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**MADE EASY  
WORKBOOK**

**Engg. Mathematics + Reasoning &  
Aptitude + General English**

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# **Engineering Mathematics (Description Sheet)**

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## 1

## Linear Algebra



## Multiple Choice Questions

Q.1 If  $X$  and  $Y$  are two singular matrices such that  $XY = Y$  and  $YX = X$  then  $X^2 + Y^2$  equals

- (a)  $X + Y$       (b)  $XY$   
 (c)  $YX$       (d)  $2(X + Y)$

[IISC]

Q.2 Let  $A$  be a  $10 \times 10$  matrix in which each row has exactly one entry is equal to 1 the remaining nine entries of the row being 0 which of the following is not possible value for the determinant of the matrix.

- (a) 0      (b) -1  
 (c) 10      (d) 1

[IISC]

Q.3 A,B,C,D,E are non-singular matrices of same order such that  $DABEC = I$  then  $B^{-1} =$  \_\_\_\_\_.

- (a) DAEC      (b) ADEC  
 (c) ECDA      (d) ECAD

[GATE]

Q.4 Let  $A$  be a  $3 \times 3$  matrix, whose elements are  $a_{ij} = i^2 - j^2 \forall i, j$  then  $A^{-1} =$  \_\_\_\_\_.

- (a)  $A$  itself      (b)  $\text{Adj } A$   
 (c)  $A^T$       (d) does not exist

Q.5 The adjoint of the matrix

$$A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$$

- (a)  $A$       (b)  $3A$   
 (c)  $3A^T$       (d)  $A^T$

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Q.6 Let  $A = (a_{ij})_{n \times n}$  such that  $a_{ij} = 3 \forall i, j$  then nullity of  $A$  is \_\_\_\_\_

- (a)  $n - 1$       (b)  $n$   
 (c)  $n - 3$       (d) 0

Q.7 The system of equations

$$\begin{aligned} ax + y + z &= 0 \\ x + ay + z &= 0 \\ x + y + az &= 0 \end{aligned}$$

Has infinitely many solutions. The set of values of  $a$  for this to happen is

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

[IISC]

Q.8 Let  $A$  be an  $m \times n$  matrix with rank  $r$ , the dimension of the space of solutions of the system of linear equations  $Ax = 0$  is

- (a)  $r$       (b)  $n - r$   
 (c)  $m - r$       (d)  $\min\{m, n\} - r$

[GATE]

Q.9 The system of equations

$$\begin{aligned} x + y + z &= 6 \\ x + 4y + 6z &= 20 \\ x + 4y + \lambda z &= \mu \end{aligned}$$

has no solution for \_\_\_\_\_

- (a)  $\lambda = 6 \mu = 20$       (b)  $\lambda \neq 6 \mu \neq 20$   
 (c)  $\lambda \neq 6 \mu = 20$       (d)  $\lambda = 6 \mu \neq 20$

[GATE]

Q.10  $A$  is  $n \times n$  matrix such that  $A^2 = I$  and  $B$  is  $n \times 1$  real vector then  $Ax = B$  has \_\_\_\_\_

- (a) no solution  
 (b) unique solution

- (c) Infinitely many solutions  
 (d) None

[GATE]

Q.11 The Eigen values of  $A = \begin{bmatrix} a & 1 & 0 \\ 1 & a & 1 \\ 0 & 1 & a \end{bmatrix}$  are \_\_\_\_\_

- (a)  $a, a, a$       (b)  $0, a, 2a$   
 (c)  $-a, 2a, 2a$       (d)  $a, a + \sqrt{2}, a - \sqrt{2}$

Q.12 The Eigen values of  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$  are

- (a)  $0, 1, 2$       (b)  $1, 1, 1$   
 (c)  $0, 0, 1$       (d)  $0, 0, 3$

Q.13 The sum of Eigen values of the matrix

$$A = \begin{bmatrix} \frac{1}{1.2} & 0 & 0 & 0 & \dots & 0 \\ \frac{1}{1.2} & \frac{1}{2.3} & 0 & 0 & \dots & 0 \\ \frac{1}{1.2} & \frac{1}{2.3} & \frac{1}{3.4} & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ \frac{1}{1.2} & \frac{1}{2.3} & \frac{1}{3.4} & \frac{1}{4.5} & \dots & \frac{1}{n(n+1)} \end{bmatrix}$$

is \_\_\_\_\_

- (a)  $\frac{1}{n}$       (b)  $1 - \frac{1}{n+1}$   
 (c)  $\frac{1}{n!}$       (d)  $\frac{2}{n(n+1)}$

Q.14 The product of Eigen values of the matrix

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & \dots & 0 \\ 1 & \frac{1}{2} & 0 & 0 & \dots & 0 \\ 1 & \frac{1}{2} & \frac{1}{3} & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & \frac{1}{2} & \frac{1}{3} & \frac{1}{4} & \dots & \frac{1}{n} \end{bmatrix}$$

is \_\_\_\_\_

- (a)  $n^2 + n + 1$       (b)  $\frac{n(n+1)}{2}$   
 (c)  $\frac{1}{n!}$       (d)  $\frac{1}{n}$

Q.15 Suppose the matrix  $A = \begin{bmatrix} 40 & -29 & -11 \\ -18 & 30 & -12 \\ 26 & 24 & -50 \end{bmatrix}$

has a certain complex number  $\lambda \neq 0$  as an Eigen value. Which of the following must also be an Eigen value of  $A$ .

- (a)  $\lambda + 20$       (b)  $\lambda - 20$   
 (c)  $20 - \lambda$       (d)  $-20 - \lambda$

[CSIR]

Q.16 The number of linearly independent Eigen

vectors of the matrix  $\begin{bmatrix} 2 & 2 & 0 & 0 \\ 2 & 1 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 1 & 4 \end{bmatrix}$  is \_\_\_\_\_

- (a) 1      (b) 2  
 (c) 3      (d) 4

[GATE]

Q.17 If the characteristic roots of  $\begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$  are  $\lambda_1, \lambda_2$ ,

the characteristic roots of  $\begin{bmatrix} 5 & -7 \\ -2 & 3 \end{bmatrix}$  are \_\_\_\_\_

- (a)  $\lambda_1 + \lambda_2, \lambda_1 - \lambda_2$       (b)  $\frac{1}{\lambda_1}, \frac{1}{\lambda_2}$   
 (c)  $2\lambda_1, 2\lambda_2$       (d)  $\lambda_1 + \lambda_2, \lambda_2 - \lambda_1$

Q.18 Let  $A$  be a  $3 \times 3$  matrix whose characteristic roots are  $3, 2, -1$ . If  $B = A^2 - A$  then  $|B| =$  \_\_\_\_\_

- (a) 24      (b) -2  
 (c) 12      (d) -12

[IISC]

Q.19 If  $A = \begin{bmatrix} 1 & 0 & 0 \\ i & \frac{-1+i\sqrt{3}}{2} & 0 \\ 0 & 1+2i & \frac{-1-i\sqrt{3}}{2} \end{bmatrix}$  then trace of  $A^{102}$  is

- (a) 0 (b) 1  
(c) 2 (d) 3 [GATE]

Q.20 If a  $3 \times 3$  real skew symmetric matrix has an Eigen value  $2i$ , then one of the remaining Eigen value is \_\_

- (a)  $\frac{1}{2!}$  (b)  $-\frac{1}{2!}$   
(c) 0 (d) 1 [GATE]

Q.21 A matrix M has Eigen values 1 and 4 with Eigen vectors  $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$  and  $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$  respectively. Then matrix M is \_\_

- (a)  $\begin{bmatrix} -4 & -8 \\ 5 & 9 \end{bmatrix}$  (b)  $\begin{bmatrix} 9 & -8 \\ 5 & -4 \end{bmatrix}$   
(c)  $\begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$  (d)  $\begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$  [GATE]

Q.22 Let A be a  $3 \times 3$  real matrix. Suppose 1 and -1 are two of the three Eigen values of A and 18 is one of the Eigen values of  $A^2 + 3A$ . Then \_\_

- (a) Both A and  $A^2 + 3A$  are invertible  
(b)  $A^2 + 3A$  is invertible but A is not invertible  
(c) A is invertible but  $A^2 + 3A$  is not invertible  
(d) Both A and  $A^2 + 3A$  are not invertible.

[CSIR]

Q.23 The Eigen vector corresponding to the largest Eigen value of the matrix  $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$  is \_\_

- (a)  $\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$  (b)  $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$   
(c)  $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$  (d) None

Q.24 Let P and Q be square matrices such that  $PQ = I$  then zero is an Eigen value of \_\_

- (a) P but not Q (b) Q but not P  
(c) both P and Q (d) neither P nor Q

[GATE]

Q.25 A real  $n \times n$  matrix  $A = [a_{ij}]$  is defined as

$$a_{ij} = \begin{cases} i & \forall i = j \\ 0 & \text{otherwise} \end{cases}$$

The sum of all  $n$  Eigen value of matrix A is \_\_

- (a)  $\frac{n(n+1)}{2}$  (b)  $\frac{n(n-1)}{2}$   
(c)  $n^2$  (d)  $\frac{n(n+1)(2n+1)}{6}$

[GATE]

Q.26 For the matrix  $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 7 & 6 \\ -1 & -2 & 0 \end{bmatrix}$  has Eigen

values 5, -3, 3 an Eigen vector corresponding to the Eigen value 5 is  $[1 \ 2 \ -1]^T$  one of the Eigen vector of  $A^3$  is \_\_

- (a)  $\begin{bmatrix} 1 \\ 8 \\ -1 \end{bmatrix}$  (b)  $\begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$   
(c)  $\begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$  (d)  $\begin{bmatrix} 1 \\ \sqrt{2} \\ -1 \end{bmatrix}$

[GATE]

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Q.27 For the matrix  $M = \begin{bmatrix} 2 & 3+2i & -4 \\ 3-2i & 5 & 6i \\ -4 & -6i & 3 \end{bmatrix}$

Which of the following are correct

- P: M is skew-Hermitian and  $iM$  is Hermitian  
Q: M is Hermitian and  $iM$  is skew-Hermitian  
R: Eigen values of M are real  
S: Eigen values of  $iM$  are real  
(a) P and R only (b) Q and R only  
(c) P and S only (d) Q and S only

[GATE]

Q.31 Let A be a  $3 \times 3$  matrix such that  $|A - I| = 0$ . If trace of A = 13 and  $\det A = 32$  then the sum of squares of the eigen values of A is \_\_.

- (a) 82 (b) 13  
(c) 169 (d) 81

[GATE]

Q.32 The value of x for which all the eigen-values of the matrix given below are real is

$$\begin{bmatrix} 10 & 5+j & 4 \\ x & 20 & 2 \\ 4 & 2 & -10 \end{bmatrix}$$

- (a)  $5+j$  (b)  $5-j$   
(c)  $1-5j$  (d)  $1+5j$

[GATE]

Q.33 If the following system has non-trivial solution,

$$\begin{aligned} px + qy + rz &= 0 \\ qx + ry + pz &= 0 \\ rx + py + qz &= 0 \end{aligned}$$

then which one of the following options is True?

- (a)  $p - q + r = 0$  or  $p = q = -r$   
(b)  $p + q - r = 0$  or  $p = -q = r$   
(c)  $p + q + r = 0$  or  $p = q = r$   
(d)  $p - q + r = 0$  or  $p = -q = -r$

[GATE]

Q.34 In the given matrix  $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 1 & 0 \\ 1 & 2 & 1 \end{bmatrix}$ , one of the eigenvalues is 1. the eigenvectors corresponding to the eigenvalue 1 are

- (a)  $\{\alpha(4,2,1) | \alpha \neq 0, \alpha \in \mathbb{R}\}$   
(b)  $\{\alpha(-4,2,1) | \alpha \neq 0, \alpha \in \mathbb{R}\}$   
(c)  $\{\alpha(\sqrt{2},0,1) | \alpha \neq 0, \alpha \in \mathbb{R}\}$   
(d)  $\{\alpha(-\sqrt{2},0,1) | \alpha \neq 0, \alpha \in \mathbb{R}\}$

[GATE]

Q.35 Let  $A = [a_{ij}]$ ,  $1 \leq i, j \leq n$  with  $n \geq 3$  and  $a_{ij} = i.j$ . The rank of  $A$  is

- (a) 0 (b) 1  
(c)  $n - 1$  (d)  $n$

[GATE]

Q.36 Let  $M^4 = I$ , (where  $I$  denotes the identity matrix) and  $M \neq I$ ,  $M^2 \neq I$  and  $M^3 \neq I$ . Then, for any natural number  $k$ ,  $M^{-1}$  equals:

- (a)  $M^{4k+1}$  (b)  $M^{4k+2}$   
(c)  $M^{4k+3}$  (d)  $M^{4k}$

[GATE-2016]

Q.37 The condition for which the eigenvalues of the matrix

$$A = \begin{bmatrix} 2 & 1 \\ 1 & k \end{bmatrix}$$

are positive, is

- (a)  $k > \frac{1}{2}$  (b)  $k > -2$   
(c)  $k > 0$  (d)  $k < -\frac{1}{2}$

[GATE-2016]

Q.38 Consider the following linear system.

$$x + 2y - 3z = a$$

$$2x + 3y + 3z = b$$

$$5x + 9y - 6z = c$$

This system is consistent if  $a$ ,  $b$  and  $c$  satisfy the equation

- (a)  $7a - b - c = 0$  (b)  $3a + b - c = 0$   
(c)  $3a - b + c = 0$  (d)  $7a - b + c = 0$

[GATE-2016]

Q.39 A  $3 \times 3$  matrix  $P$  is such that,  $P^3 = P$ . Then the eigenvalues of  $P$  are

- (a)  $1, 1, -1$   
(b)  $1, 0.5 + j0.866, 0.5 - j0.866$   
(c)  $1, -0.5 + j0.866, -0.5 - j0.866$   
(d)  $0, 1, -1$

[GATE-2016]



### Numerical Data Type Questions

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Q.40 Let  $A$  be  $n \times n$  matrix with entries 0 and 1 and  $n > 1$ . If there is exactly one non-zero entry in each row and each column of  $A$ . Then the determinant value of  $A$ , must be \_\_\_\_\_

[IISCE]

Q.41 The number of singular matrices of order 2, where each element is either 0 or 1 is \_\_\_\_\_

Q.42 The expansion of determinant of a square matrix consisting 120 terms then order of the matrix is \_\_\_\_\_

Q.43 If  $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$  and  $|A^3| = 125$  then  $\alpha =$  \_\_\_\_\_

Q.44 The rank of  $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$  \_\_\_\_\_

Q.45 The rank of  $A = \begin{bmatrix} 4 & 7 & 2 \\ 3 & -1 & 5 \\ 7 & 6 & x \end{bmatrix}$  is 2 then  $x =$  \_\_\_\_\_

Q.46 If  $A = (a_{ij})_{m \times n}$  and  $a_{ij} = 5 \forall i, j$  then rank of  $A =$  \_\_\_\_\_

Q.47 If  $X$  is  $n \times 1$  matrix then the rank of  $XX^T$  is \_\_\_\_\_

Q.48 The system of equations

$$x + y + z = 1$$

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

$$x + 2y - kz = 4$$

Where  $k \in R$ , has infinitely many solutions for \_\_\_\_\_

[CSIR]

Q.49  $A$  is  $3 \times 4$  matrix and  $Ax = B$  is an inconsistent system. Then the highest possible rank of  $A =$  \_\_\_\_\_

Q.50 The Eigen values of  $A = \begin{bmatrix} 2 & 3 \\ x & y \end{bmatrix}$  are 4 and 8 then  $x =$  \_\_\_\_\_  $y =$  \_\_\_\_\_

[GATE]

Q.51 Let  $A$  be a  $3 \times 3$  matrix with Eigen values  $-1, 1, 0$ . Then  $|A^{100} + I|$  is \_\_\_\_\_

[GATE]

Q.52 The constant term of the characteristic polynomial of the matrix

$$\begin{bmatrix} 1 & 2 & 6 & 5 \\ -1 & 3 & 2 & -5 \\ 2 & 4 & 12 & 10 \\ 3 & -2 & 1 & -4 \end{bmatrix}$$

[GATE]

Q.53 Perform the following operations on the matrix

$$\begin{bmatrix} 3 & 4 & 45 \\ 7 & 8 & 105 \\ 13 & 2 & 195 \end{bmatrix}$$

- Add the third row to the second row.
- Subtract the third column from the first column.

The determinant of the resultant matrix is \_\_\_\_\_

[GATE]

Q.54 The matrix  $A = \begin{bmatrix} a & 0 & 3 & 7 \\ 2 & 5 & 1 & 3 \\ 0 & 0 & 2 & 4 \\ 0 & 0 & 0 & b \end{bmatrix}$  has  $\det(A) = 100$  and trace  $(A) = 14$ . The value of  $|a - b|$  is \_\_\_\_\_

[GATE-2016]



### Try Yourself

T1. Let  $A = \begin{bmatrix} \frac{1}{9} & -\frac{4}{9} & \frac{8}{9} \\ \frac{8}{9} & \frac{4}{9} & \frac{1}{9} \\ \frac{\alpha}{9} & -\frac{7}{9} & \frac{\beta}{9} \end{bmatrix}$  for some  $\alpha, \beta \in R$

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If  $A$  is orthogonal then \_\_\_\_\_

- (a)  $\alpha = -4 \beta = -4$  (b)  $\alpha = 12 \beta = -5$   
(c)  $\alpha = 4 \beta = -4$  (d)  $\alpha = -4 \beta = -3$

[Ans: (c)]

$$\begin{bmatrix} a & b & c \\ x & y & z \\ p & q & r \end{bmatrix}$$

$$((2A)^{-1}) = \text{_____}$$

[Ans: 1/48]

T3. The rank of  $4 \times 4$  skew-symmetric matrix

$$\begin{bmatrix} 0 & 1 & 0 & 1 \\ -1 & 0 & 1 & 0 \\ 0 & -1 & 0 & 1 \\ -1 & 0 & -1 & 0 \end{bmatrix}$$

[Ans: 4]

T4. The system of equations

$$x + 2y + 3z = \lambda x$$

$$3x + y + 2z = \lambda y$$

$$2x + 3y + z = \lambda z$$

Has a non-zero solution when  $\lambda =$  \_\_\_\_\_.

- (a) 2 (b) 4  
(c) 6 (d) 8

[Ans: (c)]

T5. The system of equations

$$2x + y = 5$$

$$x - 3y = -1$$

$$3x + 4y = k$$

is consistent when  $K =$  \_\_\_\_\_

[Ans: 10]

T6. The Eigen values of  $A = \begin{bmatrix} 2 & -1 \\ -4 & 5 \end{bmatrix}$  are \_\_\_\_\_

- (a)  $-1, 1$  (b)  $4, -1$   
(c)  $2, 5$  (d)  $1, 6$

[Ans: (d)]

T7. Consider the matrix  $A = \begin{bmatrix} 0 & 1 & 2 & 0 \\ 1 & 0 & 1 & 0 \\ 2 & 1 & 0 & 2 \\ 0 & 0 & 2 & 0 \end{bmatrix}$ . Then \_\_\_\_\_.

