REV-00
BSE/07/12

2015/12

# 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**

**I. Answer any *five* of the following questions:**

1. Find the modulus and argument of the complex numbers, $\frac{1+i}{1-i}$ and $\frac{2+3i}{i}$. (6+4=10)

   Express $\frac{(\cos\theta+\sin\theta)^8}{(\sin\theta+\cos\theta)4}$ in the form $x+iy$.

2. (i) Find the middle term of $(x+2)^7$ and $\left(2x+\frac{1}{x}\right)^{14}$. (5+5=10)

   (ii) Show that

   $$\left(1+\frac{x^2}{2!}+\frac{x^4}{4!}+\cdots\infty\right)-\left(x+\frac{x^3}{3!}+\frac{x^5}{5!}+\cdots\infty\right)=1$$

3. (i) Solve the equation $2x^3+3x^2-32x-48=0$, given that the sum of any two roots are zero.

   (ii) Solve the equation $2x^3-3x^2-6x+8=0$, given that the roots are in A. P. (5+5=10)

4. Write any two properties of (i) matrix multiplication and (ii) transpose of matrix.

   Find $AB$ and $BA$, where, $A=\begin{pmatrix}2&1&3\\-1&4&-6\\7&1&2\end{pmatrix}$ and $B=\begin{pmatrix}1&1&1\\1&4&5\\0&2&1\end{pmatrix}$. (4+6=10)

5. Solve the following system of equations $x+y+z=6$, $x+2z=7$, $3x+y+z=12$ by using

   (i) matrix method (ii) Cramer's rule. (5+5=10)

6. Define inverse of a square matrix. Find $A^{-1}$, where $A=\begin{pmatrix} 1 & 2 & 3 \\ 1 & 0 & 1 \\ -1 & 2 & 3 \end{pmatrix}$. Prove $AB=BA=I$, where $B=\frac{adjA}{|A|}$. (2+6+2=10)

7. Separate the following into real and imaginary part: (2×5=10)

(i) $\sin(x+iy)$ (ii) $\cos(x+iy)$ (iii) $\tan(x+iy)$

(iv) $\cot(x+iy)$ (v) $\sec(x+iy)$ (vi) $\operatorname{cosec}(x+iy)$

8. Express, (i) $\sin^7\theta$ as a sum of sines of multiples of $\theta$. (5+5=10)

(ii) $\cos^8\theta$ as a sum of cosines of multiples of $\theta$.

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## MATHEMATICS-I
## (BSE - 104)

**Duration: 20 minutes** **Marks – 20**

**(PART A - Objective Type)**

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

1. Sum of the roots of the equation $x^5+3x^4+4x^3+12=0$ is
   (i) 3 (ii) -3 (iii) 1 (iv) -1
2. Sum of the products of the roots taken two at a time of the $x^5+2x^4+2x^3+x=0$ is
   (i) 2 (ii) -2 (iii) 1 (iv) -1
3. The cofactor of -2 in the matrix $\begin{pmatrix}4 & -2\\ 1 & 3\end{pmatrix}$ is
   (i) 3 (ii) -4 (iii) -1 (iv) 1
4. The rank of the matrix $\begin{pmatrix}3 & -7\\ -3 & 7\end{pmatrix}$ is
   (i) 0 (ii) 1 (iii) 2 (iv) None of these
5. If A is a $3\times 3$ matrix and $|A|=3$, then $|3A|=$
   (i) 3 (ii) 9 (iii) 27 (iv) 81
6. If $\begin{pmatrix}1 & 2 & 0\\ 8 & x & -1\\ 2 & 4 & 5\end{pmatrix}=\begin{pmatrix}1 & 2 & 0\\ 8 & 9 & -1\\ 2 & 4 & 5\end{pmatrix}$, then the value of $x$ is
   (i) 0 (ii) 2 (iii) 9 (iv) 5
7. If $A=\begin{pmatrix}1 & 0 & 0\\ 2 & -3 & 0\\ 4 & 5 & 6\end{pmatrix}$, then $|A|$ is
   (i) 1 (ii) 4 (iii) -1 (iv) -18
8. If $z=a+ib$ then $z+2\bar{z}$ is
   (i) 4a (ii) 2a (iii) ib (iv) 2ib

9. The real part of $\frac{2-3i}{2+i}$ is

(i) $\frac{1}{5}$ (ii) $\frac{7}{5}$ (iii) $-\frac{1}{5}$ (iv) $-\frac{2}{5}$

10. $(cos\theta + isin\theta)^n =$

(i) $cosn\theta + isinn\theta$ (ii) $cosn\theta - isinn\theta$

(iii) $e^{in}\theta$ (iv) None of these

11. $sin\theta =$

(i) $\frac{e^{i\theta}+e^{-i\theta}}{2}$ (ii) $\frac{e^{i\theta}-e^{-i\theta}}{2}$ (iii) $e^{i\theta} - e^{-i\theta}$ (iv) $e^{i\theta} + e^{-i\theta}$

12. The value of $cosh0$ is

(i) 1 (ii) $\frac{1}{2}$ (iii) 0 (iv) $\frac{1}{\sqrt{2}}$

13. Which of the following is true?

(i) $sinix = sinhx$ (ii) $cosix = coshx$

(iii) $tanix = tanhx$ (iv) $cotix = cothx$

14. Which of the following is not true?

(i) $e^{\theta} + e^{-\theta} = 2cosh\theta$ (ii) $e^{\theta} - e^{-\theta} = 2sinh\theta$

(iii) $e^{i\theta} = cos\theta + isin\theta$ (iv) $e^{\theta} - e^{-\theta} = 2isinh\theta$

15. Modulus of $-\sqrt{3} - i$ is

(i) 1 (ii) 2 (iii) 3 (iv) 4

16. If $\alpha, \beta, \gamma$ are the roots of the equation $x^3 + px^2 + qx + r = 0$ the $\alpha\beta\gamma = ?$

(i) $p$ (ii) $q$ (iii) $r$ (iv) $-r$

17. The middle term in the expansion of $(a+x)^n$, when $n$ is even is

(i) $C^n_{n/2} a^{n/2} x^{n/2}$ (ii) $C^n_{n/2} a^n x^{n/2}$ (iii) $C^n_{n/2} a^{n/2} x^n$ (iv) $C^n_{n/2} a^n x^n$

18. The general term $T_{r+1}$ in the expansion of $(a+x)^n$ is

(i) $C^n_r a^{n-r} x^r$ (ii) $C^n_r a^r x^{n-r}$ (iii) $C^n_{n/2} a^{n/2} x^n$ (iv) $C^n_{n/2} a^n x^n$

19. Which of the following is correct?

(i) $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + ....\infty$ (ii) $e^x = 1 + x + \frac{x^2}{2} + \frac{x^3}{3} + ....\infty$

(iii) $e^x = 1 + x + \frac{x^2}{2} + \frac{x^4}{4} + ....\infty$ (iv) $e^x = 1 + x + \frac{x^3}{3} + \frac{x^5}{5} + ....\infty$

20. If $A$ and $B$ are two square matrix of same order and $AB=BA=I$, then which of the following is correct,

(i) $B = \frac{adjA}{|A|}$ (ii) $B = adjA$ (iii) $B = \frac{adjA}{|B|}$ (iv) $A = \frac{adjB}{|A|}$

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