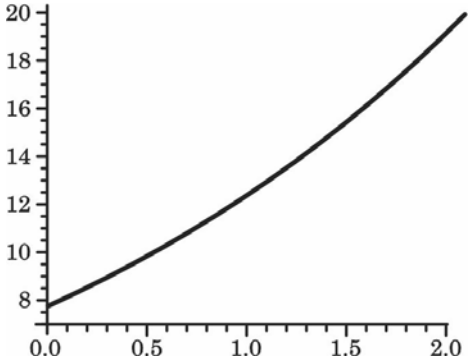
B. $-\frac{8}{5}$

C. $\frac{5}{8}$

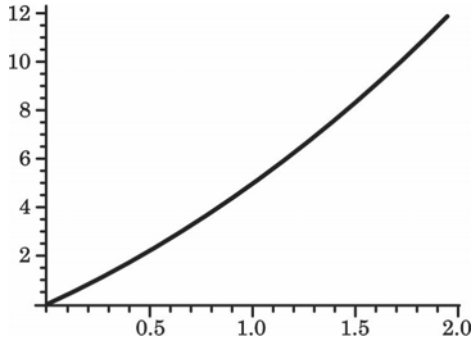
D. $-\frac{1}{5}$

39. Which of the following is the graph of the function $f(x) = (x-2)^2 + 4$ in the interval $[0, 2]$?

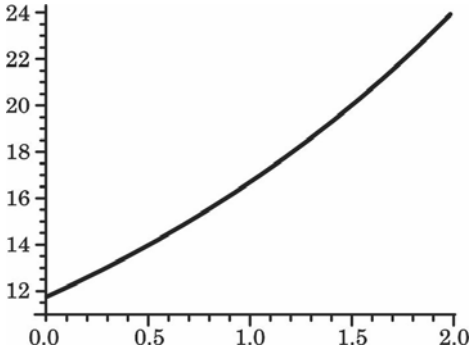
A.



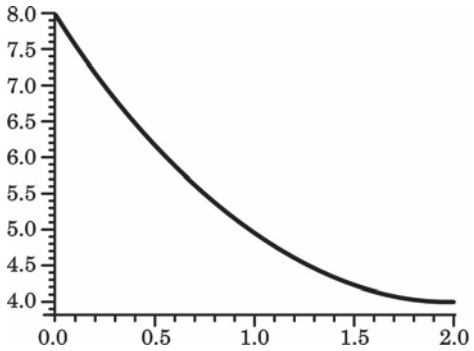
B.



C.



D.



40. Choose the correct complex number that is equal to the quotient $\frac{4+2i}{1-i}$.

A. $1+3i$

B. $3+i$

C. $4-3i$

D. $2+3i$

RESPONSE SHEET

1	A	B	C	D	E	11	A	B	C	D	E	21	A	B	C	D	E	31	A	B	C	D	E
2	A	B	C	D	E	12	A	B	C	D	E	22	A	B	C	D	E	32	A	B	C	D	E
3	A	B	C	D	E	13	A	B	C	D	E	23	A	B	C	D	E	33	A	B	C	D	E
4	A	B	C	D	E	14	A	B	C	D	E	24	A	B	C	D	E	34	A	B	C	D	E
5	A	B	C	D	E	15	A	B	C	D	E	25	A	B	C	D	E	35	A	B	C	D	E
6	A	B	C	D	E	16	A	B	C	D	E	26	A	B	C	D	E	36	A	B	C	D	E
7	A	B	C	D	E	17	A	B	C	D	E	27	A	B	C	D	E	37	A	B	C	D	E
8	A	B	C	D	E	18	A	B	C	D	E	28	A	B	C	D	E	38	A	B	C	D	E
9	A	B	C	D	E	19	A	B	C	D	E	29	A	B	C	D	E	39	A	B	C	D	E
10	A	B	C	D	E	20	A	B	C	D	E	30	A	B	C	D	E	40	A	B	C	D	E

ROUGH WORK

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