- (a) A has no real Eigen value
- (b) All Eigen values of A are positive and real
- (c) All real Eigen values of A are negative
- (d) A has both positive and negative real Eigen values.

[Ans: (d)]

T8. Let  $M = \begin{bmatrix} 1 & 1+i & 2i & 9 \\ 1-i & 3 & 4 & 7-i \\ -2i & 4 & 5 & i \\ 9 & 7+i & -i & 7 \end{bmatrix}$  then

- (a) M has only real Eigen values
- (b) M has only imaginary Eigen values
- (c) All Eigen values of M are zero
- (d) None of the above

[Ans: (a)]

T9. Let A be a  $3 \times 3$  matrix such that

$$A \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix}, A \begin{bmatrix} -1 \\ 2 \\ -1 \end{bmatrix} = \begin{bmatrix} -2 \\ 4 \\ -2 \end{bmatrix}, A \begin{bmatrix} 0 \\ -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 0 \\ -3 \\ 6 \end{bmatrix}$$

Suppose  $Q = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$  then  $AQ$  is

(a)  $\begin{bmatrix} 2 & -1 & 0 \\ -2 & 4 & -2 \\ 0 & 0 & 6 \end{bmatrix}$  (b)  $\begin{bmatrix} 2 & -1 & 0 \\ 0 & 0 & 6 \\ -2 & 4 & -2 \end{bmatrix}$

(c)  $\begin{bmatrix} 2 & -2 & 0 \\ -1 & 4 & -3 \\ 0 & -2 & 6 \end{bmatrix}$  (d)  $\begin{bmatrix} 2 & -2 & 0 \\ 0 & -2 & 6 \\ -1 & 4 & -3 \end{bmatrix}$

[CSIR]  
[Ans: (c)]

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T10. The number of different  $n \times n$  symmetric matrices with each element being 0 or 1 is

- (a)  $2n$
- (b)  $2^{n^2}$
- (c)  $2^{\frac{n^2-n}{2}}$
- (d)  $2^{\frac{n^2+n}{2}}$

[GATE]  
[Ans: (d)]

T11. If  $A = (a_{ij})m \times n$  is defined as  $a_{ij} = i + j \forall i, j$  then the sum of all elements of matrix A = \_\_\_\_.

- (a)  $\frac{mn}{2}(m+n+1)$
- (b)  $\frac{mn}{2}(m+n+2)$
- (c)  $\frac{m}{2}\left(\frac{n(n+1)}{2}\right)$
- (d)  $\frac{n}{2}\left(\frac{m(m+1)}{2}\right)$

[JNU]  
[Ans: (b)]

T12. The number of different matrices that can be formed with elements 0, 1, 2 and 3; each matrix having 4 elements is

- (a)  $2 \times 4^4$
- (b)  $3 \times 4^4$
- (c)  $4 \times 4^4$
- (d)  $3 \times 2^4$

[Ans: (b)]

T13. The system of equation

$$\begin{aligned} x + 2ay + az &= 0 \\ x + 3by + bz &= 0 \\ x + 4cy + cz &= 0 \end{aligned}$$

Has non-zero solution then a, b, c are

- (a) in A.P
- (b) in G.P
- (c) in H.P
- (d) in A.G.P

[Ans: (c)]

T14. Let  $\alpha = e^{2\pi i/5}$  and matrix

$$M = \begin{bmatrix} 1 & \alpha & \alpha^2 & \alpha^3 & \alpha^4 \\ 0 & \alpha & \alpha^2 & \alpha^3 & \alpha^4 \\ 0 & 0 & \alpha^2 & \alpha^3 & \alpha^4 \\ 0 & 0 & 0 & \alpha^3 & \alpha^4 \\ 0 & 0 & 0 & 0 & \alpha^4 \end{bmatrix}$$

then trace of the matrix  $I + M + M^2 = \underline{\hspace{2cm}}$ .

- (a) -5
- (b) 0
- (c) 3
- (d) 5

[GATE]  
[Ans: (d)]

T15. Let  $P = \begin{bmatrix} 0 & -2 & -3 \\ -1 & 1 & -1 \\ a & 2 & b \end{bmatrix}$  for some  $a, b \in R$ ,

suppose 1 and 2 are eigen values of P and

$$P \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} 3 \\ 0 \\ -3 \end{bmatrix} \text{ then } P^4 \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} \text{ is } \underline{\hspace{2cm}}.$$

(a)  $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$

(b)  $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$

(c)  $\begin{bmatrix} 16 \\ 16 \\ 0 \end{bmatrix}$

(d)  $\begin{bmatrix} 16 \\ -16 \\ 0 \end{bmatrix}$

[CSIR]  
[Ans: (d)]

T16. Let A be a  $4 \times 4$  matrix with real entries such that -1, 1, 2, -2 are its Eigen values. If

$$B = A^4 - 5A^2 + 5I \text{ then trace of } A + B \text{ is } \underline{\hspace{2cm}}.$$

[CSIR]  
[Ans: (4)]

## Differential Calculus



### Multiple Choice Questions

Q.1 The values of a and b for which the function

$$f(x) = \begin{cases} 2x+1, & \text{if } x \leq 1 \\ ax^2 + b & \text{if } 1 < x < 3 \\ 5x+2a & \text{if } x \geq 3 \end{cases}$$

is continuous every

where

- (a)  $a = 2, b = 1$
- (b)  $a = 1, b = 2$
- (c)  $a = 3, b = 2$
- (d)  $a = 2, b = 3$

[IISCE]

Q.2 Which of the following function is continuous at  $x = 3$ .

$$(a) f(x) = \begin{cases} 2, & x = 3 \\ x-1, & x > 3 \\ \frac{x+3}{3}, & x < 3 \end{cases}$$

$$(b) f(x) = \begin{cases} 4, & x = 3 \\ 8-x, & x \neq 3 \end{cases}$$

$$(c) f(x) = \begin{cases} x+3, & x \leq 3 \\ x-4, & x > 3 \end{cases}$$

$$(d) f(x) = \frac{1}{x^3 - 27}, x \neq 3$$

[GATE]

Q.3 If  $f(x) = \begin{cases} x^2 + 3x + a, & x \leq 1 \\ bx + 2, & x > 1 \end{cases}$  is

differentiable for all values of 'x' then a, b =

- (a)  $a = 3, b = 5$
- (b)  $a = 1, b = 2$
- (c)  $a = 1, b = 3$
- (d)  $a = 3, b = 1$

Q.4 If  $x = a(\theta - \sin\theta)$ ,  $y = a(1 - \cos\theta)$  then

$$\frac{d^2y}{dx^2} =$$

$$(a) -\frac{1}{a\sin^2\frac{\theta}{2}}$$

$$(b) -\frac{1}{4a}\operatorname{cosec}^4\frac{\theta}{2}$$

$$(c) -\frac{1}{4a}\sec^2\theta/2 \cdot \operatorname{cosec}^4\theta/2$$

$$(d) \frac{1}{4a}\sec^2\theta/2 \cdot \operatorname{cosec}^4\theta/2$$

$$Q.5 \lim_{x \rightarrow 0} e^x (\cos x)^{\frac{1}{\sin^2 x}} =$$

- (a) 1
- (b)  $e^{-1/2}$
- (c)  $e^{1/2}$
- (d) e

[CSIR]

Q.6 If  $\lim_{x \rightarrow 0} \frac{\sin 2x + a \sin x}{x^3} = b$  where 'b' is finite  
then  $a = \underline{\hspace{2cm}}$ ,  $b = \underline{\hspace{2cm}}$

- (a) -2, -1
- (b) 2, 1
- (c) 2, -1
- (d) -2, 1

Q.7 The values of a and b such that

$$\lim_{x \rightarrow 0} \frac{a \sin^2 x + b \log(\cos x)}{x^4} = \frac{1}{2}$$

- (a) -1, -2  
(b) 1, 2  
(c) -1, 2  
(d) 1, -2

[IAS]

$$Q.8 \lim_{n \rightarrow \infty} \left[ \frac{n}{n^2} + \frac{n}{n^2 + 1^2} + \dots + \frac{n}{n^2 + (n-1)^2} \right]$$

- (a)  $\frac{\pi}{4}$
- (b)  $\frac{\pi}{3}$
- (c) 0
- (d)  $\frac{1}{4}$

Q.9 Which of the following function satisfies all the conditions of Rolle's Theorem in the interval  $[0, 1]$

- (a)  $f(x) = \tan \pi x$
- (b)  $f(x) = \begin{cases} x, & 0 \leq x < \frac{1}{2} \\ 1-x, & \frac{1}{2} \leq x \leq 1 \end{cases}$
- (c)  $f(x) = x^2$
- (d)  $f(x) = \sqrt{x(1-x)}$

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Q.10 By applying Lagrange's mean value for the function  $f(x) = (1+x)\log(1+x)$  on  $[0, 1]$  the value of  $c \in (0, 1)$  is

- (a)  $\frac{4}{e}$
- (b)  $\frac{1}{e}$
- (c)  $\frac{4-e}{e}$
- (d)  $\frac{1-e}{e}$

Q.11 A curve 'C' is defined as  $x = a \cos^3\theta$ ,  $y = a \sin^3\theta$  in  $[0, \pi/2]$ . What will be the point P on curve C where the tangent to the curve is parallel to the chord joining points  $(a, 0)$  &  $(0, a)$ .

- (a)  $(a, a)$
- (b)  $\left(\frac{a}{2}, \frac{a}{2}\right)$
- (c)  $\left(\frac{a}{\sqrt{2}}, \frac{a}{\sqrt{2}}\right)$
- (d)  $\left(\frac{a}{2\sqrt{2}}, \frac{a}{2\sqrt{2}}\right)$

Q.12 The Taylor series expansion of  $\sin x$  about

$x = \frac{\pi}{6}$  is

$$(a) \frac{1}{2} + \frac{\sqrt{3}}{2} \left( x - \frac{\pi}{6} \right) - \frac{1}{4} \left( x - \frac{\pi}{6} \right)^2 + \dots$$

$$(b) x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$$

$$(c) \frac{1}{2}$$

$$(d) \frac{x - \pi/6}{1!} - \frac{(x - \pi/6)^3}{3!} + \dots$$

[GATE]

Q.13 The Taylor series expansion of  $f(x) = \frac{\sin x}{x - \pi}$  at  $x = \pi$  is

$$(a) 1 + \frac{(x - \pi)^2}{3!} + \dots$$

$$(b) -1 + \frac{(x - \pi)^2}{3!} + \dots$$

$$(c) 1 - \frac{(x - \pi)^2}{3!} + \dots$$

$$(d) \frac{x - \pi/6}{1!} - \frac{(x - \pi/6)^3}{3!} + \dots$$

[GATE]

Q.14 The Taylor series expansion of  $\log\left(\frac{1+x}{1-x}\right)$  at  $x = 0$  is

$$(a) 2 \left( x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right)$$

$$(b) 2 \left( x - \frac{x^3}{3} + \frac{x^5}{5} + \dots \right)$$

$$(c) 2 \left( \frac{x^2}{2} + \frac{x^4}{4} + \dots \right)$$

$$(d) 2 \left( \frac{x^2}{2} - \frac{x^4}{4} + \dots \right)$$

Q.15 In the Taylor series expansion of  $e^x$  about  $x = 2$ , the coefficient of  $(x - 2)^4$  is

$$(a) \frac{1}{4!}$$

$$(b) \frac{e^2}{4!}$$

$$(c) \frac{e^4}{4!}$$

$$(d) \frac{e^2}{2!}$$

[GATE]

Q.16 If  $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x + \dots}}}$  then

- $$\frac{dy}{dx} =$$
- (a)  $\frac{\tan x}{2y-1}$
  - (b)  $\frac{\sqrt{\tan x}}{2y-1}$
  - (c)  $\frac{\sec x}{2y-1}$
  - (d)  $\frac{\sec^2 x}{2y-1}$

Q.17 If  $u = f(r, s)$  where  $r = x + y, s = x - y$  then then

- $$u_x + u_y =$$
- (a)  $2u_r$
  - (b)  $2u_s$
  - (c)  $-2u_r$
  - (d)  $-2u_s$

Q.18 If  $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$  then  $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$

- (a)  $\sin 2u$
- (b)  $\cos 2u$
- (c)  $\tan 2u$
- (d)  $\cot 2u$

Q.19 If  $\sin u = \frac{x+2y+3z}{x^8+y^8+z^8}$  then

- $$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} =$$
- (a)  $\frac{1}{7}\tan u$
  - (b)  $-7\tan u$
  - (c)  $\frac{1}{7}\sec u$
  - (d)  $-\frac{1}{7}\tan u$

Q.20 If  $u = \frac{x^3 + y^3}{x - y} + x \sin\left(\frac{x}{y}\right)$  then

- $$x^2u_{xx} + 2xyu_{xy} + y^2u_{yy} =$$
- (a) 0
  - (b)  $2\left(\frac{x^3 + y^3}{x - y}\right)$
  - (c)  $x\sin\frac{x}{y}$
  - (d)  $u$

Q.21 The function  $f(x) = x^2 + \frac{250}{x}$  at  $x = 5$ , attains

- (a) maxima
- (b) minima
- (c) neither maxima nor minima
- (d) none

[GATE]

Q.22 Maximum value of  $f(x) = \frac{e^{\sin x}}{e^{\cos x}}, x \in \mathbb{R}$  is \_\_\_\_.

- (a)  $e^{\sqrt{2}}$
- (b)  $e^{-\sqrt{2}}$
- (c)  $e^{1/\sqrt{2}}$
- (d)  $e^{-1/\sqrt{2}}$

[GATE]

Q.23 The function  $f(x) = x^{1/x}$  has a maxima at  $x = \dots$ .

- (a) 1
- (b) e
- (c)  $e^2$
- (d) 2

Q.24 The function  $f(x, y) = 2x^4 + y^2 - x^2 - 2y$  has a relative \_\_\_\_.

- (a) maxima at  $\left(\frac{1}{2}, 1\right)$
- (b) minima at  $\left(\frac{1}{2}, 1\right)$
- (c) maxima at  $(0, 1)$
- (d) minima at  $(0, 1)$

[GATE]

Q.25 The function  $f(x, y) = 4x^2 + 6y^2 - 8x - 4y + 8$  the optimal value of  $f(x, y)$  is

- (a) a minimum value equal to  $\frac{10}{3}$
- (b) a maximum value equal to  $\frac{8}{3}$
- (c) a maximum value equal to  $\frac{10}{3}$
- (d) a minimum value equal to  $\frac{8}{3}$

[GATE]

Q.26  $\int_0^{\pi/4} \log(1 + \tan x) dx$

- (a) 0
- (b)  $\frac{\pi}{4} \log 2$
- (c)  $\frac{\pi}{8} \log 2$
- (d)  $\frac{\pi}{2} \log 2$

Q.27  $\int_0^{\pi/2} (a^2 \cos^2 x + b^2 \sin^2 x) dx =$

- (a) 0
- (b)  $\frac{\pi}{2}(a^2 + b^2)$
- (c)  $\frac{\pi}{4}(a^2 + b^2)$
- (d)  $\frac{\pi}{8}(a^2 + b^2)$

[JNU]

Q.28  $\int_0^{\pi/2} \sin^5 x \cos^3 x dx =$

- (a)  $\frac{1}{16}$
- (b)  $\frac{1}{24}$
- (c)  $\frac{1}{48}$
- (d)  $\frac{1}{96}$

Q.29  $\int_0^{\pi} \frac{1}{a^2 \cos^2 x + b^2 \sin^2 x} dx =$

- (a) 0
- (b)  $\frac{\pi}{ab}$
- (c)  $\pi ab$
- (d)  $\frac{\pi}{a^2 + b^2}$

Q.30  $\int_0^{\pi} x \sin^6 x \cos^4 x dx =$

- (a)  $\frac{3\pi^2}{512}$
- (b)  $\frac{5\pi^2}{256}$
- (c)  $\frac{3\pi^2}{256}$
- (d) 0

Q.31  $\int_0^1 x^6 \sqrt{1-x^2} dx =$

- (a)  $\frac{5\pi}{256}$
- (b)  $\frac{5\pi}{128}$
- (c)  $\frac{5\pi}{512}$
- (d)  $\frac{3\pi}{512}$

Q.32 The value of  $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx =$

- (a)  $\frac{\pi}{4}$
- (b)  $\frac{\pi}{2}$
- (c)  $\frac{\pi^2}{4}$
- (d)  $\frac{\pi^2}{8}$

Q.33 The value of  $\int_0^1 \frac{x^6}{\sqrt{1-x^2}} dx =$

- (a)  $\frac{\pi}{32}$
- (b)  $\frac{3\pi}{32}$
- (c)  $\frac{5\pi}{32}$
- (d) 0

Q.34  $\int_0^{\infty} e^{-y^3} \cdot y^{1/2} dy =$

- (a)  $\sqrt{\pi}$
- (b)  $\frac{\sqrt{\pi}}{3}$
- (c)  $\frac{\sqrt{\pi}}{2}$
- (d) 0

[GATE]

Q.35 The value of  $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy =$

- (a)  $\frac{\sqrt{\pi}}{2}$
- (b)  $\sqrt{\pi}$
- (c)  $\pi$
- (d)  $\frac{\pi}{4}$

[GATE]

Q.36 The value of  $\int_0^1 \int_{2y}^2 e^{x^2} dx dy =$

- (a)  $e^4$
- (b)  $e^4 - 1$
- (c)  $\frac{e^4 - 1}{4}$
- (d)  $\frac{e^4}{4}$

Q.37 The value of  $\int_0^{\pi} \int_x^{\pi} \int_0^2 \frac{\sin y}{y} dz dy dx =$

- (a) -2
- (b) 2
- (c) -4
- (d) 4

[GATE]

Q.38 By change the order of integration in

$\int_0^8 \int_{x/4}^2 f(x, y) dy dx$  changes to  $\int_r^s \int_p^q f(x, y) dx dy$   
then  $q =$

- (a) 4y
- (b)  $16y^2$
- (c) x
- (d) 8

[GATE]

Q.39 Let  $\int_0^1 \int_y^1 xy \sin(xy) dx dy = \int_0^1 \int_a^b xy \sin xy dy dx$

- (a)  $a = 0, b = x$
- (b)  $a = 1, b = x$
- (c)  $a = 0, b = 1$
- (d)  $a = -1, b = x$

[CSIR]

Q.40 By change the order of integration

$\int_0^2 \int_{x^2}^{2x} f(x, y) dy dx$  may be represented as

- (a)  $\int_0^2 \int_{x^2}^{2x} f(x, y) dy dx$
- (b)  $\int_0^2 \int_y^{\sqrt{y}} f(x, y) dy dx$
- (c)  $\int_0^4 \int_{y/2}^{\sqrt{y}} f(x, y) dy dx$
- (d)  $\int_{x^2}^{2x} \int_0^2 f(x, y) dy dx$

[GATE]

- Q.41 The area bounded by  $2y = x^2$  and  $x = y - 4$  is  
 (a) 6      (b) 18  
 (c) 16      (d)  $\infty$

- Q.42 The volume generated by revolving the area bounded by  $y^2 = 8x$  and the line  $x = 2$ , about y-axis is  
 (a)  $\frac{128\pi}{5}$       (b)  $\frac{5}{128\pi}$   
 (c)  $\frac{127}{5\pi}$       (d)  $\frac{32\pi}{5}$

- Q.43 By change of variables  $x = r \cos \theta, y = r \sin \theta$  in  $\iint f(x, y) dx dy$  changes to

$$\iint f(r \cos \theta, r \sin \theta) \phi(r, \theta) r dr d\theta \text{ then } \phi(r, \theta) =$$

(a)  $r$       (b)  $\frac{1}{r}$   
 (c)  $r^2$       (d) 1

[GATE]

- Q.44 By change of variables  $x = uv, y = \frac{v}{u}$  in  $\iint f(x, y) dx dy$  changes to

$$\iint f\left(uv, \frac{v}{u}\right) \phi(u, v) du dv \text{ then } \phi(u, v) =$$

(a)  $2uv$       (b)  $\frac{2u}{v}$   
 (c)  $\frac{2v}{u}$       (d) 1

[GATE]

- Q.45 As  $x$  varies from -1 to +3, which one of the following describes the behaviour of the function  $f(x) = x^3 - 3x^2 + 1$ ?  
 (a)  $f(x)$  increases monotonically.  
 (b)  $f(x)$  increases, then decreases and increases again.  
 (c)  $f(x)$  decreases, then increases and decreases again.  
 (d)  $f(x)$  increases and then decreases

[GATE-2016]

- Q.46 The area of the region bounded by the parabola  $y = x^2 + 1$  and the straight line  $x + y = 3$  is

(a) $\frac{59}{6}$	(b) $\frac{9}{2}$
(c) $\frac{10}{3}$	(d) $\frac{7}{6}$

[GATE-2016]



### Numerical Data Type Questions

- Q.47  $\lim_{x \rightarrow \infty} \left( e^{\frac{1}{5x}} - 1 \right) \left( 5x + \frac{x}{5} \sin \frac{1}{x} \right) = \underline{\hspace{2cm}}$

[CSIR]

- Q.48  $\lim_{n \rightarrow \infty} \left[ \frac{1}{1+n} + \frac{1}{2+n} + \dots + \frac{1}{n+n} \right] \text{ is } \underline{\hspace{2cm}}$

[IISC]

- Q.49 By applying, Rolle's theorem for  $f(x) = \frac{\sin x}{e^x}$  in  $[0, \pi]$ , the value of  $c \in (0, \pi)$  is  $\underline{\hspace{2cm}}$ .

