18. The roots of the equation $ax^2+bx+c=0$ are real. If

A) $D>0$ where $D=b^2-4ac$
B) $D<0$
C) $D=0$
D) $D\geq 0$

19. In the order of matrix A is $m\times p$ and the order of B is $p\times n$ then order of matrix AB is:

A) $m\times n$ (B) $n\times m$ (C) $n\times p$ (D) $p\times n$

20. If $A=\begin{bmatrix}2i & i\\ i & -i\end{bmatrix}$ then $|A|=$

A) 2 (B) 3 (C) 4 (D) 5

21. $(AB)^t=$

A) B^tA^t (B) A^tB^t
C) AB (D) BA

22. What is a, if $B=\begin{bmatrix}1 & 4\\ 2 & a\end{bmatrix}$ is a singular matrix

A) 5 (B) 6 (C) 7 (D) 8

23. The matrix $A=\begin{bmatrix}90\\ 09\end{bmatrix}$ is

A) even matrix (B) odd matrix
C) scalar matrix (D) identity matrix

24. If $A=\begin{bmatrix}\alpha & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$ then value of α for which $A^2=B$ is

A) 1 (B) –1 (C) 4 (D) no real values

25. If A and B are square matrices of equal order then which one is correct

A) $A+B=B+A$ (B) $A+B=A-B$
C) $A-B=B-A$ (D) $AB=BA$

26. Order of a matrix $\begin{bmatrix}2 & 5 & 7\end{bmatrix}$ is

A) 3×3 (B) 1×1
C) 3×1 (D) 1×3

27. The determinant of a singular matrix is

A) 1 (B) 2 (C) 0 (D) 3

28. The 10^{th} term of the $A\cdot P$ $Z+4+6+8+\cdots$ is

A) 10 (B) 12 (C) 14 (D) 20

29. The rank of non-singular matrix 3×3 is

A) 1 (B) 2 (C) 0 (D) 3

30. The sum of the first 20 terms of the $A.P$ $1+4+7+10+\cdots$ is

A) 590 (B) 580 (C) 550 (D) 540

31. The 10^{th} term of the geometric series $5+25+125+\cdots$ is

A) 5^5 (B) 5^{10} (C) 5^1 (D) 5^{20}

32. Sum of first 100 natural numbers is

A) 5050 (B) 500 (C) 100 (D) 200

33. Which term of the A.P $5+2+\cdots$ is –22

A) 1st term (B) 2nd term (C) 3rd term (D) 10^{th} term

34. The complex conjugate of $1+8i$ is

A) $1-8i$ (B) $-1-8i$ (C) $-1+8i$ (D) $8i$

35. If $Z+\overline{Z}=0$ then Z is

A) purely real B) purely imaginary
C) none D) both A & B

36. If Z is a complex number, then

A) $|Z^2|>|Z|^2$ (B) $|Z^2|=|Z|^2$
C) $|Z^2|<|Z|^2$ (D) $|Z^2|\geq|Z|^2$

37. If By $|Z_1+Z_2|=|Z_1|+|Z_2|$, then

A) $Z_2=\overline{Z}_1$ (B) $Z_2=1/Z_1$
C) $\arg(Z_1)=\arg(Z_2)$ (D) $|Z_1|=|Z_2|$

38. The value of $\sqrt{-1}$ is

A) i (B) 1 (C) -1 (D) $-i$

39. $\lim\limits_{x\to 0}\dfrac{\sin x}{2x}$ is equal to

A) 2 (B) -2 (C) ½ (D) $-$½

40. $\dfrac{d}{dx}\left(\sin x+2x^2\right)$ is equal to

A) $-\cos x+4x$ (B) $\cos x-4x$
C) $\cos x+4x$ (D) $\sin x+2x^2$

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DESCRIPTIVE QUESTIONS

Very Short Answer Type Questions (to be answered upto a maximum of 30 words)

1. Prove that $\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix} = 0$ where w is cube root of unity.
2. Find the 10^{th} term of the geometric series $5+25+125+\cdots$
3. Evaluate $\int x \log x \, dx$
4. If α, β, γ are the roots of equation $x^3 - px + qx - r = 0$ then find $\Sigma\alpha\beta$.

