REV-00
BSE/15/20

2016/12

B.Sc. ELECTRONICS
First Semester
MATHEMATICS-I
(BSE - 104)

Duration: 3Hrs. **Full Marks: 70**

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

Answer any *four* from *Question no.* 2 to 8
***Question no.* 1 is compulsory.**

1. If $A=\begin{bmatrix}3 & 7\\ -5 & 4\end{bmatrix}, B=\begin{bmatrix}2 & 3\\ -1 & 5\end{bmatrix}$ Verify that $(AB)^{-1}=B^{-1}A^{-1}$ (10)

2. If A is a 2x3 Matrix given by (10)

$A=\begin{pmatrix}1 & 2 & 3\\ 2 & 4 & 6\end{pmatrix}$, find $r(A)$

3. Solve by Matrix Method. (10)

$$x+2y-3z=-4$$
$$2x+3y+2z=2$$
$$3x-3y-4z=11$$

4. Reduce to partial fraction. (5+5=10)

(i) $\frac{x^3}{(x-a)(x-b)(x-c)}$ (ii) $\frac{x^2-3x-2}{(x+1)(x^2+x+1)^2}$

5. Expand using Maclaurin's expansion log{1-log(1-x)} in powers of x upto x^3. If f(x)=0 be a reciprocal equation of degree n and of the first type then f(x)=$x^n f(\frac{1}{x})$

(5+5=10)

6. Solve by Cramer's Rule. (10)

$$x + 2z = 7$$
$$3x + y = 5$$
$$2y - 3z = -5$$

7. Suppose the Matrix A is defined as above, i.e. (10)

$$A = \begin{pmatrix} 10 & 2 \\ 3 & -4 \end{pmatrix}$$

Suppose $f(x) = 2x^2 - 3x + 5$. Find $f(A)$. If $g(x) = x^2 + 3x - 10$ What is $g(A)$?

8. Prove that (10)

$Z\overline{Z} = |Z|^2$ and $|Z_1 Z_2| = |Z_1||Z_2|$

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Duration: 20 minutes **Marks – 20**

(PART A - Objective Type)

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

1. If $A = (1 \quad 2 \quad 3), B = \begin{pmatrix} 1 & 4 \\ 2 & 2 \\ 3 & 1 \end{pmatrix}$, then $AB = ?$

   (a) $AB = (14 \quad 11)$ (b) $AB = (14 \quad 21)$

   (c) $AB = \begin{pmatrix} 14 \\ 12 \\ 3 \end{pmatrix}$ (d) $AB = \begin{pmatrix} 14 \\ 12 \\ 7 \end{pmatrix}$

2. If α, β, γ be the roots of cubic equation $x^3 + px^2 + qx + r = 0$, then $\sum \alpha^2$ is

   (a) $p^2 + 2q = 0$ (b) $p^2 - 2q = 0$

   (c) $p^2 - q = 0$ (d) 0

3. If a function remains unaltered by an interchange of any two of its variables then it is

   (a) Singular function (b) Symmetric function

   (c) Asymmetric function (d) Cannot be defined

4. What is value of $1 + \omega + \omega^2 = ?$

   (a) 0 (b) 1 (c) -1 (d) 5

5. If two roots of the equation $2x^3 - x^2 - 18x + 9 = 0$ are equal in magnitude but opposite in sign, then the roots are

   (a) 2,1,1 (b) 1,0,1 (c) 2,1,1 (d) 3,- 3, $\frac{1}{2}$

6. If $A = \begin{pmatrix} 1^2 & 2^2 & 3^2 \\ 4^2 & 5^2 & 6^2 \end{pmatrix}, B = \begin{pmatrix} 1 & 4 & 9 \\ 16 & 25 & 36 \end{pmatrix}$ then

   (a) $A = B$ (b) $A \neq B$

   (c) $AB = BA$ (d) none of these

7. If α be a root of order 3 of the equation $x^4 + bx^2 + cx + d = 0$, then α is

   (a) $\frac{-8d}{3c}$ (b) $\frac{8d}{3c}$ (c) 1 (d) 0

8. $\begin{pmatrix} 4 & x \\ 2 & 5 \end{pmatrix}$ is singular for

(a) $x = 10$ (b) $x = 1$ (c) $x = -10$ (d) $x = -1$

9. If α, β, γ be the roots of the cubic equation $a_0x^3 + a_1x^2 + a_2x + a_3 = 0$, then

(a) $\sum \alpha = -\frac{a_1}{a_0}$ (b) $\sum \alpha = \frac{a_1}{a_0}$

(c) $\sum \alpha = 0$ (d) $\sum \alpha = 1$

10. Two matrix A and B can be multiplied if

(a) Column number of A= Row number of B

(b) Column number of B= Row number of A

(c) Both are same order

(d) Both are not same order

11. The standard form of a cubic equation $a_0x^3 + a_1x^2 + a_2x + a_3 = 0$ with binomial coefficient is

(a) $z^3 + 3H^2z + 3H + G = 0$ (b) $z^3 + 3H + G = 0$

(c) $z = 0$ (d) $z = 1$

12. If $Z = 3 + 4i$, then $\overline{Z} = ?$

(a) $Z = 3 - 4i$ (b) $Z = -3 + 4i$

(c) $Z = -3 - 4i$ (d) $Z = 3 + 4i$

13. The series expansion $1 - \frac{\alpha^2}{2!} + \frac{\alpha^4}{4!} - \cdots \ldots + (-1)^n \frac{\alpha^{2n}}{(2n)!} + \ldots \ldots$ is the expansion of

(a) cos α (b) sin α

(c) $tan\alpha$ (d) None of these

14. What is the value of $\left|\frac{1}{1+i}\right| = ?$

(a) $\frac{1}{\sqrt{2}}$ (b) $-\frac{1}{\sqrt{2}}$

(c) 1 (d) None of these

15. The value of cos x is

(a) $\frac{1}{2}(e^{ix} + e^{-ix})$ (b) e^{ix}

(c) $\frac{1}{2}(e^{ix} - e^{-ix})$ (d) None of these

16. If $Z = x + iy$, polarform of z is

(a) $Z = r(\cos\theta + i\sin\theta)$ (b) $Z = r(\cos\theta - i\sin\theta)$

(c) $Z = (\cos\theta + i\sin\theta)$ (d) $Z = (\cos\theta + \sin\theta)$

17. Any positive integral power of ω is equal to

(a) - 1, ω, ω^2 (b) 1, ω, ω^2

(c) 1, $-\omega, -\omega^2$ (d) 0

18. What is the value of $i^{4n+3} = ?$

(a) $-i$ (b) i (c) i^2 (d) i^3

19. The square root of - i is

(a) $\pm\frac{(1-i)}{\sqrt{2}}$ (b) $\pm\frac{(1+i)}{\sqrt{2}}$

(c) 1+i (d) Cannot be defined

20. $\sqrt{-1} = ?$

(a) i (b) i^2 (c) $-i$ (d) i^3

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