- Q.50 By applying mean value theorem, for the function  $f(x) = \sqrt{x^2 - 4}$  on  $[2, 4]$ , the value of  $c \in (2, 4)$  is  $\underline{\hspace{2cm}}$ .

- Q.51 By applying Cauchy's mean value theorem for  $f(x) = x^2, g(x) = x^3$  over  $[1, 2]$  the value of  $c \in (1, 2)$  is  $\underline{\hspace{2cm}}$ .

- Q.52 Maximum slope of the curve  $-x^3 + 6x^2 + 2x + 1$  is  $\underline{\hspace{2cm}}$ .

- Q.53 If  $f(n) = \int_0^{\pi/4} \tan^n x dx$  then  $f(3) + f(1) = \underline{\hspace{2cm}}$

[JNU]

- Q.54 The value of  $\int_0^1 \int_0^{x^2} e^{y/x} dy dx = \underline{\hspace{2cm}}$

[JNU]

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- Q.55 The value of  $\int_0^\infty \int_x^\infty \frac{1}{y} e^{-y/2} dy dx = \underline{\hspace{2cm}}$

[GATE]

- Q.56 The area bounded by  $y^2 = 4x$  and  $x^2 = 4y$  is  $\underline{\hspace{2cm}}$ .

- Q.57 The value of  $\int_0^{\pi/2} \int_x^{\pi/2} \frac{\cos y}{y} dy dx = \underline{\hspace{2cm}}$

[CSIR]

- Q.58 The value of the integral of the function

$Q(x, y) = 4x^3 + 10y^4$  along the straight line segment from the point  $(0,0)$  to the point  $(1,2)$  in the  $xy$  plane is  $\underline{\hspace{2cm}}$

[GATE]

- Q.59 The length of the arc  $r = a(1 + \cos \theta)$  between  $\theta = 0$  to  $\pi$  is  $\underline{\hspace{2cm}}$ .

- Q.60 The maximum value attained by the function  $f(x) = x(x-1)(x-2)$  in the interval  $[1, 2]$  is  $\underline{\hspace{2cm}}$

[GATE-2016]



### Try Yourself

- T1.  $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{3n+k} = \underline{\hspace{2cm}}$

[Ans:  $\log\left(\frac{4}{3}\right)$ ]

- T2. If  $y = x + \sqrt{x + \sqrt{x + \dots}}$  then  $y(2) = \underline{\hspace{2cm}}$

- (a) 4 or 1      (b) 4 only  
 (c) 1 only      (d) undefined

[Ans: (b)]

- T3. If  $|4x - 7| = 5$ , then the value of  $2|x| - |x|$  is  $\underline{\hspace{2cm}}$

[Ans:  $3, \frac{1}{2}$ ]

- T4. If  $u = \begin{vmatrix} x^2 & y^2 & z^2 \\ x & y & z \\ 1 & 1 & 1 \end{vmatrix}$  then  $u_x + u_y + u_z = \underline{\hspace{2cm}}$

[Ans: 0]

- T5. The maximum value of  $f(x) = x^3 - 9x^2 + 24x + 5$  is  $\underline{\hspace{2cm}}$

[Ans: 25]

- T6.  $\int_0^{\pi/2} \frac{\cos x - \sin x}{1 + \sin x \cos x} dx = \underline{\hspace{2cm}}$

[Ans: 0]

- T7. The value of  $\int_1^2 \int_0^x \frac{1}{x^2 + y^2} dy dx = \underline{\hspace{2cm}}$

[Ans:  $\left(\frac{\pi}{4} \log 2\right)$ ]

- T8. Let  $E = \{(x, y) \in R^2, 0 < x < y, 0 < y < \infty\}$  then  $\iint_E ye^{-(x+y)} dx dy = \underline{\hspace{2cm}}$

[Ans: 3/4]

- T9. If  $R$  is the region bounded by  $x = 0, y = 0$  and  $x + y = 1$  then  $\iint_R (x^2 + y^2) dx dy = \underline{\hspace{2cm}}$

[Ans: 1/6]

- T10.  $\int_{-1}^2 1 + |x| dx = \underline{\hspace{2cm}}$

[Ans: 5.5]

- T11. The integral  $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$  converges to  $\underline{\hspace{2cm}}$

[Ans:  $\pi/2$ ]

- T12. The integral  $\int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$  converges to  $\underline{\hspace{2cm}}$

[Ans:  $\pi$ ]

T13.  $\lim_{n \rightarrow \infty} \left( \frac{n!}{n^n} \right)^{\frac{1}{n}}$

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

[Ans: (a)]

T14. A real function

$$f(x) = \begin{cases} \alpha x^2 + \beta x, & \text{for } x < 0 \\ \alpha x^3 + \beta x^2 + 5 \sin x, & x \geq 0 \end{cases}$$

If  $f(x)$  is twice differentiable then

- (a)  $\alpha = 1, \beta = 0$     (b)  $\alpha = 1, \beta = 5$   
(c)  $\alpha = 5, \beta = -10$     (d)  $\alpha = 5, \beta = 5$

[IISCE]

T15. If  $x^a y^b = (x+y)^{a+b}$  then  $\frac{dy}{dx} =$

- (a)  $\frac{x}{y}$       (b)  $\frac{1}{y}$   
(c)  $\frac{1}{x}$       (d)  $\frac{y}{x}$

T16. If  $z = f(x, y)$  where  $x = e^u + e^{-v}, y = e^{-u} - e^v$  then  $z_u - z_v =$   
(a)  $xz_x - yz_y$     (b)  $xz_x + yz_y$   
(c)  $xz_y + yz_x$     (d)  $xz_y - yz_x$

[Ans: (a)]

T17. If  $u = x^n f_1 \left( \frac{x}{y} \right) + y^{-n} f_2 \left( \frac{x}{y} \right)$  then

$$\frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} =$$

(a) 0      (b)  $n(n+1)u$   
(c)  $n^2 u$     (d)  $n(n-1)u$

[Ans: (c)]

T18.  $\int_0^{\pi/2} \log(\sin x) dx =$

- (a) 0      (b)  $\frac{-\pi}{2} \log 2$   
(c)  $-\pi \log 2$     (d)  $\log 2$

[JNU]  
[Ans: (b)]

T19.  $\int_{-\infty}^{\infty} e^{-x^2/2} dx =$

- (a)  $\frac{1}{2}$       (b)  $\sqrt{2\pi}$   
(c) 1      (d)  $\infty$

[GATE]  
[Ans: (b)]

T20. The value of  $\int_0^1 \int_y^1 y \sqrt{1+x^3} dx dy =$

- (a)  $2\sqrt{2}$       (b)  $\frac{2\sqrt{2}-1}{2}$   
(c)  $\frac{2\sqrt{2}-1}{8}$     (d)  $\frac{2\sqrt{2}-1}{9}$

[IISCE]  
[Ans: (d)]

T21. For  $n \in N$ , the value of  $\int_0^{n-1} \frac{1-(x/n)^n}{n-x} dx =$

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

[CSIR]  
[Ans: (b)]

T22. The maximum value of the function

$$5 \cos \theta + 3 \cos \left( \theta + \frac{\pi}{3} \right) + 3 \text{ is } \underline{\hspace{2cm}}$$



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3

## Vector Calculus



### Multiple Choice Questions

- Q.5 The flux of the vector field  $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$  flowing out through the surface of the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$  where  $a > b > c > 0$  is  
(a)  $\pi abc$     (b)  $3\pi abc$   
(c)  $2\pi abc$     (d)  $4\pi abc$  [GATE]
- Q.6 Let S be the sphere  $x^2 + y^2 + z^2 = 1$ . The value of surface integral  $\iint_S (x \sin y, \cos^2 x, 2z - z \sin y) \cdot (x, y, z) ds$  is  
(a)  $\frac{\pi}{3}$     (b)  $\frac{2\pi}{3}$   
(c)  $\frac{4\pi}{3}$     (d)  $\frac{8\pi}{3}$  [CSIR]
- Q.7 The value of  $\int_S (4x\vec{i} - 2y^2\vec{j} + z^2\vec{k}) \cdot \hat{n} ds$  where S is bounded by  $x^2 + y^2 = 4, z = 0$  and  $z = 3$  is  
(a)  $16\pi$     (b)  $48\pi$   
(c)  $32\pi$     (d)  $84\pi$
- Q.8 Let S be the unit sphere  $x^2 + y^2 + z^2 = 1$ . Then the value of surface integral  $\iint_S [(2x^2 + 3x) - y^2 + 5z^2] ds$  is  
(a)  $2\pi$     (b)  $4\pi$   
(c)  $8\pi$     (d)  $12\pi$  [CSIR]

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T13.  $\lim_{n \rightarrow \infty} \left( \frac{n!}{n^n} \right)^{\frac{1}{n}}$

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

[Ans: (a)]

T14. A real function

$$f(x) = \begin{cases} \alpha x^2 + \beta x, & \text{for } x < 0 \\ \alpha x^3 + \beta x^2 + 5 \sin x, & x \geq 0 \end{cases}$$

If  $f(x)$  is twice differentiable then

- (a)  $\alpha = 1, \beta = 0$     (b)  $\alpha = 1, \beta = 5$   
(c)  $\alpha = 5, \beta = -10$     (d)  $\alpha = 5, \beta = 5$

[IISC]

T15. If  $x^a y^b = (x+y)^{a+b}$  then  $\frac{dy}{dx} =$

- (a)  $\frac{x}{y}$       (b)  $\frac{1}{y}$   
(c)  $\frac{1}{x}$       (d)  $\frac{y}{x}$

T16. If  $z = f(x, y)$  where  $x = e^u + e^{-v}, y = e^{-u} - e^v$  then  $z_u - z_v =$

- (a)  $xz_x - yz_y$       (b)  $xz_x + yz_y$   
(c)  $xz_y + yz_x$       (d)  $xz_y - yz_x$

[Ans: (a)]

T17. If  $u = x^n f_1 \left( \frac{x}{y} \right) + y^{-n} f_2 \left( \frac{x}{y} \right)$  then

$$\frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} =$$

(a) 0      (b)  $n(n+1)u$   
(c)  $n^2 u$       (d)  $n(n-1)u$

[Ans: (c)]

T18.  $\int_0^{\pi/2} \log(\sin x) dx =$

- (a) 0      (b)  $\frac{-\pi}{2} \log 2$   
(c)  $-\pi \log 2$       (d)  $\log 2$

[JNU]  
[Ans: (b)]

T19.  $\int_{-\infty}^{\infty} e^{-x^2/2} dx =$

- (a)  $\frac{1}{2}$       (b)  $\sqrt{2\pi}$   
(c) 1      (d)  $\infty$

[GATE]  
[Ans: (b)]

T20. The value of  $\int_0^1 \int_y^1 y \sqrt{1+x^3} dx dy =$

- (a)  $2\sqrt{2}$       (b)  $\frac{2\sqrt{2}-1}{2}$   
(c)  $\frac{2\sqrt{2}-1}{8}$       (d)  $\frac{2\sqrt{2}-1}{9}$

[IISC]  
[Ans: (d)]

T21. For  $n \in N$ , the value of  $\int_0^{n/1-(x/n)^n} \frac{dx}{n-x} =$

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

[CSIR]  
[Ans: (b)]

T22. The maximum value of the function

$$5 \cos \theta + 3 \cos \left( \theta + \frac{\pi}{3} \right) + 3 \text{ is } \underline{\hspace{2cm}}$$



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3

## Vector Calculus



### Multiple Choice Questions

Q.5 The flux of the vector field

$$\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$$

flowing out through the surface of the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$   
 $a > b > c > 0$  is

- (a)  $\pi abc$       (b)  $3\pi abc$   
(c)  $2\pi abc$       (d)  $4\pi abc$

[GATE]

Q.6 Let S be the sphere  $x^2 + y^2 + z^2 = 1$ . The value of surface integral

$$\iint_S (x \sin y, \cos^2 x, 2z - z \sin y) \cdot (x, y, z) ds$$

- (a)  $\frac{\pi}{3}$       (b)  $\frac{2\pi}{3}$   
(c)  $\frac{4\pi}{3}$       (d)  $\frac{8\pi}{3}$

[CSIR]

Q.7 The value of  $\int_S (4x\vec{i} - 2y^2\vec{j} + z^2\vec{k}) \cdot \hat{n} ds$  where

S is bounded by  $x^2 + y^2 = 4, z = 0$  and  $z = 3$  is

- (a)  $16\pi$       (b)  $48\pi$   
(c)  $32\pi$       (d)  $84\pi$

Q.8 Let S be the unit sphere  $x^2 + y^2 + z^2 = 1$ . Then the value of surface integral

$$\iint_S [(2x^2 + 3x) - y^2 + 5z^2] ds$$

- (a)  $2\pi$       (b)  $4\pi$   
(c)  $8\pi$       (d)  $12\pi$

[CSIR]

Q.9 Let  $I = \int_C \frac{e^y}{x} dx + (e^y \ln x + x) dy$ , where  $C$  is the positive oriented boundary of the region enclosed by  $y = 1 + x^2$ ,  $y = 2$  and  $x = \frac{1}{2}$  then the value of  $I = \underline{\hspace{2cm}}$ .

- (a)  $\frac{1}{8}$       (b)  $\frac{5}{24}$   
 (c)  $\frac{7}{24}$       (d)  $\frac{3}{8}$

[GATE]

Q.10 The value of  $\int_C (2x^2 + y^2) dx + e^y dy$ , where  $C$  is the boundary of the region in first quadrant bounded by  $y = 0$ ,  $x = 0$  and  $x^2 + y^2 = 1$   $\underline{\hspace{2cm}}$ .

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

[GATE]

Q.11 The value of  $\int_C yzdx + xzdy + xydz$  where  $C$  is the line segment joining  $(1, 1, 0)$  and  $(2, 3, 2)$  is  $\underline{\hspace{2cm}}$ .

- (a) 0      (b) 7  
 (c) 9      (d) 12

[GATE]

Q.12 The value of  $\int_C ((2x-y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}) d\vec{r}$ . Where  $C$  is the boundary of upper half of the surface of the sphere  $x^2 + y^2 + z^2 = 1$  above  $xy$  plane is  $\underline{\hspace{2cm}}$ .

- (a)  $\pi$       (b)  $-\pi$   
 (c)  $2\pi$       (d) 0

[GATE]

Q.13 The value of  $\int_C \vec{F} \cdot d\vec{r}$  where  $\vec{F} = y\vec{i} + z\vec{j} + x\vec{k}$  and  $C$  is the curve bounded by  $x = \cos\theta$ ,  $y = \sin\theta$ ,  $z = 0$  is  $\underline{\hspace{2cm}}$ .

- (a)  $\pi$       (b)  $-\pi$   
 (c)  $2\pi$       (d)  $-2\pi$



### Numerical Data Type Questions

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Q.14 The greatest value of directional derivative of  $xy^2 + yz^3$  at  $(2, -1, 1)$  is  $\underline{\hspace{2cm}}$ .

Q.15 The value of  $\nabla^2 \left( \frac{1}{r} \right) = \underline{\hspace{2cm}}$  where  $\vec{r}$  is the position vector of any point.

Q.16 If  $|\vec{F}| = r^n$  and  $\nabla \cdot \vec{F} = 0$  then  $n = \underline{\hspace{2cm}}$ .

[GATE]

Q.17 Let  $f(x, y) = kxy - x^3y - xy^3$  where  $K$  is real constant. If the directional derivative of  $f$  at point  $(1, 2)$  in the direction of a unit vector

$$-\frac{1}{\sqrt{2}}\vec{i} - \frac{1}{\sqrt{2}}\vec{j} \text{ is } \frac{15}{\sqrt{2}} \text{ then the value of } K \text{ is } \underline{\hspace{2cm}}$$

[GATE]

Q.18 Let  $w = \{(x, y, z) \in R^3 : 1 \leq x^2 + y^2 + z^2 \leq 4\}$  and  $F : w \rightarrow R^3$  defined by

$$F = \frac{(x, y, z)}{(x^2 + y^2 + z^2)^{\frac{3}{2}}} \text{ for } (x, y, z) \in w.$$

If  $\partial\omega$  denotes the boundary of  $\omega$  oriented by the outward normal  $\vec{n}$  to  $\omega$ , then  $\iint_{\partial\omega} \vec{F} \cdot \vec{n} d\omega$  is  $\underline{\hspace{2cm}}$ .