Medium Answer Type Questions (to be answered upto a maximum of 200 words)

5. Differentiate $\sin x$ by first principle method.
6. Solve the following inequalities (a) $4x+3<5x+7$ (b) $\frac{x}{3} > \frac{x}{2} + 1$.

Long Answer Type Question (to be answered upto a maximum of 500 words)

7. Solve the following simultaneous equations by Cramer's Rule $x+y+z=20$; $2x+y-z=23$; $3x+y+z=46$.

OR

Find the sum of squares of first n natural numbers.

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MATHEMATICS IN COMPUTING
(Course Code: MC-116)

Questions Booklet Series B
Semester-I

Time Allowed: 2 Hours

Maximum Marks: 60
Minimum Marks: 24

MULTIPLE CHOICE QUESTIONS

1. $1/x$ is discontinuous at $x =$
   A) 0 (B) 1 (C) -1 (D) 2

2. $\frac{d}{dx}\left(\frac{x}{\sin x}\right)$ is
   A) 0
   B) $\sin x = x\cos x / (\sin x)^2$
   C) $\sin x + x\cos x / (\sin x)^2$
   D) 1

3. If $y = \cos\theta, x = \sin\theta$ then $dy/dx =$
   A) $-\tan\theta$ (B) $-\cot\theta$
   C) $\cot\theta$ (D) $\tan\theta$

4. $\int \frac{1}{x} dx =$
   A) $-\log x + c$ (B) $\log x + c$
   C) $\log\frac{1}{x} + c$ (D) $\log\frac{1}{x^2} + c$

5. $\int x e^x dx =$
   A) $e^x(x^2 - 1) + c$
   B) $e^x(x^2 + 1) + c$
   C) $e^x(x + 1) + c$ 7!
   D) $e^x(x - 1) + c$

6. If $y = \tan^{-1} x$ then dy/dx is:
   A) $\frac{1}{\sqrt{1+x^2}}$ (B) $\frac{1}{\sqrt{1-x^2}}$
   (C) $\frac{1}{1+x^2}$ (D) $\frac{1}{1-x^2}$

7. $\int x^n dx =$:
   A) $\frac{x^{n+1}}{n+1}$ (B) $\frac{x^{n+1}}{n}$
   C) x^{n+1} (D) $(x)^{n-1}$

8. $\int x\sec^2 x\, dx =$
   A) $x\cot x - \log\sin x$ (B) $-x\cot x + \log\sin x$
   C) $x\cot x + \log\sin x$ (D) $-x\cot x - \log\sin x$

9. The degree of a constant polynomial is
   A) 1 (B) 2 (C) -1 (D) 0

10. Bi quadratic polynomial has degree
    A) 1 (B) 2 (C) 3 (D) 4

11. $3x^2 + 4x + 5$ is a polynomial over the set of
    A) integers (B) complex numbers
    C) rational numbers (D) None of the above

12. If α, β, γ are the roots of $ax^3 + bx^2 + cx + d = 0$ then $\alpha + \beta + \gamma =$
    A) $-b/a$ (B) b/a
    C) 0 (D) c/a

13. An odd degree polynomial over reals has at least one zero
    A) complex (B) real
    C) both A & B (D) none

14. The roots of the equation $x^2 - 1 = 0$ are
    A) 1, 2 (B) 1, -1
    C) 2, -2 (D) 0, 1

15. The sum of roots of the equation $ax^2 + bx + c = 0$ is
    A) c/a (B) $-$b/a
    C) b/a D) $-$c/a

16. The solution set of the linear inequality $\frac{x}{3} > \frac{x}{2} + 1$ is
    A) $(-\infty, 0)$ (B) $(-1, 1)$
    C) $(-\infty, -6)$ (D) $(0, 1)$

17. The solution set of the linear inequality $4x + 3 < 5x + 7$ is
    A) $(0, \infty)$ (B) $(4, \infty)$
    C) $(-4, \infty)$ (D) $(-1, \infty)$

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