[GATE]

Q.19 The work done of a moving particle in the force field  $\vec{F} = 5x^2\vec{i} + (xz - y)\vec{j} + 3z\vec{k}$  along the straight line joining  $(0, 0, 0)$  to  $(1, 1, 1)$  is  $\underline{\hspace{2cm}}$ .

[GATE]

Q.20 If  $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$  then  $\oint_C \vec{F} \cdot d\vec{r}$  is  $\underline{\hspace{2cm}}$ .

- (a)  $32\pi$       (b)  $16\pi$   
 (c)  $8\pi$       (d)  $64\pi$

[Ans:  $32\pi$ ]

Q.21 The value of  $\int_C \vec{F} \cdot d\vec{r}$  where  $\vec{F} = xy\vec{i} + yz\vec{j} + zx\vec{k}$  and  $C$  is the curve  $\vec{r} = t\vec{i} + t^2\vec{j} + t^3\vec{k}$  from  $t = 0$  to  $t = 1$  is  $\underline{\hspace{2cm}}$ .

Q.22 Maximum value of directional derivative of  $\phi : e^{3x} \sin(yz^4)$  at  $(0, \frac{\pi}{2}, 1)$  is  $\underline{\hspace{2cm}}$ .

Q.23 The angle between the surfaces  $x^2 + y^2 + z^2 = 9$  and  $x^2 + y^2 - z = 3$  at  $(2, -1, 2)$  is  $\underline{\hspace{2cm}}$ .

Q.24 If  $\vec{F} = 3xy^2\vec{i} - 4yz\vec{j} + xz^2\vec{k}$  then the value of  $\nabla \cdot (\nabla \times \vec{F})$  at  $(3, -5, 1)$  is  $\underline{\hspace{2cm}}$ .

Q.25 The directional derivative of  $\operatorname{div} \vec{F}$  at  $(1, 2, 2)$  in the direction of outward normal to the surface of the sphere  $x^2 + y^2 + z^2 = 9$  where  $\vec{F} = x^4\vec{i} - y^4\vec{j} + z^4\vec{k}$  is  $\underline{\hspace{2cm}}$ .

Q.26 The region specified by  $\{(p, \phi, z) : 3 \leq p \leq 5,$

$\frac{\pi}{8} \leq \phi \leq \frac{\pi}{4}, 3 \leq z \leq 4.5\}$  in cylindrical coordinates has volume of  $\underline{\hspace{2cm}}$ .

[GATE-2016]

Q.27 Suppose  $C$  is the closed curve defined as the circle  $x^2 + y^2 = 1$  with  $C$  oriented anti clockwise.

The value of  $\oint_C (xy^2 dx + x^2 y dy)$  over the curve  $C$  equals  $\underline{\hspace{2cm}}$ .

[GATE-2016]

T1. The value of  $\int_S \vec{F} \cdot \vec{n} ds$  where  $S$  is the surface of the sphere  $x^2 + y^2 + z^2 = 4$  where  $\vec{n}$  is the unit normal and  $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$  is  $\underline{\hspace{2cm}}$ .



## 4

## Differential Equations



## Multiple Choice Questions

Q.1 The differential equation of the family of circles of radius 'r' and whose centre lies on 'x' axis

(a)  $r^2 \left(1 + \left(\frac{dy}{dx}\right)^2\right) = x^2$

(b)  $y^2 \left(1 + \left(\frac{dy}{dx}\right)^2\right) = r^2$

(c)  $x^2 \left(1 + \left(\frac{dy}{dx}\right)^2\right) = r^2$

(d)  $y^2 \left(1 - \left(\frac{dy}{dx}\right)^2\right) = r^2$

Q.2 The differential equation of the family of curves of the form  $y = Ax + Bx^2$  is

(a)  $x^2y'' - 2xy' + 2y = 0$

(b)  $x^2y'' + 2xy' + 2y = 0$

(c)  $2x^2y'' - xy' + 2y = 0$

(d)  $x^2y'' - 2xy' - 2y = 0$

Q.3 The solution of  $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y \cos y}$  is

(a)  $y \sin y = x^2 \log x + c$

(b)  $y \cos y = x^2 \log x - x + c$

(c)  $y \sin y = x^2 \log x - x^2 + c$

(d)  $y \sin y = x \log x - x + c$

Q.4 The solution of  $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$  is

(a)  $e^y = e^{-x} + \frac{x^3}{3} + c$  (b)  $e^{-y} = e^{-x} + \frac{x^3}{3} + c$

(c)  $e^y = e^x + \frac{x^3}{3} + c$  (d)  $e^{-y} = e^{-x} + \frac{x^3}{3} + c$

Q.6 The solution of  $\frac{dy}{dx} = \sin(x+y)$  is

(a)  $\tan(x+y) - \sec(x+y) = x + c$

(b)  $\sec(x+y) - \tan(x+y) = \frac{x^2}{2} + c$

(c)  $\tan(x+y) - \cos(x+y) = x + c$

(d)  $\tan(x+y) - \cot(x+y) = x + c$

Q.7 The solution of  $\frac{dy}{dx} = \left(\frac{y}{x}\right) + \tan\left(\frac{y}{x}\right)$  is

(a)  $\sin\left(\frac{y}{x}\right) = xc$

(b)  $\tan\left(\frac{y}{x}\right) = xc$

(c)  $\operatorname{cosec}\left(\frac{y}{x}\right) = xc$

(d)  $\cot\left(\frac{y}{x}\right) = xc$

Q.8 Which of the following differential equation is linear

(a)  $\frac{dy}{dx} + x^2y = \sin y$

(b)  $\frac{dy}{dx} - x^2y = \sin x$

Q.13 The differential equation

$$(\alpha xy^3 + y \cos x)dx + (x^2y^2 + \beta \sin x)dy = 0$$

is exact for

(a)  $\alpha = \frac{3}{2}, \beta = 1$  (b)  $\alpha = 1, \beta = \frac{3}{2}$

(c)  $\alpha = \frac{2}{3}, \beta = 1$  (d)  $\alpha = 1, \beta = \frac{2}{3}$

[GATE]

Q.14 The integrating factor of

$$(\cos y \sin 2x)dx + (\cos^2 y - \cos^2 x)dy = 0$$

(a)  $\sec^2 y + \sec y \cdot \tan y$

(b)  $\tan^2 y + \sec y \cdot \tan y$

(c)  $\frac{1}{\sec^2 y + \sec y \cdot \tan y}$

(d)  $\frac{1}{\tan^2 y + \sec y \cdot \tan y}$

[GATE]

Q.11 The general solution of the differential equation

$$\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$$

(a)  $\tan y = \frac{1}{2}(x^2 - 1) + c \cdot e^{-x^2}$

(b)  $\tan y = (x^2 - 2) + c \cdot e^{-x^2}$

(c)  $\tan y = (x^2 - 1) + c \cdot e^{-x^2}$

(d)  $\cot y = \frac{1}{2}(x^2 - 1) + c \cdot e^{-x^2}$

Q.12 The general solution of  $(x^3y^2 + xy)\frac{dx}{dy} = 1$  is

(a)  $\frac{-1}{y} = x^2 - 2 + c \cdot e^{-x^2/2}$

(b)  $\frac{1}{y} = x^2 + 2 + c \cdot e^{-x^2/2}$

(c)  $\frac{1}{y} = x^2 + 2 + c \cdot e^{x^2/2}$

(d)  $\frac{1}{y} = x^2 + 1 + c \cdot e^{-x^2/2}$

Q.15 The solution of the differential equation

$$(x^2 + y^2 + 2x)dx + 2ydy = 0$$

(a)  $e^x(x^2 - y^2) = c$

(b)  $e^x(x^2 + y^2) = c$

(c)  $e^{-x}(x^2 + y^2) = c$

(d)  $e^{-x}(x^2 - y^2) = c$

Q.16 The solution of  $(y - xy^2)dx - (x + x^2y)dy = 0$  is

(a)  $\ln\left(\frac{x}{y}\right) - \frac{x}{y} = c$  (b)  $\ln\left(\frac{x}{y}\right) + \frac{x}{y} = c$

(c)  $\ln\left(\frac{x}{y}\right) + xy = c$  (d)  $\ln\left(\frac{x}{y}\right) - xy = c$

Q.17 The orthogonal trajectory of family of straight lines  $y = k(x-1)$ ,  $k \in \mathbb{R}$  are given by

(a)  $(x-1)^2 + (y-1)^2 = c^2$

(b)  $x^2 + y^2 = c^2$

(c)  $x^2 + (y-1)^2 = c^2$

(d)  $(x-1)^2 + y^2 = c^2$

[GATE]

Q.18 The orthogonal trajectories to family of centroids

$r = a(1 + \cos\theta)$  is

(a)  $r = c(1 - \sin\theta)$  (b)  $r = c(1 + \sin\theta)$

(c)  $r = c(1 - \cos\theta)$  (d)  $r = c(1 + \cos\theta)$

Q.19 Let  $y(x)$  is solution of  $y''' - y'' + 4y' - 4y = 0$ , $y(0) = y'(0) = 2, y''(0) = 0$  then the value of

$y\left(\frac{\pi}{2}\right) =$

(a)  $\frac{1}{5}(4e^{\pi/2} - 6)$  (b)  $\frac{1}{5}(6e^{\pi/2} - 4)$

(c)  $\frac{1}{5}(8e^{\pi/2} - 2)$  (d)  $\frac{1}{5}(8e^{\pi/2} + 2)$

[GATE]

Q.20 Consider  $\frac{d^2y}{dx^2} + b\frac{dy}{dx} + cy = 0$  where b & c arereal constants. If  $y = x \cdot e^{-5x}$  is a solution then

(a) both b and c are positive

(b) b is positive, and c is negative

(c) b is negative but c is positive

(d) both b and c are negative

Q.21 The general solution of the differential equation

$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^x$  is

(a)  $c_1e^{2x} + c_2e^{3x} + \frac{e^x}{2}$

(b)  $c_1e^{-2x} + c_2e^{-3x} + \frac{e^x}{2}$

(c)  $c_1e^{2x} + c_2e^{3x} + \frac{e^x}{4}$

(d)  $c_1e^{-2x} + c_2e^{-3x} + \frac{e^x}{4}$

Q.22 The solution of the differential equation

$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 3 \cdot e^{2x}, y(0) = 0, y'(0) = -2$  is

(a)  $y = e^{-x} - e^{2x} + xe^{2x}$

(b)  $y = e^x - e^{-2x} + xe^{2x}$

(c)  $y = e^{-x} + e^{2x} + \frac{x^2e^{2x}}{2}$

(d)  $y = e^x - e^{-2x} - \frac{x}{2}e^{2x}$

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Q.27 The particular integral of  $(D^2 - 4D + 4)y = x^2$  is

(a)  $\frac{1}{4}\left(x^2 + 2x + \frac{3}{2}\right)$

(b)  $\frac{1}{4}\left(x^2 + 2x - \frac{3}{2}\right)$

(c)  $\frac{1}{4}\left(x^2 - 2x + \frac{3}{2}\right)$

(d)  $\frac{1}{4}\left(x^2 - 2x - \frac{3}{2}\right)$

Q.23 Consider  $y'' - y = 2e^x$  if  $y(0) = 0, y'(0) = 0$  then

$y(1) =$

(a)  $e + \sin h(1)$  (b)  $\cos h(1)$

(c)  $\sin h(1)$  (d)  $\cos h(1) + 1$

[CSIR]

Q.24 The particular integral of the differential equation

$(D^2 - 4D + 3)y = \cos x$  is

(a)  $\frac{\cos x - 2\sin x}{10}$

(b)  $\frac{\cos x + 2\sin x}{10}$

(c)  $\frac{2\cos x - 4\sin x}{5}$

(d)  $\frac{2\cos x + 4\sin x}{5}$

Q.25 The particular integral of

$(D^2 - 9)y = e^{3x} + \sin 2x$  is

(a)  $\frac{e^{3x}}{6} + \frac{\sin 2x}{13}$  (b)  $\frac{e^{3x}}{6} - \frac{1}{32}\sin 2x$

(c)  $\frac{e^{3x}}{6} - \frac{1}{13}\sin 2x$  (d)  $\frac{xe^{3x}}{6} - \frac{1}{13}\sin 2x$

Q.26 The solution of the differential equation

$\frac{d^2y}{dx^2} = x, y(1) = 0, y(2) = 0$  is

(a)  $y = \frac{x^2}{6} - \frac{x}{6} + 1$

(b)  $y = \frac{x^3}{6} - \frac{7x}{6} + 1$

(c)  $y = \frac{x^3}{6} - \frac{7x}{6} - 1$

(d)  $y = \frac{x^3}{6} + \frac{7x}{6} + 1$

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Q.31 The particular integral of  $(D^2 + 4)y = x\cos 2x$  is

(a)  $\frac{x^2 \sin 2x}{4}$  (b)  $\frac{x^2 \sin 2x}{8}$

(c)  $\frac{x^2 \cos 2x}{4}$  (d)  $\frac{x^2 \cos 2x}{8}$

Q.32 The particular integral of  $(D^2 + 9)y = \sec 3x$  is

(a)  $\frac{x}{3} \sin 3x + \frac{\cos 3x}{9} \log(\cos x)$

(b)  $\frac{x}{3} \sin 3x + \frac{\cos 3x}{9} \log(\cos 3x)$

(c)  $\frac{x}{3} \cos 3x + \frac{\sin 3x}{3} \log(\sec 3x)$

(d)  $\frac{x}{3} \cos 3x + \frac{\sin 3x \log(\cos 3x)}{3}$

Q.33 The general solution of the differential equation

$(x^3 D^3 + 2x^2 D^2 + 2)y = 0$  is

(a)  $y = C_1 x + (C_2 \cos x + C_3 \sin x)e^x$

(b)  $y = \frac{C_1}{x} + x(C_2 \cos(\log x) + C_3 \sin(\log x))$

(c)  $y = C_1 + x(C_2 \cos(\log x) + C_3 \sin(\log x))$

(d)  $y = C_1 x + x^2(C_2 \cos(\log x) + C_3 \sin(\log x))$

Q.34 The differential equation for which  $x, x \ln x$  and  $x^2$  are independent solutions is

(a)  $x^3 y''' + x^2 y'' - 3xy' + 3y = 0$

(b)  $x^3 y''' - 2x^2 y'' + 3xy' - 6y = 0$

(c)  $x^3 y''' - x^2 y'' + 2xy' - 2y = 0$

(d)  $y''' - y'' + 2y' - 3y = 0$

[CSIR]

Q.35 Consider the differential equation

$x^2 y'' - 3xy' + 4y = 0$  then the two linearly independent solutions of the differential equation are given by

- (a)  $x^2, x^3$   
 (b)  $x^2, x^2 \ln x$   
 (c)  $v$   
 (d)  $x, xe^x$

Q.36 The partial differential equation

$$2\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 3\frac{\partial^2 u}{\partial y^2} = 2 \text{ is}$$

- (a) Elliptic  
 (b) Hyperbolic  
 (c) Parabolic  
 (d) None

Q.37 The partial differential equation

$$xy\frac{\partial^2 u}{\partial x^2} - (x^2 - y^2)\frac{\partial^2 u}{\partial x \partial y} - xy\frac{\partial^2 u}{\partial y^2} + y\frac{\partial u}{\partial x} - x\frac{\partial u}{\partial y} = 2(x^2 - y^2) \text{ is}$$

- (a) Elliptic  
 (b) Hyperbolic  
 (c) Parabolic  
 (d) None

Q.38 The partial differential equation

$$\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = 0 \text{ is}$$

- (a) elliptic  
 (b) hyperbolic  
 (c) parabolic  
 (d) none

Q.39 The respective expressions for complimentary function and particular integral part of the solution of the differential equation

$$\frac{d^4 y}{dx^4} + 3\frac{d^2 y}{dx^2} = 108x^2 \text{ are}$$

- (a)  $[c_1 + c_2 x + c_3 \sin \sqrt{3}x + c_4 \cos \sqrt{3}x]$   
 and  $[3x^4 - 12x^2 + c]$   
 (b)  $[c_2 + c_3 \sin \sqrt{3}x + c_4 \cos \sqrt{3}x]$   
 and  $[5x^4 - 12x^2 + c]$   
 (c)  $[c_1 + c_3 \sin \sqrt{3}x + c_4 \cos \sqrt{3}x]$   
 and  $[3x^4 - 12x^2 + c]$   
 (d)  $[c_1 + c_2 x + c_3 \sin \sqrt{3}x + c_4 \cos \sqrt{3}x]$   
 and  $[5x^4 - 12x^2 + c]$

[GATE-2016]

[CSIR]

Q.40 The type of partial differential equation

$$\frac{\partial^2 P}{\partial x^2} + \frac{\partial^2 P}{\partial y^2} + 3\frac{\partial^2 P}{\partial x \partial y} + 2\frac{\partial P}{\partial x} - \frac{\partial P}{\partial y} = 0 \text{ is}$$

- (a) elliptic  
 (b) parabolic  
 (c) hyperbolic  
 (d) none of these

[GATE-2016]

### 80 Numerical Data Type Questions

Q.41 The order and degree of the differential equation

$$\left[1 + \left(\frac{d^3 y}{dx^3}\right)^2\right]^{4/3} = \frac{d^2 y}{dx^2} \text{ are } \underline{\hspace{2cm}}$$

[GATE]

Q.42 The degree of the differential equation

$$\left[y + x\left(\frac{d^2 y}{dx^2}\right)^2\right]^{1/4} = \frac{d^3 y}{dx^3} \text{ is } \underline{\hspace{2cm}}$$

Q.43 Consider  $\frac{dy}{dx} = \frac{4+y^2}{1+x^2}$ , if  $y(1)=2$  then  $y(2)=\underline{\hspace{2cm}}$

[CSIR]

Q.44 If  $\frac{dy}{dx} + 2y \tan x = \sin x$  and  $y\left(\frac{\pi}{3}\right) = 0$  then the maximum value of 'y' is  $\underline{\hspace{2cm}}$ .

Q.45 The differential equation

$$(27x^2 + ky \cos x)dx + (2 \sin x - 27y^3)dy = 0$$

is exact for  $k = \underline{\hspace{2cm}}$

[GATE]

Q.46 If the integrating factor of

$$(x^7 y^2 + 3y)dx + (3x^8 y - x)dy = 0$$

is  $x^\alpha y^\beta$  then  $\alpha = \underline{\hspace{2cm}}$  and  $\beta = \underline{\hspace{2cm}}$

[GATE]

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Q.47 If  $e^{-x}$  and  $xe^{-x}$  are two independent solutions of

$$\frac{d^2 y}{dx^2} + \lambda \frac{dy}{dx} + y = 0 \text{ then the value of } \lambda = \underline{\hspace{2cm}}$$

Q.48 Suppose  $y_p(x) = x \cos 2x$  is a particular integral of  $y'' + \alpha y = -4 \sin 2x$ , then the constant  $\alpha$  is  $\underline{\hspace{2cm}}$

[GATE]

Q.49 Consider the differential equation

$$\frac{d^2 x(t)}{dt^2} + 3\frac{dx(t)}{dt} + 2x(t) = 0. \text{ Given } x(0) = 20 \text{ and } x(1) = 10/e, \text{ where } e = 2.718, \text{ the value of } x(2) \text{ is } \underline{\hspace{2cm}}$$

[GATE]

Q.50 Consider the following second order linear differential equation

$$\frac{d^2 y}{dx^2} = -12x^2 + 24x - 20$$

The boundary conditions are: at  $x = 0, y = 5$  and  $x = 2, y = 21$

The value of  $y$  at  $x = 1$  is  $\underline{\hspace{2cm}}$

[GATE]

### Try Yourself

T1. The set of linearly Independent solutions of the

differential equation  $\frac{d^4 y}{dx^4} - \frac{d^2 y}{dx^2} = 0$  is  $\underline{\hspace{2cm}}$

[Ans:  $\{1, x, e^{-x}, e^x\}$ ]

T2. The particular integral of

$$\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} + 2y = \log 2 \text{ is } \underline{\hspace{2cm}}$$

[Ans:  $\frac{\log 2}{2}$ ]

T3. The particular solution of  $y''' - y'' - y' = -e^x$  is a constant multiple of  $\underline{\hspace{2cm}}$

[Ans:  $e^x$ ]

T4. The rate of which bacteria multiply is proportional to the instantaneous number present, if the original number doubles in 2 hours then it will be triple in

(a)  $2\frac{\log 3}{\log 2}$       (b)  $2\frac{\log 2}{\log 3}$

(c)  $\frac{\log 3}{\log 2}$       (d)  $\frac{\log 2}{\log 3}$

[Ans: (a)]

T5. The rate at which a body cools is proportional to the difference between the temperature of the body and that of the surrounding air. If a body in air at  $25^\circ\text{C}$  cools from  $100^\circ\text{C}$  to  $75^\circ\text{C}$  in one minute then the temperature at the end of three minutes is

(a)  $47.22^\circ\text{C}$       (b)  $42.22^\circ\text{C}$   
 (c)  $37.22^\circ\text{C}$       (d)  $39.22^\circ\text{C}$

[Ans: (a)]

T6. A radium decomposes at a rate proportional to the amount of radium present at that time. If 5% grams of original amount disappears after 50 years then the amount will remain after 100 years is

- (a) 95.95% of the original amount  
 (b) 95% of the original amount  
 (c) 90% of the original amount  
 (d) 90.25% of the original amount

[Ans: (d)]

T7. The solution of  $\frac{dy}{dx} = (4x + y + 1)^2$  is

(a)  $\frac{1}{2} \tan^{-1} \left( \frac{4x + y + 1}{2} \right) = c$

(b)  $\frac{1}{2} \tan^{-1} \left( \frac{4x + y + 1}{2} \right) = x + c$

(c)  $\frac{1}{2} \tan^{-1}(4x + 4y + 1) = x + c$

(d)  $\frac{1}{2} \tan^{-1}(4x + y + 1) = c$

[Ans: (b)]

- T8. If  $x^2 \frac{dy}{dx} + 2xy = \frac{2\log x}{x}$  and  $y(1) = 0$  then  
 $y(e) = 0$   
 (a)  $e$       (b) 1  
 (c)  $\frac{1}{e}$       (d)  $\frac{1}{e^2}$

[GATE]  
 [Ans: (d)]

- T9. The general solution of the differential equation  
 $\frac{dy}{dx} + \tan x \cdot \sec y = \cos x \cdot \sec y$  is  
 (a)  $2\sin y = (x + c - \sin \cos x) \sec x$   
 (b)  $\sin y = (x + c) \cos x$   
 (c)  $\cos y = (x + c) \sin x$   
 (d)  $\sec y = (x + c) \cos x$

[GATE]  
 [Ans: (b)]

- T10. A solution of the first order differential equation  
 $y' \cos(x+y) + \frac{\sin(x+y)}{x} = e^x - \cos(x+y)$  is  
 (a)  $\sin(x+y) - e^x = \text{constant}$   
 (b)  $e^x \tan(x+y) = \text{constant}$   
 (c)  $x(\cos(x+y) - e^x) + e^x = \text{constant}$   
 (d)  $x(\sin(x+y) - e^x) + e^x = \text{constant}$

[CSIR]  
 [Ans: (d)]

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5

## Complex Variables



### Multiple Choice Questions

- Q.1 Which of the following is possible value for the imaginary part of  $\ln(\sqrt{i})$

- (a)  $\pi$       (b)  $\frac{\pi}{2}$   
 (c)  $\frac{\pi}{4}$       (d)  $\frac{\pi}{8}$

[GATE]

- Q.2 If  $f(z) = u + iv$  is analytic then, the harmonic conjugate of  $u = x^2 - y^2 + xy$  is

- (a)  $x^2 - y^2 - xy$   
 (b)  $x^2 + y^2 + xy$   
 (c)  $2xy + \frac{1}{2}(y^2 - x^2)$   
 (d)  $\frac{xy}{2} + 2(y^2 - x^2)$

[GATE]

- Q.3 The function  $f(z) = z^2$  maps first quadrant onto

- (a) itself  
 (b) upper half plane  
 (c) third quadrant  
 (d) right half plane

- Q.4 Let  $u = 2x(1-y)$  for real  $x$  and  $y$  then a function  $v(x, y)$  so that  $f(z) = u + iv$  is analytic

- (a)  $x^2 - (y-1)^2$       (b)  $(x-1)^2 + y^2$   
 (c)  $(x-1)^2 - y^2$       (d)  $x^2 + (y-1)^2$

[GATE]

- Q.5 If  $1, \omega, \omega^2$  are cube roots of units, then the roots of  $(x-1)^3 + 8 = 0$  are  
 (a)  $-1, -1, -1$   
 (b)  $1, \omega, 2\omega$   
 (c)  $-1 + 1 + 2\omega, 1 + 2\omega^2$   
 (d)  $-1, 1 - 2\omega, 1 - 2\omega^2$

- Q.6 Consider the functions  $f(z) = x^2 + iy^2$  and

$$g(z) = x^2 + y^2 + ixy \text{ at } z=0,$$

- (a)  $f$  is analytic, but not  $g$   
 (b)  $g$  is analytic but not  $f$   
 (c) both  $f$  and  $g$  are analytic  
 (d) neither  $f$  nor  $g$  is analytic

[GATE]

- Q.7  $\lim_{z \rightarrow 0} \frac{\bar{z}}{z}$  is

- (a) 0      (b) 1  
 (c)  $\frac{1}{2}$       (d) does not exist

- Q.8 Which of the following is not harmonic

- (a)  $u = \sin hx \cdot \cos y$   
 (b)  $u = \frac{1}{2} \log(x^2 + y^2)$   
 (c)  $u = x^2 + y^2$   
 (d)  $u = x^2 - y^2$

- Q.9 The value of  $\int_C \bar{z} dz$  from  $z=0$  to  $z=4+2i$  along the curve 'c' given by  $z=t^2 + it$

- (a)  $10 - \frac{8i}{3}$       (b)  $10i + \frac{8}{3}$   
 (c)  $10 - \frac{8}{3i}$       (d) 0

- Q.10 The residue of  $f(z) = \frac{\sin z}{z^8}$  at  $z=0$  is  
 (a) 0      (b)  $-\frac{1}{7!}$   
 (c)  $\frac{1}{7!}$       (d) none

[GATE]

- Q.11 The value of  $\int_{|z|=1} \frac{\cos z}{z(z-2)(z-4)} dz$  is  
 (a)  $\frac{\pi i}{2}$       (b)  $\frac{\pi i}{4}$   
 (c)  $\pi i$       (d)  $2\pi i$

[GATE]

- Q.12 Let 'C' be the circle  $|z|=1$  in the complex plane described in counter clock wise then

$$\int_C \frac{1+z}{(2-z)z} dz$$

- (a)  $\pi i$       (b)  $-\pi i$   
 (c)  $2\pi i$       (d)  $-2\pi i$

[IISCE]

- Q.13 The value of  $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-4)(z-2)} dz$  where  $|z|=3$  is  
 (a)  $2\pi i$       (b)  $-2\pi i$   
 (c)  $\pi i$       (d)  $-\pi i$

[GATE]

- Q.14 The value of  $\int_C \frac{1}{z^2+4} dz$  where 'c' is  $|z-i|=2$  is \_\_\_\_\_.  
 (a)  $\frac{i\pi}{2}$       (b)  $-\frac{\pi}{2}$   
 (c)  $-\frac{i\pi}{2}$       (d)  $\frac{\pi}{2}$

[GATE]

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- Q.15 The value of  $\int_C \frac{e^{2z}}{(z+1)^4} dz$  where 'c' is  $|z|=3$  is  
 (a)  $\frac{8\pi i}{3} e^{-2}$       (b)  $\frac{4\pi i}{3} e^{-2}$   
 (c)  $\frac{8\pi i}{3} e^{-1}$       (d) 0

[GATE]

- Q.16 The value of  $\int_C e^{1/z} dz$  where c is counter clockwise unit circle on z-plane is equal to  
 (a) 0      (b)  $2\pi i$   
 (c)  $2\pi\sqrt{-1}$       (d)  $\infty$

[GATE]

- Q.17 The Taylor series expansion of  $f(z) = \sin z$  about  $z = \frac{\pi}{4}$  is

$$(a) \frac{1}{\sqrt{2}} \left[ 1 + \left( z - \frac{\pi}{4} \right) + \frac{\left( z - \frac{\pi}{4} \right)^2}{2!} + \frac{\left( z - \frac{\pi}{4} \right)^3}{3!} + \dots \right]$$

$$(b) \frac{1}{\sqrt{2}} \left[ 1 + \left( z - \frac{\pi}{4} \right) - \frac{\left( z - \frac{\pi}{4} \right)^2}{2!} - \frac{\left( z - \frac{\pi}{4} \right)^3}{3!} - \dots \right]$$

$$(c) z - \frac{z^3}{3!} + \frac{z^5}{5!} - \dots$$

(d) none

[GATE]

- Q.18 Given two complex numbers

$$z_1 = 5 + (5\sqrt{3})i \text{ and } z_2 = \frac{2}{\sqrt{3}} + 2i$$

argument of  $\frac{z_1}{z_2}$  in degree is

- (a) 0      (b) 30  
 (c) 60      (d) 90

[GATE]

- Q.19 The value of  $\oint_C \frac{1}{z^2} dz$ , where the contour is the unit circle traversed clockwise, is  
 (a)  $-2\pi i$       (b) 0  
 (c)  $2\pi i$       (d)  $4\pi i$

[GATE]

- Q.20 Let  $z = x + iy$  be a complex variable. Consider that contour integration is performed along the unit circle in anticlockwise direction. Which one of the following statements is NOT TRUE?

- (a) The residue of  $\frac{z}{z^2-1}$  at  $z=1$  is  $\frac{1}{2}$   
 (b)  $\oint_C z^2 dz = 0$   
 (c)  $\frac{1}{2\pi i} \oint_C \frac{1}{z} dz = 1$   
 (d)  $\bar{z}$  (complex conjugate of  $z$ ) is analytical function

[GATE]

- Q.21 The value of the integral

$$\oint_C \frac{2z+5}{(z-\frac{1}{2})(z^2-4z+5)} dz$$

over the contour  $|z|=1$ , taken in the anti-clockwise direction, would be

- (a)  $\frac{24\pi i}{13}$       (b)  $\frac{48\pi i}{13}$   
 (c)  $\frac{24}{13}$       (d)  $\frac{12}{13}$

[GATE-2016]

- Q.22 The values of the integral  $\frac{1}{2\pi j} \oint_C \frac{e^z}{z-2} dz$  along

a closed contour c in anti-clockwise direction for

- (i) the point  $z_0 = 2$  inside the contour c, and  
 (ii) the point  $z_0 = 2$  outside the contour c, respectively, are

- (a) (i) 2.72, (ii) 0      (b) (i) 7.39, (ii) 0  
 (c) (i) 0, (ii) 2.72      (d) (i) 0, (ii) 7.39

[GATE-2016]


**Numerical Data Type Questions**

- Q.23 If  $|z-1|=2$ , then  $z\bar{z} - z - \bar{z} = \underline{\hspace{2cm}}$ .

- Q.24 The residue of  $f(z) = \cot z$  at any one its poles is \_\_\_\_\_.

[GATE]

- Q.25 The value of 'P' such that the function

$$f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1}\left(\frac{px}{y}\right)$$

is analytic is \_\_\_\_\_.

[JNU]

- Q.26 The value of  $\int_C \sec z dz$  where 'C' is  $|z|=1$  is \_\_\_\_\_.

[GATE]

- Q.27 The coefficient of  $\frac{1}{z}$  in the Laurent series expansion of  $\log\left(\frac{z}{z-1}\right)$  valid in  $|z|>1$  is \_\_\_\_\_.

[GATE]

- Q.28 In laurent series expansion of  $f(z) = \frac{1}{z-1} - \frac{1}{z-2}$  valid in the region  $|z|>2$ , the coefficient of  $\frac{1}{z^2}$  is \_\_\_\_\_.

[GATE]

- Q.29 In the following integral, the contour C encloses the points  $2\pi j$  and  $-2\pi j$

$$-\frac{1}{2\pi j} \oint_C \frac{\sin z}{(z-2\pi j)^3} dz$$

The value of the integral is \_\_\_\_\_.

[GATE-2016]

**Try Yourself**

T1. The function  $f(z) = \frac{\sin(z-1)}{z-1}$  at  $z=1$  is \_\_\_\_.

[Ans: Removable singular]

T2. The function  $f(z) = \frac{z - \sin z}{z^3}$  at  $z=0$  is \_\_\_\_.

[Ans: Removable singular]

T3. The function  $f(z) = \sin\left(\frac{1}{1-z}\right)$  at  $z=1$  is \_\_\_\_.

[Ans: Essential singular]

T4. The value of  $\int \frac{-3z+4}{z^2+4z+5} dz$  where 'c' is  $|z|=1$  is \_\_\_\_.

[Ans: 0]

T5. Let  $\beta = e^{\frac{i\pi}{10}}$ , then residue of  $f(z) = \frac{1}{1+z^{10}}$  at  $z=\beta$  is

- (a)  $-\frac{\beta}{10}$       (b)  $\frac{\beta}{10}$   
 (c)  $\frac{-\pi i \beta}{5}$       (d)  $\frac{\pi i \beta}{5}$

6

## Probability and Statistics



### Multiple Choice Questions

Q.1 Two dice are thrown simultaneously. The probability that the sum of numbers on both exceeds 8 is

- (a)  $\frac{4}{36}$       (b)  $\frac{7}{36}$   
 (c)  $\frac{9}{36}$       (d)  $\frac{10}{36}$

[PI, GATE : 2005]

Q.2 In a population of N families, 50% of the families have three children, 30% of the families have two children and the remaining families have one child. What is the probability that a randomly picked child belongs to a family with two children?

- (a)  $3/23$       (b)  $6/23$   
 (c)  $3/10$       (d)  $3/5$

[GATE, CS : 2004]

Q.3 What is the probability that a divisor of  $10^{99}$  is a multiple of  $10^{96}$ ?

- (a)  $1/625$       (b)  $4/625$   
 (c)  $12/625$       (d)  $16/625$

[GATE, CS : 2010]

Q.4 Seven car accidents occurred in a week, what is the probability that they are occurred on the same day?

- (a)  $\frac{1}{7^7}$       (b)  $\frac{1}{7^6}$   
 (c)  $\frac{1}{2^7}$       (d)  $\frac{7}{2^7}$

[GATE, EE : 2001]

Q.5 A fair coin is tossed three times in succession. If the first toss produces a head, then the probability of getting exactly two heads in three tosses is

- (a)  $\frac{1}{8}$       (b)  $\frac{1}{2}$   
 (c)  $\frac{3}{8}$       (d)  $\frac{3}{4}$

[GATE, EE : 2005]

Q.6 The box 1 contains chips numbered 3, 6, 9, 12 and 15. The box 2 contains chips numbered 6, 11, 16, 21 and 26. Two chips, one from each box, are drawn at random. The numbers written on these chips are multiplied. The probability for the product to be an even number is

- (a)  $\frac{6}{25}$       (b)  $\frac{2}{5}$   
 (c)  $\frac{3}{5}$       (d)  $\frac{19}{25}$

[GATE, IN : 2011]

Q.7 There are two containers, with one containing 4 red and 3 green balls and the other containing 3 blue and 4 green balls. One ball is drawn at random from each container. The probability that one of the balls is red and the other is blue will be

- (a)  $1/7$       (b)  $9/49$   
 (c)  $12/49$       (d)  $3/7$

[GATE, CE : 2011]

Q.8 A box contains 4 red balls and 6 black balls. Three balls are selected randomly from the box one after another, without replacement. The probability that the selected set contains one red ball and two black balls is

- (a) 1/20      (b) 1/12  
 (c) 3/10      (d) 1/2  
**[GATE, ME : 2012]**

**Q.9** If two squares are chosen at random on a chess board the probability that they have a side in common is

- (a)  $\frac{1}{9}$       (b)  $\frac{2}{7}$   
 (c)  $\frac{1}{18}$       (d) none of these

**Q.10** The letters of the word PROBABILITY are arranged in all possible ways. The chance that B's and also two I's occur together is

- (a)  $\frac{1}{55}$       (b)  $\frac{2}{55}$   
 (c)  $\frac{4}{165}$       (d) none of these

**Q.11** A party of  $n$  persons takes their seats at random at a round table, then the probability that two specified person do not sit together is

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

**[GATE]**

**Q.12** From 6 positive and 8 negative numbers 4 numbers are drawn at random without replacement and multiplied, the probability that the product is a positive number is

- (a)  $\frac{505}{1001}$       (b)  $\frac{50}{1001}$   
 (c)  $\frac{5}{101}$       (d)  $\frac{55}{1001}$

**[GATE]**

**Q.13** Two dice are thrown together. What is the probability that the sum of the numbers on the two faces is divisible by 4 or 6?

- (a) 1/2      (b) 1/3  
 (c) 5/12      (d) 7/18

**Q.14** A single die is thrown twice. What is the probability that the sum is neither 8 nor 9?  
 (a) 1/9      (b) 5/36  
 (c) 1/4      (d) 3/4  
**[GATE, ME : 2005]**

**Q.15** A pair of fair dice is thrown. Find the probability of getting a sum of 7, when it is known that the digit in the first die is greater than that of the second.  
 (a) 5/12      (b) 1/5  
 (c) 1/12      (d) 5/8

**Q.16** An examination consists of two papers, Paper 1 and Paper 2. The probability of failing in Paper 1 is 0.3 and that in Paper 2 is 0.2. Given that a student has failed in Paper 2, the probability of failing in Paper 1 is 0.6. The probability of a student failing in both the papers is  
 (a) 0.5      (b) 0.18  
 (c) 0.12      (d) 0.06

**[GATE, CS : 2007]**

**Q.17** A box contains 2 washers, 3 nuts and 4 bolts. Items are drawn from the box at random one at a time without replacement. The probability of drawing 2 washers first followed by 3 nuts and subsequently the 4 bolts is  
 (a) 2/315      (b) 1/630  
 (c) 1/1260      (d) 1/2520  
**[2010 : 2 Marks]**

**Q.18** A fair coin is tossed till a head appears for the first time. The probability that the number of required tosses is odd, is  
 (a) 1/3      (b) 1/2  
 (c) 2/3      (d) 3/4  
**[GATE, PI : 2012]**

**Q.19** Two players, A and B, alternately keep rolling a fair dice. The person to get a six first wins the game. Given that player A starts the game, the probability that A wins the game is

- (a)  $\frac{5}{11}$       (b)  $\frac{1}{2}$   
 (c)  $\frac{7}{13}$       (d)  $\frac{6}{11}$

**[GATE]**

**Q.20** A pair of dice is rolled again and again till a total of 5 or 7 is obtained. The chance that a total of 5 comes before a total of 7 is

- (a)  $\frac{2}{5}$       (b)  $\frac{3}{7}$   
 (c)  $\frac{3}{13}$       (d) none of these

**Q.21** A bag P contains 3 white and 4 black balls and another bag Q contains 4 white and three black balls. A ball is transferred (at random) from bag P to the bag Q and then a ball is transferred from bag Q to the bag P. A ball is then taken out from the bag P. The chance that it is a white ball is

- (a)  $\frac{31}{56}$       (b)  $\frac{25}{49}$   
 (c)  $\frac{25}{56}$       (d) none of these

**Q.22** There are two identical locks with two identical keys and the key are among six different ones which a person carries in his pocket. In hurry he drops one key somewhere. Then the probability that the locks can still opened by drawing one key at random is equal to

- (a)  $\frac{1}{3}$       (b)  $\frac{5}{6}$   
 (c)  $\frac{1}{12}$       (d)  $\frac{1}{30}$

**[GATE]**

**Q.23** A screening test is carried out to detect a certain disease. It is found that 12% of the positive reports and 15% of the negative reports are incorrect. Assuming that the probability of a person getting a positive report is 0.01, the probability that a person tested gets an incorrect report is

- (a) 0.0027      (b) 0.0173  
 (c) 0.1497      (d) 0.2100

**[GATE, IN : 2009]**

**Q.24** The probability that a student knows the correct answer to a multiple choice question is  $2/3$ . If the student does not know the answer, then the student guesses the answer. The probability of the guessed answer being correct is  $1/4$ . Given that the student has answered the question correctly, the conditional probability that the student knew the correct answer is  
 (a) 2/3      (b) 3/4  
 (c) 5/6      (d) 8/9

**[2013 : 2 Marks]**

**Q.25** In a given day in the rainy season, it may rain 70% of the time. If it rains, chance that a village fair will make a loss on that day is 80%. However, if it does not rain, chance that the fair will make a loss on that day is only 10%. If the fair has not made a loss on a given day in the rainy season, what is the probability that it has not rained on that day?  
 (a) 3/10      (b) 9/11  
 (c) 14/17      (d) 27/41

**[GATE, PI : 2014 (Set-1)]**

**Q.26** A die is loaded so that probability of getting face  $x$  is proportional to  $x$ . The probability of an odd number occurring when the die is rolled would be  
 (a) 1/21      (b) 2/7  
 (c) 3/7      (d) 4/7

**[JNU]**

**Q.27** A continuous random variable  $X$  has a probability density function  
 $f(x) = e^{-x}$ ,  $0 < x < \infty$ . Then  $P\{X > 1\}$  is  
 (a) 0.368      (b) 0.5  
 (c) 0.632      (d) 1.0  
**[GATE, EC : 2013]**

**Q.28** Find the value of  $\lambda$  such that function  $f(x)$  is valid probability density function  
 $f(x) = \lambda(x-1)(2-x)$  for  $1 \leq x \leq 2$   
 $= 0$  otherwise  
**[GATE, CE : 2013]**

- Q.29** The random variable  $X$  takes on the values 1, 2 (or) 3 with probabilities  $\frac{2+5P}{5}$ ,  $\frac{1+3P}{5}$  and  $\frac{1.5+2P}{5}$  respectively the values of  $P$  and  $E(X)$  are respectively  
 (a) 0.05, 1.87      (b) 1.90, 5.87  
 (c) 0.05, 1.10      (d) 0.25, 1.40  
**[GATE, PI : 2007]**

- Q.30** A machine produces 0, 1 or 2 defective pieces in a day with associated probability of  $1/6$ ,  $2/3$  and  $1/6$ , respectively. The mean value and the variance of the number of defective pieces produced by the machine in a day, respectively, are  
 (a) 1 and  $1/3$       (b)  $1/3$  and 1  
 (c) 1 and  $4/3$       (d)  $1/3$  and  $4/3$   
**[GATE, ME : 2014 (Set-3)]**

- Q.31** A fair coin is tossed independently four times. The probability of the event "the number of times heads show up is more than the number of times tails show up" is  
 (a)  $\frac{1}{16}$       (b)  $\frac{1}{8}$   
 (c)  $\frac{1}{4}$       (d)  $\frac{5}{16}$   
**[GATE, EC : 2010]**

- Q.32** An unbiased coin is tossed an infinite number of times. The probability that the fourth head appears at the tenth toss is  
 (a) 0.067      (b) 0.073  
 (c) 0.082      (d) 0.091  
**[GATE, EC : 2014 (Set-3)]**

- Q.33** A die has four blank faces and two faces marked 3. The chance of getting a total of 12 in 5 throws is  
 (a)  ${}^5C_4 \left(\frac{1}{3}\right)^4 \left(\frac{2}{3}\right)$       (b)  ${}^5C_4 \left(\frac{1}{3}\right) \left(\frac{2}{3}\right)^4$   
 (c)  ${}^5C_4 \left(\frac{1}{6}\right)^5$       (d) none of these

- Q.34** A man takes a step forward with probability 0.4 and backward with probability 0.6. The probability that at the end of 11 steps he is one step away from the starting point is

(a)  $\left(\frac{6}{25}\right)^5$       (b)  $462 \left(\frac{6}{25}\right)^5$   
 (c)  $538 \left(\frac{1}{25}\right)^5$       (d)  $\left(\frac{1}{25}\right)^5$

[JNU]

- Q.35** In a manufacturing plant, the probability of making a defective bolt is 0.1. The mean and standard deviation of defective bolts in a total of 900 bolts are respectively  
 (a) 90 and 9      (b) 9 and 90  
 (c) 81 and 9      (d) 9 and 81  
**[GATE, EE : 2000]**

- Q.36** The number of accidents occurring in a plant in a month follows Poisson distribution with mean as 5.2. The probability of occurrence of less than 2 accidents in the plant during a randomly selected month is  
 (a) 0.029      (b) 0.034  
 (c) 0.039      (d) 0.044  
**[GATE, ME : 2014 (Set-4)]**

- Q.37** It is estimated that the average number of events during a year is three. What is the probability of occurrence of not more than two events over a two year duration? Assume that the number of events follow a Poisson distribution  
 (a) 0.052      (b) 0.062  
 (c) 0.072      (d) 0.082  
**[GATE, PI : 2011]**

- Q.38** A manufacturer knows that the condensers he makes contain an average 1% defectives. He packs them, in boxes of 100. What is the probability that a box picked up at random will contain 3 or more faulty condensers  
 (a)  $1 - \frac{3}{2}e^{-1}$       (b)  $1 - \frac{5}{2}e^{-1}$   
 (c)  $1 - \frac{2}{e}$       (d)  $1 - \frac{5}{e}$   
**[GATE]**

- Q.39** A random variable is uniformly distributed over the interval 2 to 10. Its variance will be

(a)  $\frac{16}{3}$       (b) 6  
 (c)  $\frac{256}{9}$       (d) 36

[GATE, IN : 2008]

- Q.40** Assume that the duration in minutes of a telephone conversion follows the expo-nential distribution  $f(x) = \frac{1}{5} e^{-x/5}$ ,  $x \geq 0$ . The probability that the conversion will exceed five minutes is  
 (a)  $\frac{1}{e}$       (b)  $1 - \frac{1}{e}$   
 (c)  $\frac{1}{e^2}$       (d)  $1 - \frac{1}{e^2}$   
**[GATE, IN : 2007]**

- Q.41** The life of a bulb (in hours) is a random variable with an exponential distribution  $f(t) = \alpha e^{-\alpha t}$ ,  $0 \leq t \leq \infty$ . The probability that its value lies between 100 and 200 hours is  
 (a)  $e^{-100\alpha} - e^{-200\alpha}$       (b)  $e^{-100} - e^{-200}$   
 (c)  $e^{-100\alpha} + e^{-200\alpha}$       (d)  $e^{-200\alpha} - e^{-100\alpha}$   
**[GATE, PI : 2005]**

- Q.42** For a random variable  $x$  ( $-\infty < x < \infty$ ) following normal distribution, the mean is  $\mu = 100$  if the probability is  $P = \alpha$  for  $\alpha \geq 110$ . Then the probability of  $x$  laying between 90 and 110 i.e.,  $P(90 \leq x \leq 110)$  is equal to  
 (a)  $1 - 2\alpha$       (b)  $1 - \alpha$   
 (c)  $1 - \alpha/2$       (d)  $2\alpha$   
**[GATE, PI : 2008]**

- Q.43** Let  $X$  be a normal random variable with mean 1 and variance 4. The probability  $P[X < 0]$  is  
 (a) 0.5  
 (b) greater than zero and less than 0.5  
 (c) greater than 0.5 and less than 1.0  
 (d) 1.0  
**[GATE, ME : 2013]**

- Q.44** The annual precipitation data of a city is normally distributed with mean and standard deviation as 1000 mm and 200 mm, respectively. The

probability that the annual precipitation will be more than 1200 mm is

- (a) < 50%      (b) 50%  
 (c) 75%      (d) 100%  
**[GATE, CE : 2011]**

- Q.45**  $X$  and  $Y$  are two random independent events. It is known that  $P(X) = 0.40$  and  $P(X \cup Y^c) = 0.7$ . Which one of the following is the value of  $P(X \cup Y)$ ?  
 (a) 0.7      (b) 0.5  
 (c) 0.4      (d) 0.3    **[GATE-2016]**

- Q.46** Let the probability density function of a random variable,  $X$ , be given as :

$$f_x(x) = \frac{3}{2} e^{-3x} u(x) + ae^{4x} u(-x)$$

where  $u(x)$  is the unit step function.  
 Then the value of 'a' and Prob  $\{X \leq 0\}$ , respectively, are

- (a)  $2, \frac{1}{2}$       (b)  $4, \frac{1}{2}$   
 (c)  $2, \frac{1}{4}$       (d)  $4, \frac{1}{4}$     **[GATE-2016]**

### Numerical Data Type Questions

- Q.47** A bin in a hardware store, contains 125 bolts and 200 nuts. One-fifth of the bolts and three-fourth of the nuts are defective. One item is picked randomly from the bin. The probability that the item is either a defective item or it is a nut is \_\_\_\_\_.

- Q.48** The probability of India winning a test match against England is 0.5. Assuming independence of the result of various matches the chance that in a 5 match series, India's second win occurs at 3rd test is \_\_\_\_\_.

- Q.49** A student takes a multiple-choice examination, where each question has 5 possible answers. He attempts a question correctly if he knows the answer, otherwise he guesses at random. Suppose he knows answer to 70% of the questions, the probability that on a question chosen at random, the student gets correct answer is \_\_\_\_\_.

- Q.50 Consider the following probability mass function (p.m.f.) of a random variable  $X$ .

$$p(X,q) = \begin{cases} q & \text{If } X=0 \\ 1-q & \text{If } X=1 \\ 0 & \text{otherwise} \end{cases}$$

If  $q = 0.4$ , the variance of  $X$  is \_\_\_\_\_. [GATE]

- Q.51 Let  $X$  be a random variable which is uniformly chosen from the set of positive odd numbers less than 100. The expectation,  $E[X]$ , is [GATE, EC : 2014 (Set-2)]

- Q.52 Each of the nine words in the sentence "The quick brown fox jumps over the lazy dog" is written on a separate piece of paper. These nine pieces of paper are kept in a box. One of the pieces is drawn at random from the box. The expected length of the word drawn is \_\_\_\_\_. (The answer should be rounded to one decimal place). [GATE, CS : 2014 (Set-2)]

- Q.53 Suppose you break a stick of unit length at a point chosen uniformly at random. Then the expected length of the shorter stick is \_\_\_\_\_. [GATE, CS : 2014 (Set-1)]

- Q.54 The area (in percentage) under standard normal distribution curve of random variable  $Z$  within limits from  $-3$  to  $+3$  is \_\_\_\_\_. [GATE-2016]

### Try Yourself

- T1. A bag contains 4 black balls and 3 white balls. Balls are picked up one by one at random and placed in row. The chance that the balls are alternatively of different colours is \_\_\_\_\_. [Ans: 1/35]

- T2. In a box of 20 pens, five are defective. Two pens are drawn at random without replacement. The probability that both the pens being non-defective is \_\_\_\_\_. [Ans: 21/38]

- T3. A random variate has the following distribution:  
 $x : 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7$   
 $p(x) : 0 \ k \ 2k \ 2k \ 3k \ k^2 \ 2k^2 \ 7k^2 + k$   
 The value of  $k$  is \_\_\_\_\_. [Ans: 0.10]

- T4. When five coins are tossed, Heads and tails show up on the coins. The probability of showing exactly two heads on the coins is \_\_\_\_\_. [Ans: 5/16]

- T5. 8 coins are tossed simultaneously. The chance that head appears on atleast five of them is

- (a)  ${}^8C_5$       (b)  ${}^8C_5 \left(\frac{1}{2}\right)^8$   
 (c)  $\frac{93}{256}$       (d) None of these

- T6. Probability of getting a plumbing contract is 0.5. Probability of getting an electrical contract is 0.3. Probability of getting neither contract is 0.25. The probability of getting both types of contract is \_\_\_\_\_. [GATE]

- T7. An automobile plant contracted to buy shock absorbers from two suppliers  $X$  and  $Y$ .  $X$  supplies 60% and  $Y$  supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of  $X$ 's shock absorbers, 96% are reliable. Of  $Y$ 's shock absorbers, 72% are reliable.

The probability that a randomly chosen shock absorber, which is found to be reliable, is made by  $Y$  is \_\_\_\_\_. [GATE]

- T8. Let  $D = \{(x_1, x_2, x_3, x_4) : x_i = 0 \text{ (or) } 1 \text{ for } i = 1, 2, 3, 4\}$  a vector is selected at random from set  $D$ . The probability that the product of the first and third coordinate is 0 is \_\_\_\_\_. [CSIR]

- T9. The mean of squares of first 23 natural numbers is \_\_\_\_\_. [GATE]

7

## Numerical Methods



### Multiple Choice Questions

- Q.1 The matrix  $[A] = \begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix}$  is decomposed into a product of a lower triangular matrix  $[L]$  and an upper triangular matrix  $[U]$ . The properly decomposed  $[L]$  and  $[U]$  matrices respectively are

- (a)  $\begin{bmatrix} 1 & 0 \\ 4 & -1 \end{bmatrix}$  and  $\begin{bmatrix} 1 & 1 \\ 0 & -2 \end{bmatrix}$   
 (b)  $\begin{bmatrix} 2 & 0 \\ 4 & -1 \end{bmatrix}$  and  $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 1 & 0 \\ 4 & 1 \end{bmatrix}$  and  $\begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}$   
 (d)  $\begin{bmatrix} 2 & 0 \\ 4 & -3 \end{bmatrix}$  and  $\begin{bmatrix} 1 & 0.5 \\ 0 & 1 \end{bmatrix}$

[GATE]

- Q.2 The Newton-Raphson algorithm for the function

$$f(x) = \frac{1}{x} - a \text{ will be}$$

- (a)  $x_{k+1} = \frac{1}{2} \left( x_k + \frac{a}{x_k} \right)$   
 (b)  $x_{k+1} = \left( x_k + \frac{a}{2x_k^2} \right)$   
 (c)  $x_{k+1} = 2x_k - ax_k^2$   
 (d)  $x_{k+1} = x_k - \frac{a}{2} x_k^2$

[GATE]

- Q.3 The following equation needs to be numerically solved using the Newton-Raphson method.

$$x^3 + 4x - 9 = 0$$

The iterative equation for this purpose is ( $k$  indicates the iteration level)

- (a)  $x_{k+1} = \frac{2x_k^3 + 9}{3x_k^2 + 4}$   
 (b)  $x_{k+1} = \frac{3x_k^2 + 4}{2x_k^2 + 9}$   
 (c)  $x_{k+1} = x_k - 3x_k^2 + 4$   
 (d)  $x_{k+1} = \frac{4x_k^2 + 3}{9x_k^2 + 2}$

[GATE]

- Q.4 The square root of a number  $N$  is to be obtained by applying the Newton-Raphson iteration to the equation  $x^2 - N = 0$ . If  $i$  denotes the iteration index, the correct iterative scheme will be

- (a)  $x_{i+1} = \frac{1}{2} \left( x_i + \frac{N}{x_i} \right)$   
 (b)  $x_{i+1} = \frac{1}{2} \left( x_i^2 + \frac{N}{x_i^2} \right)$   
 (c)  $x_{i+1} = \frac{1}{2} \left( x_i + \frac{N^2}{x_i} \right)$   
 (d)  $x_{i+1} = \frac{1}{2} \left( x_i - \frac{N}{x_i} \right)$

[GATE]

- Q.5 Let  $x^2 - 117 = 0$ . The iterative steps for the solution using Newton-Raphson's method is given by

- (a)  $x_{k+1} = \frac{1}{2} \left( x_k + \frac{117}{x_k} \right)$   
 (b)  $x_{k+1} = x_k - \frac{117}{x_k}$

- (c)  $x_{k+1} = x_k - \frac{x_k}{117}$   
 (d)  $x_{k+1} = x_k - \frac{1}{2} \left( x_k + \frac{117}{x_k} \right)$  [GATE]

Q.6 Solution of the variables  $x_1$  and  $x_2$  for the following equations is to be obtained by employing the Newton-Raphson iterative method equation (i)  $10x_2 \sin x_1 - 0.8 = 0$

$$\text{equation (ii)} 10x_2^2 - 10x_2 \cos x_1 - 0.6 = 0$$

Assuming the initial values  $x_1 = 0.0$  and  $x_2 = 1.0$ , the Jacobian matrix is

- (a)  $\begin{bmatrix} 10 & -0.8 \\ 0 & -0.6 \end{bmatrix}$  (b)  $\begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$   
 (c)  $\begin{bmatrix} 0 & -0.8 \\ 10 & -0.6 \end{bmatrix}$  (d)  $\begin{bmatrix} 10 & 0 \\ 10 & -10 \end{bmatrix}$  [GATE]

Q.7 A 2<sup>nd</sup> degree polynomial,  $f(x)$  has values of 1, 4 and 15 at  $x = 0, 1$  and 2, respectively. The

integral  $\int_0^2 f(x) dx$  is to be estimated by applying the trapezoidal rule to this data. What is the error (defined as "true value - approximate value") in the estimate?

- (a)  $-\frac{4}{3}$  (b)  $-\frac{2}{3}$   
 (c) 0 (d)  $\frac{2}{3}$  [GATE]

Q.8 The minimum number of equal length

subintervals needed to approximate  $\int_0^1 xe^x dx$  to an accuracy of at least  $1/3 \times 10^{-6}$  using the trapezoidal rule is

- (a)  $1000e$  (b) 1000  
 (c)  $100e$  (d) 100

[GATE]

Q.9 The accuracy of Simpson's rule quadrature for a step size  $h$  is

- (a)  $O(h^2)$  (b)  $O(h^3)$   
 (c)  $O(h^4)$  (d)  $O(h^5)$

[GATE]

Q.10 The order of convergence of Newton-Raphson's Method is

- (a) 1st order (b) 2nd order  
 (c) 3rd order (d) None [GATE]

Q.11 The accuracy of the Trapezoidal rule is

- (a)  $O(h^2)$  (b)  $O(h^3)$   
 (c)  $O(h^4)$  (d)  $O(h^5)$  [GATE]

Q.12 The root of the equation  $x = e^{-x}$  by Newton-Raphson Method is

- (a) 0.683 (b) 0.597  
 (c) 0.567 (d) 0.638 [GATE]

Q.13 By Simpson's rule  $n = 4$ , the value of

$$\int_0^1 \frac{1}{1+x^2} dx \text{ is}$$

- (a) 0.7885 (b) 0.7812  
 (c) 0.7854 (d) None [GATE]

Q.14 The value of  $\int_0^4 e^x dx$  by Simpson's rule is ( $n = 4$ )

- (a) 53.87 (b) 53.60  
 (c) 54.29 (d) None

Q.15 The integral  $\int_{x_1}^{x_2} x^2 dx$  with  $x_2 > x_1 > 0$  is

evaluated analytically as well as numerically using a single application of the trapezoidal rule. If  $I$  is the exact value of the integral obtained analytically and  $J$  is the approximate value obtained using the trapezoidal rule, which of the following statements is correct about their relationship?

- (a)  $J > I$   
 (b)  $J < I$   
 (c)  $J = I$   
 (d) Insufficient data to determine the relationship

[GATE]

### Numerical Data Type Questions

Q.16 For the function  $f(x) = \frac{1}{x} - 7$  by Newton Raphson method if  $x_0 = 0.2$ , the first two iterations will be \_\_\_\_\_.

[GATE]

Q.17 Starting from  $x_0 = 1$ , one step of Newton-Raphson method in solving the equation  $x^3 + 3x - 7 = 0$  gives the next value ( $x_1$ ) as \_\_\_\_\_.

[GATE]

Q.18 Equation  $e^x - 1 = 0$  is required to be solved using Newton's method with an initial guess  $x_0 = -1$ . Then, after one step of Newton's method, estimate  $x_1$  of the solution will be given by \_\_\_\_\_.

[GATE]

Q.19 Consider the series  $x_{n+1} = \frac{x_n}{2} + \frac{9}{8x_n}$ ,  $x_0 = 0.5$  obtained from the Newton-Raphson method. The series converges to \_\_\_\_\_.

[GATE]

Q.20 The table below gives values of a function  $F(x)$  obtained for values of  $x$  at intervals of 0.25.

$x$	0	0.25	0.5	0.75	1.0
$F(x)$	1	0.9412	0.8	0.64	0.50

The value of the integral of the function between the limits 0 to 1 using Simpson's rule is \_\_\_\_\_.

[GATE]

Q.21 The integral  $\int_x^3 \frac{1}{x} dx$ , when evaluated by using Simpson's (1/3)<sup>rd</sup> rule on two equal subintervals each of length 1, equals \_\_\_\_\_.

[GATE]

Q.22 Consider a differential equation  $\frac{dy(x)}{dx} - y(x) = x$  with the initial condition  $y(0) = 0$ . Using Euler's first order method with a step size of 0.1, the value of  $y(0.3)$  is \_\_\_\_\_.

[GATE]

Q.23 In the LU decomposition of the matrix  $\begin{bmatrix} 2 & 2 \\ 4 & 9 \end{bmatrix}$ ,

if the diagonal elements of U are both 1, then the lower diagonal entry  $L_{22}$  of L is \_\_\_\_\_.

[GATE]

Q.24 The quadratic equation  $x^2 - 4x + 4 = 0$  is to be solved numerically, starting with the initial guess  $x_0 = 3$ . The Newton-Raphson method is applied once to get a new estimate and then the Secant method is applied once using the initial guess

and this new estimate. The estimated value of the root after the application of the Secant method is \_\_\_\_\_.

[GATE]

Q.25 For step-size,  $\Delta x = 0.4$ , the value of following integral using Simpson's 1/3 rule is \_\_\_\_\_.

$$\int_0^{0.8} (0.2 + 25x - 200x^2 + 675x^3 - 900x^4 + 400x^5) dx$$

[GATE]

Q.26 Consider the first order initial value problem  $y' = y + 2x - x^2$ ,  $y(0) = 1$ ,  $(0 \leq x < \infty)$  with exact solution  $y(x) = x^2 + e^x$ . For  $x = 0.1$ , the percentage difference between the exact solution and the solution obtained using a single iteration of the second-order Runge-Kutta method with step-size  $h = 0.1$  is \_\_\_\_\_. [GATE-2016]

### Try Yourself

T1. The equation  $x^3 - x^2 + 4x - 4 = 0$  is to be solved using the Newton-Raphson method. If  $x = 2$  is taken as the initial approximation of the solution, then the next approximation using this method will be \_\_\_\_\_.

[Ans: 4/3]

T2. A numerical solution of the equation  $f(x) = x + \sqrt{x} - 3 = 0$  can be obtained using Newton-Raphson method. If the starting value is  $x = 2$  for the iteration, the value of  $x$  that is to be used in the next step is \_\_\_\_\_.

[Ans: 1.694]

T3. Newton-Raphson method is used to compute a root of the equation  $x^2 - 13 = 0$  with 3.5 as the initial value. The approximation after one iteration is \_\_\_\_\_.

[Ans: 3.607]

T4. Newton-Raphson iteration formula for finding the root of an equation  $f(x) = 0$  is \_\_\_\_\_.

$$\left[ \text{Ans: } x_n - \frac{f(x_n)}{f'(x_n)} \right]$$

■ ■ ■ ■

## 8

## Laplace Transforms



## Multiple Choice Questions

Q.1  $L(t^{-1/2}) =$

- (a)  $\frac{1}{\sqrt{s}}$  (b)  $\frac{\pi}{\sqrt{s}}$   
 (c)  $\frac{\pi}{2\sqrt{s}}$  (d)  $\sqrt{\frac{\pi}{s}}$

Q.2  $L(t^{1/2}) =$

- (a)  $\frac{\sqrt{\pi}}{S^{3/2}}$  (b)  $\frac{1-\sqrt{\pi}}{2S^{3/2}}$   
 (c)  $\frac{\sqrt{\pi}}{S^{3/2}}$  (d)  $\frac{\sqrt{\pi}}{S^{1/2}}$

Q.3 If  $f(t) = \begin{cases} \frac{1}{k}, & \text{when } 0 < t < k \\ 1, & \text{when } t > k \end{cases}$  then  $L(f(t)) =$

- (a)  $\frac{1-e^{-ks}}{ks^2}$  (b)  $\frac{1+e^{-ks}}{ks^2}$   
 (c)  $\frac{k-e^{-ks}}{s^2}$  (d)  $\frac{1+(k-1)e^{-ks}}{ks}$

Q.4  $L(t \sinh at) =$

- (a)  $\frac{2as}{(s^2 + a^2)^2}$  (b)  $\frac{2as}{(s^2 - a^2)^2}$   
 (c)  $\frac{2as}{(s^2 - a^2)}$  (d)  $\frac{2as}{(s^2 + a^2)}$

Q.5  $L\left(\frac{\sin 2t}{t}\right) =$   
 (a)  $\cos^{-1}s$  (b)  $\cot^{-1}s$   
 (c)  $\cot^{-1}\frac{s}{2}$  (d)  $\tan^{-1}\frac{s}{2}$

Q.6  $L\left(\frac{1-e^t}{t}\right) =$   
 (a)  $\log\left(\frac{s-1}{s}\right)$  (b)  $\log\left(\frac{s+1}{s}\right)$   
 (c)  $\log\left(\frac{s}{s-1}\right)$  (d)  $\log\left(\frac{s-1}{s+1}\right)$

Q.7 The value of  $\int_0^\infty \frac{\sin t}{t} dt =$   
 (a)  $\frac{\pi}{4}$  (b)  $\frac{\pi}{2}$   
 (c)  $\frac{\pi}{3}$  (d) 0

Q.8 The value of  $\int_0^\infty \frac{e^{-t} \sin t}{t} dt =$   
 (a)  $\frac{\pi}{4}$  (b)  $\frac{\pi}{2}$   
 (c)  $\frac{\pi}{3}$  (d) 0

Q.9 The solution of  
 $y'' + 25y = 10 \cos 5t, y(0) = 2, y'(0) = 0$  is  
 (a)  $2\cos 5t + t \sin 5t$   
 (b)  $2\sin 5t + t \cos 5t$   
 (c)  $3\cos 5t - t \sin 5t$   
 (d)  $3\cos 5t + t \sin 5t$

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Q.10 The solution of

$y'' + 4y = 12t, y(0) = 0, y'(0) = 9$  is  
 (a)  $3t + 3\sin 2t$  (b)  $3t - 3\sin 2t$   
 (c)  $3t - 6\sin 2t$  (d)  $3t + 3\cos 2t$

Q.11  $L^{-1}\left[\frac{1}{(s+1)(s-2)}\right] =$

- (a)  $\frac{e^{2t}}{3}$  (b)  $\frac{e^{-t}}{3}$   
 (c)  $\frac{e^{2t}-e^{-t}}{3}$  (d)  $\frac{e^{2t}+e^{-t}}{3}$

Q.12  $L^{-1}[\cot^{-1}s] =$

- (a)  $\frac{\sin t}{t}$  (b)  $\frac{1-\cos t}{t}$   
 (c)  $\frac{\sin 2t}{t}$  (d)  $\frac{1-\cos 2t}{t}$

Q.13  $L^{-1}\left[\log\left(\frac{s-2}{s-4}\right)\right] =$

- (a)  $\frac{e^{2t}-e^{4t}}{t}$  (b)  $\frac{e^{4t}-e^{2t}}{t}$   
 (c)  $\frac{e^{2t}+e^{4t}}{t}$  (d)  $\frac{e^{-4t}-e^{-2t}}{t}$

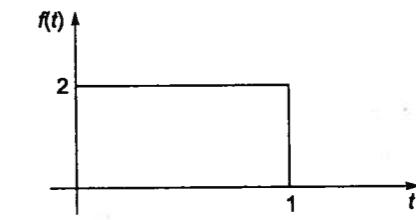
Q.14 The solution of initial value problem

$y'' + 2y' + 10y = 6\delta(t), y(0) = 0, y'(0) = 0$   
 where  $\delta(t)$  is direct delta function is

- (a)  $2e^t \sin 3t$  (b)  $6e^t \sin 3t$   
 (c)  $2e^{-t} \sin 3t$  (d)  $6e^{-t} \sin 3t$

Q.15 If  $f(t) = \begin{cases} \sin t, & 0 < t < \pi \\ 0, & \pi < t < 2\pi \end{cases}$  then  $L(f(t)) =$

- (a)  $\frac{1}{1-e^{\pi s}(s^2+1)}$  (b)  $\frac{1}{1+e^{-\pi s}(s^2+1)}$   
 (c)  $\frac{1+e^{-\pi s}}{s^2+1}$  (d)  $\frac{1-e^{-\pi s}}{s^2+1}$

Q.16 Laplace transform of the function  $f(t)$  is givenby  $F(s) = L\{f(t)\} = \int_0^\infty f(t)e^{-st} dt$ . Laplace transform of the function shown below is given by

- (a)  $\frac{1-e^{-2s}}{s}$  (b)  $\frac{1-e^{-s}}{2s}$   
 (c)  $\frac{2-2e^{-s}}{s}$  (d)  $\frac{1-2e^{-s}}{s}$

[GATE]

Q.17 The Laplace transform of  $f(t) = 2\sqrt{t/\pi}$  is  $s^{-3/2}$ .The Laplace transform of  $g(t) = \sqrt{1/\pi t}$  is

- (a)  $\frac{3s^{-5/2}}{2}$  (b)  $s^{-1/2}$   
 (c)  $s^{1/2}$  (d)  $s^{3/2}$

[GATE]

Q.18 The value of the integral  $2 \int_{-\infty}^{\infty} \left( \frac{\sin 2\pi t}{\pi t} \right) dt$  is equal

- to  
 (a) 0 (b) 0.5  
 (c) 1 (d) 2

[GATE-2016]

Numerical Data Type  
Questions

Q.20 Let 'y' be the solution of  $\frac{d^2y}{dt^2} = 6\cos 2t$ ,  
 $y(0) = 3, y'(0) = 1$ . Let laplace transform of y  
 be  $Y(S)$ , the value of  $Y(1) = \underline{\hspace{2cm}}$ .

Q.21 If  $L(f) = F(s) = \frac{5s^2 + 23s + 6}{s(s^2 + 2s + 2)}$  then  $\lim_{t \rightarrow \infty} f(t) = \underline{\hspace{2cm}}$ .

Q.22 If  $F(s) = \frac{2}{s(1+s)}$  then  $\lim_{x \rightarrow \infty} f(t) = \underline{\hspace{2cm}}$  where  
 $L(f(t)) = F(s)$


**Try Yourself**

- T1.  $L(\sin^2 t) =$   
 (a)  $\frac{1}{s(s^2 + 1)}$  (b)  $\frac{2}{s(s^2 + 4)}$   
 (c)  $\frac{2}{s^2(s^2 + 4)}$  (d)  $\frac{4 - s^2}{2s(s^2 + 4)}$   
 [Ans: (b)]

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- T2.  $L(t^3 e^{-2t}) =$   
 (a)  $\frac{2}{(s - 2)^4}$  (b)  $\frac{6}{(s - 2)^4}$   
 (c)  $\frac{6}{(s + 2)^4}$  (d)  $\frac{6}{(s + 3)^4}$   
 [Ans: (c)]
- T3.  $L^{-1}\left[\frac{s}{s^2 + 4}\right] =$   
 (a)  $\cos t$  (b)  $\sin t$   
 (c)  $\cos 2t$  (d)  $\sin 2t$   
 [Ans: (c)]  
 ■■■■

# 2017

**MADE EASY**  
**WORKBOOK**

**Engg. Mathematics + Reasoning & Aptitude + General English**

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# Reasoning & Aptitude

## 1. Number System

- Q.1** Number of factors of 1800  
 (a) 48      (b) 36  
 (c) 54      (d) 72
- Q.2** Number of prime factors of  $(30)^7 \times (22)^5 \times (34)^{11}$   
 (a) 4      (b) 3  
 (c) 5      (d) 7
- Q.3** The highest power of 3 in 80!  
 (a) 36      (b) 34  
 (c) 23      (d) 24
- Q.4** If  $137 + 276 = 435$  how much is  $731 + 672$ ?  
 (a) 534      (b) 1403  
 (c) 1623      (d) 1531
- Q.5**  $50!$  ends with how many trailing zeroes?  
 (a) 16      (b) 11  
 (c) 12      (d) 14
- Q.6** If  $7^{84}$  divided by 342 then find the remainder  
 (a) 0      (b) 49  
 (c) 1      (d) 341
- Q.7** Remainder when  $15^{23} + 23^{23}$  is divided by is 19  
 (a) 4      (b) 18  
 (c) 15      (d) 0
- Q.8** Number of even factors of N, where  $N = 10800$   
 (a) 48      (b) 60  
 (c) 36      (d) 12
- Q.9**  $1.2+2.3+3.4+\dots$  sum of n terms =  
 (a)  $\frac{n(n+1)^2}{2}$       (b)  $\frac{n(n+1)(n+2)}{2n+1}$   
 (c)  $\frac{n(n+1)(n+2)}{3}$       (d)  $\frac{n(n+1)^2}{4}$

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**Q.10** The unit digit of the following addition is \_\_\_\_\_.  
 $1! + 2! + 3! + 4! \dots 999!$

**Q.11** The unit digit of following multiplication

$$(173)^{430} \times (226)^{127} \times (78)^{243} \times (374)^{214}$$

**Q.12** A rectangular floor  $12 \times 16$  is to be filled with square tiles without breaking tiles such that each tile is as large as possible. How many square tiles will be required?

- (a) 32      (b) 16  
 (c) 8      (d) 12

**Q.13** Red light flashes after every 15 seconds and green light flashes after every 10 seconds. How many times will they be flashing together in a day \_\_\_\_\_.  
**Try Yourself**

**T1.**  $A = 4^{86} - 2^{171}$ . How many digits would be there, if A is expressed in binary base

- (a) 171      (b) 86  
 (c) 87      (d) 172

**T2.** Find the sum of the expression

$$\frac{1}{\sqrt{1}+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{80}+\sqrt{81}}$$

- (a) 7      (b) 8  
 (c) 9      (d) 10

## 2. Time and Work

- Q.1** A and B can do a work in 3 days, B and C can do it in 4 days, A and C can do it in 6 days. How long will it take A alone to do it?  
 (a) 8 days      (b) 6 days  
 (c) 4 days      (d) 12 days

**Q.2** 4 Men or 7 Women can do a work in 40 days. In how many days 8 men and 6 women can do that work?  
 (a) 18      (b) 14  
 (c) 20      (d) 12

**Q.3** If A is 20% less efficient than B. If B alone can do the work in 40 days, in how many days can A and B together complete the same work?  
 (a)  $22\frac{2}{9}$       (b)  $20\frac{1}{9}$   
 (c)  $21\frac{2}{9}$       (d)  $32\frac{2}{9}$

**Q.4** A and B earn ₹ 320 in 4 days. B and C earn ₹ 450 in 10 days. A, B and C earn ₹ 600 in 5 days. Find the daily earning of B.  
 (a) ₹ 15      (b) ₹ 5  
 (c) ₹ 25      (d) ₹ 40

**Q.5** 4 Men and 3 Women can do a work in 8 days. 6 men and 9 women can do the same work in 4 days. In how many days can 20 men and 6 women do the same work?  
 (a) 2      (b) 4  
 (c) 5      (d) 6

**Q.6** A, B and C can do a work in 20, 15 and 12 days respectively. A is assisted by B on first day and by C on the next day, alternatively. How long the work would take to finish?  
 (a) 8 days      (b) 6 days  
 (c) 10 days      (d) 4 days

**Q.7** A and B can do a work in 10 days and 12 days respectively. If they work on alternate days beginning with A, when will the work be completed?  
 (a) 11 days      (b)  $10\frac{5}{6}$  days  
 (c) 12 days      (d)  $12\frac{2}{3}$  days

**Q.8** A can finish a piece of work in 15 days of 8 hours each and B finishes it in  $6\frac{2}{3}$  days of 9 hours each. In how many days can they finish the work, if they work together for 10 hours each day?  
 (a)  $13\frac{1}{3}$       (b)  $16\frac{2}{3}$   
 (c)  $26\frac{2}{3}$       (d)  $24\frac{2}{3}$

**Try Yourself**

**T3.** In a hostel there is enough food for 25 days for 40 students. After 5 days 10 students left from the hostel. Find the number of days for which the remaining food will be sufficient for remaining students.

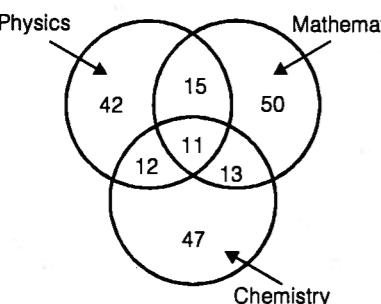
- T4. A and B together can do a piece of work in 12 days which B and C together can finish in 16 days. After A has worked on it for 5 days, and B for 7 days, C finishes remaining work in 13 days. In how many days can A finish the work alone?
- (a) 16      (b) 14  
(c) 48      (d) 24

### 3. Set Theory & Logical Venn Diagram

**Directions (Q.1-Q.3):** A TV survey gives this data for TV viewing. 60% see programme A, 50% see programme B, 30% see programme C. 30% see programmes A and B, 20% see programmes B and C and 10% see programmes A and C. 10% see all programmes A, B, C. Then answer the following questions.

- Q.1 What percent view A and B but not C?  
(a) 20      (b) 10  
(c) 30      (d) 7
- Q.2 What percent do not view any of the three programmes?  
(a) 30      (b) 10  
(c) 15      (d) 17
- Q.3 What percent view exactly two programmes?  
(a) 20      (b) 30  
(c) 50      (d) 24

**Directions (Q.4-Q.6):** The diagram given below shows the number of students who got distinction in 3 subjects out of 500 students. Study the diagram and answer the following:



- Q.4 What is the percentage of the student who got distinction in exactly two subjects?  
(a) 8%      (b) 9%  
(c) 10%      (d) 12%

- Q.5 What is the percentage of students who got distinction?  
(a) 28%      (b) 30%  
(c) 38%      (d) 40%

- Q.6 The percentage of students with distinctions in Mathematics is  
(a) 17.8%      (b) 18.6%  
(c) 19.2%      (d) 20.6%

- Q.7 In a certain locality of Delhi, there are 1000 families. A survey indicated of 300 subscribe to the Hindustan Times Daily News Paper and 250 subscribe to Statesman Daily News Paper and of these two categories 100 subscribe both. Find the number of families which do not subscribe to any of these New Papers

**Directions (Q.8-Q.11):** In an organization 500 employees are working. Among them 200 are Technicians, 220 are Managers and 120 are Supervisors. 100 employees are Managers who are also Technicians but not Supervisors. There are 10 employees who are Supervisors, Technicians and also Managers. There are 50 employees who are only Technicians. 40 employees are only Supervisors. Then answer the following questions.

- Q.8 How many employees are only managers?  
(a) 80      (b) 120  
(c) 140      (d) 160

- Q.9 How many employees do exactly one type of job?  
(a) 160      (b) 150  
(c) 170      (d) 180

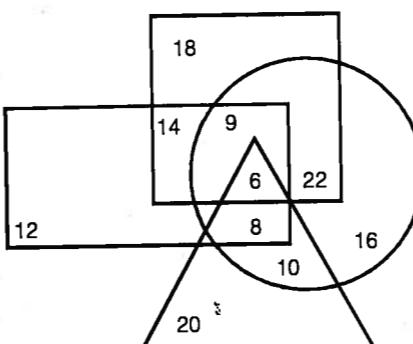
- Q.10 How many employees are neither technicians nor managers nor supervisors?  
(a) 100      (b) 250  
(c) 150      (d) 200

- Q.11 How many employees are managers and supervisors but not technicians?

- (a) 30      (b) 70  
(c) 10      (d) 80

- Q.12 There are 16 teachers who can teach Thermodynamics (TD), 11 who can teach Electrical Sciences (ES), and 5 who can teach both TD and Engineering Mechanics (EM). There are a total of 40 teachers. 6 cannot teach any of the three subjects, i.e. EM, ES or TD. 6 can teach only ES. 4 can teach all three subjects, i.e. EM, ES and TD. 4 can teach ES and TD. How many can teach both ES and EM but not TD?  
(a) 1      (b) 2  
(c) 3      (d) 4

**Directions (Q.13-Q.16):** These questions are based on the diagram given below



Square represents the people who are intelligent, Rectangle represent the people who work hard, Triangle represents the people who are employees. Circle represents the people who are professors.

- Q.13 How many intelligent people who work hard, are neither employees nor professors?  
(a) 14      (b) 18  
(c) 30      (d) 20

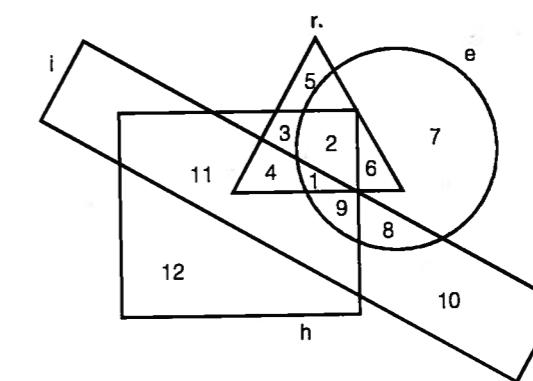
- Q.14 Which of the following numbers represents people who are only intelligent?  
(a) 14      (b) 1  
(c) 12      (d) 18

- Q.15 How many professors are intelligent and work hard but are not employees?  
(a) 6      (b) 9  
(c) 10      (d) 16

- Q.16 What does number 10 represent in the above diagram?  
(a) Only employees who work hard

- (b) Only intelligent  
(c) Only employees who are professors  
(d) Only hard worker

**Directions (Q.17.-Q.20):** In the following figure, the circle stands for employed, the square stands for hard working, the triangle stands for rural and the rectangle stands for intelligent. Study the figure carefully and answer the questions that follow.



- Q.17 Non-rural, employed, hard working and intelligent people are indicated by region  
(a) 8      (b) 9  
(c) 10      (d) 11

- Q.18 Non-rural, employed people who are neither intelligent nor hard working are represented by region  
(a) 12      (b) 11  
(c) 10      (d) 7

- Q.19 Intelligent, employed and hard working non rural people are indicated by region  
(a) 11      (b) 6  
(c) 9      (d) 4

- Q.20 Hard working non-rural people who are neither employed nor intelligent are shown in region  
(a) 8      (b) 7  
(c) 6      (d) 12

**Try Yourself**

- T5. In a certain school 30 students play football, 15 play hockey and 25 take part in athletics. 8 play both football and hockey, 6 play hockey and athletics, 12 play football and athletics. 4 take part in all three games. How many students in all are involved in any of the three games? \_\_\_\_\_.

**4. Ratio, Proportion & Mixtures**

- Q.1 If  $A : B = 3 : 2$ ,  $B : C = 5 : 4$ ,  $C : D = 3 : 7$ , then  $A : B : C : D$   
 (a) 45 : 30 : 24 : 56      (b) 45 : 24 : 30 : 56  
 (c) 45 : 56 : 30 : 24      (d) 45 : 30 : 56 : 24
- Q.2 Two numbers are in the ratio 4 : 7. If 4 is added to each number then the ratio becomes 3 : 5. The smaller number is  
 (a) 42      (b) 32      (c) 56      (d) 24
- Q.3 In a bag, number of 25 p coins, 20 p coins and 10 p coins are in the ratio 3 : 7 : 9 and together worth of ₹ 61. Find the number of 20 p coins  
 (a) 180      (b) 60      (c) 140      (d) 90
- Q.4 The ratio of the age of a man and his wife is 6 : 5. After 16 years, the ratio becomes 10 : 9. Find the husband's age when the wife was born  
 (a) 3      (b) 4      (c) 24      (d) 6
- Q.5 There are peacocks and deers in a park. If the total number of their heads is 150 and that of legs is 400, the number of deers is  
 (a) 50      (b) 100      (c) 60      (d) 90
- Q.6 Find the fourth proportion of 1.75, 5.25, 3.5  
 (a) 10.5      (b) 6.5      (c) 12.5      (d) 4.5

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- Q.7 Find the third proportion of 36 and 48.  
 (a) 64      (b) 48  
 (c) 60      (d) 72

- Q.8 5 chairs cost as much as 12 stools, 7 stools as much as 2 tables, 3 tables as much as 2 sofas. If the cost of 5 sofas is ₹ 875, then find the cost of a chair  
 (a) ₹ 60      (b) ₹ 80  
 (c) ₹ 75      (d) ₹ 90

- Q.9 The mean proportion of 0.7 and 2.8 is \_\_\_\_\_.

- Q.10 A and B enter into a partnership with capital in the ratio 5 : 8. At the end of 8 months, A withdraws from the business. If their profit are in the ratio 1 : 2, how long B invest his capital  
 (a) 8 months      (b) 10 months  
 (c) 9 months      (d) 6 months

- Q.11 A mixture contains milk and water in the ratio 4 : 3. When 5 litres of water is added, then ratio becomes 1 : 1. Find the amount of milk in the mixture  
 (a) 15 litres      (b) 20 litres  
 (c) 25 litres      (d) 30 litres

- Q.12 In what ratio must tea at ₹ 62 per kg be mixed with tea at ₹ 72 per kg so that the mixture must be worth ₹ 64.50 per kg?  
 (a) 3 : 1      (b) 3 : 2  
 (c) 4 : 3      (d) 5 : 3

- Q.13 A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container?  
 \_\_\_\_\_.

**Try Yourself**

- T6. A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water

- (a) 2 : 5      (b) 1 : 2  
 (c) 2 : 3      (d) None of these

**5. Percentages**

- Q.1 The length and breadth of a rectangle increased by 10% and 20%. What is the percentage increase in the area of the rectangle?  
 (a) 32%      (b) 40%  
 (c) 30%      (d) 38%

- Q.2 The population of a city increases by 20% every year. If the present population is 5,76,000, what was population of the city two years ago?  
 (a) 4,00,000      (b) 4,40,000  
 (c) 4,20,000      (d) 4,10,000

- Q.3 40 litres of mixture of milk and water contains 25% of water. When 10 litres of water is added, what will be percentage of milk in the final mixture?  
 (a) 40%      (b) 60%  
 (c) 80%      (d) 70%

- Q.4 If ₹ 636 is divided between A, B, C such that A gets 20% more than B, and B gets 25% less than C, find the share of C  
 (a) ₹ 280      (b) ₹ 240  
 (c) ₹ 220      (d) ₹ 200

- Q.5 The income of a person decreased by 20% and then again decreased by 20%. Find the total percentage decrease in his income.  
 (a) 36%      (b) 40%  
 (c) 28%      (d) 32%

- Q.6 A man spent 5% of his money and then after spending 75% of the remainder, he had ₹ 950 left with him. How much money he had at the beginning?  
 (a) ₹ 9000      (b) ₹ 6575  
 (c) ₹ 4000      (d) ₹ 6000

- Q.7 A shopkeeper increased the selling price of an article by 25% and then decreased by 25%. If the present selling is ₹ 225. Then what was his original selling price?

- (a) ₹ 240      (b) ₹ 300  
 (c) ₹ 320      (d) ₹ 225

- Q.8 In an election between two candidates, one got 52% of the total valid votes. 25% of the total votes were invalid. The total number of votes was 8400. How many valid votes did the other candidate get? \_\_\_\_\_.

- Q.9 If price of spices is increased by 10%, by how much percentage should a household woman reduce her consumption of spices so as not to alter her allotted budget for spices? \_\_\_\_\_.

**Try Yourself**

- T7. In an exam 80% passed in English, 70% passed in Science and 15% failed in both the subjects. If 195 passed in both the subjects. Find the total number of students.  
 (a) 250      (b) 300  
 (c) 400      (d) 350

- T8. The price of Paruti car per unit rises by 30%, while number of cars sold came down by 20%. Then the total percentage change in revenue is \_\_\_\_\_.

**6. Profit and Loss**

- Q.1 A shopkeeper sells two computers for ₹ 24,000 each. On first he gained 20% and on the other, he lost 20%. What is the overall gain or loss percentage  
 (a) 4% gain      (b) 4% loss  
 (c) 6% gain      (d) 6% loss

- Q.2 Ravi purchases two TV's at ₹ 3500 each. He sold one TV at 10% gain and the other at 10% loss. What is his overall gain or loss percentage?  
 \_\_\_\_\_.

- Q.3 By selling an article for ₹ 3000, a person loses 20%. What will he gain or lose, if he sells it for ₹ 3900?  
 (a) 6% gain      (b) 6% loss  
 (c) 4% gain      (d) 4% loss

Q.4 A man buys an article for ₹ 7290 and sells at a loss of  $\frac{2}{7}$  of selling price. Find the S.P.

- (a) 5820      (b) 5670  
(c) 6000      (d) 6120

Q.5 If the cost price of 15 tables is equal to the selling price of 12 tables, find gain or loss percentage

- (a) 25% loss      (b) 25% gain  
(c) 20% gain      (d) 20% loss

Q.6 The single discount equivalent to two successive discounts 10% and 20% will be \_\_\_\_\_.

Q.7 An article is marked at ₹ 2500 and the shopkeeper allows three successive discounts 10%, 20% and 10%. Find the S.P.

- (a) ₹ 1620      (b) ₹ 1840  
(c) ₹ 2000      (d) ₹ 2100

Q.8 A person gives 25% discount on M.P. and still gains 20%. How much percent is M.P. above the C.P.?

- (a) 25%      (b) 60%  
(c) 40%      (d) 30%

Q.9 After giving two successive discounts of 10% and 20%, the selling price of an article is ₹ 216. Find the marked price

- (a) ₹ 250      (b) ₹ 300  
(c) ₹ 290      (d) ₹ 400

Q.10 A person marks a product at 50% over the cost price and then gives some discount. If he makes a profit of 5%, what is the percentage discount that he offered on the marked price?

- (a) 10%      (b) 20%  
(c) 30%      (d) 40%

Q.11 'A' sells a DVD to 'B' at a gain of 17% and 'B' sells it to 'C' at a loss of 25%. If 'C' pays ₹ 1053 to 'B', then what is the cost price of the DVD to 'A'?

- (a) ₹ 1200      (b) ₹ 1450  
(c) ₹ 1250      (d) ₹ 1375

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Q.12 A fruit seller buys apples at the rate of ₹ 12 per dozen and sells them at the rate of 15 apples for ₹ 12. Find his percentage gain or loss.

- (a) 20% gain      (b) 20% loss  
(c) 25% gain      (d) 25% loss

Q.13 A dishonest shopkeeper uses a false weight of 900 gms instead of 1 kg. If he promises to sell his goods at cost price, which of the following is true?

- (a) Profit of 10%      (b) Profit of 11.11%  
(c) Loss of 10%      (d) Loss of 11.11%

### Try Yourself

T9. Even after allowing a discount of 11.11% on market price, shopkeeper makes a profit of 14.28%. The percentage by which the marked price is over cost price is

- (a) 14.28      (b) 28.56  
(c) 25      (d) 50

### 7. Simple Interest and Compound Interest

Q.1 Find the simple interest on ₹ 22,000 for 5 years at 8% per annum.

- (a) ₹ 8000      (b) ₹ 8200  
(c) ₹ 8800      (d) ₹ 8400

Q.2 A certain sum of money amounts to ₹ 3080 in 3 years and ₹ 3400 in 5 years at S.I. What is the sum?

- (a) ₹ 2600      (b) ₹ 3600  
(c) ₹ 4600      (d) ₹ 1700

Q.3 In how many years will a sum of money become 5 times at 8% p.a. simple interest?

- (a) 10 years      (b) 20 years  
(c) 30 years      (d) 50 years

Q.4 A sum of money ₹ 15000 is lent in two parts: one at 7% p.a. and other at 4% p.a. If the annual interest received is ₹ 900, what is the amount lent at 4% p.a.?

- (a) ₹ 4000      (b) ₹ 6000  
(c) ₹ 5000      (d) ₹ 8000

Q.5 Find the compound interest on ₹ 2000 for 9 months at 40% p.a. compounded quarterly

- (a) ₹ 662      (b) ₹ 362  
(c) ₹ 862      (d) ₹ 962

Q.6 Find the difference between C.I. and S.I. on ₹ 6400 for 2 years at 12.5% p.a.

- (a) ₹ 400      (b) ₹ 300  
(c) ₹ 100      (d) ₹ 200

Q.7 The C.I. on a certain sum for 2 years at 10% p.a. is ₹ 1260. What is the S.I. on the same sum at the same rate for 2 years?

- (a) ₹ 1100      (b) ₹ 1200  
(c) ₹ 600      (d) ₹ 1400

Q.8 The S.I. on a certain sum of money for 2 years at 5% p.a. is ₹ 600. What is the C.I. on the same sum at the same rate and for the same time?

- (a) ₹ 415      (b) ₹ 615  
(c) ₹ 815      (d) ₹ 960

Q.9 At C.I. a certain sum becomes twice itself in 7 years. In how many years will it become 32 times? \_\_\_\_\_

### Try Yourself

T10. A sum of money amounts to ₹ 4840 in 2 years and ₹ 5324 in 3 years at C.I. What is the rate percent?

- (a) 9%      (b) 8%  
(c) 4%      (d) 10%

T11. The difference between C.I. and S.I. on ₹ 32,000 for 3 years at rate 5% p.a. in ₹ \_\_\_\_\_.

### 8. Time, Speed and Distance

Q.1 In a 200 m race, 'A' beats 'B' by 20 m. 'B' beats C by 10 m in a 250 m race. By how many meters will 'A' beat C in a 1 km race?

- (a) 146 m      (b) 164 m  
(c) 136 m      (d) 144 m

Q.2 If a boat with speed 20 m/s in still water takes 1/3 hr and 1/2 hr in order to cover same distance downstream and upstream respectively, then the speed of the current is

- (a) 6 m/s      (b) 8 m/s  
(c) 3 m/s      (d) 4 m/s

Q.3 Vijay goes from Delhi to Bhopal at a uniform speed of 40 km/hr and comes back at a uniform speed of 60 km/hr. His average speed over the entire journey is

- (a) 50      (b) 52.5  
(c) 48      (d) 51.5

Q.4 Two trains are approaching each other from opposite sides and cross each other in 14 seconds. What is the speed of second train if speed of first train is 7 km/hr and the length of the trains are 126 m and 240 m respectively?

- (a) 67.14 kmph      (b) 87.11 kmph  
(c) 77.14 kmph      (d) 97.11 kmph

Q.5 A bus has to cover a distance of 80 km in 10 hrs. If it covers first half of journey in 3/5 of time, what should be its speed to cover the remaining distance in the assigned time?

- (a) 20 km/hr      (b) 10 km/hr  
(c) 5 km/hr      (d) 8 km/hr

Q.6 A boy covers a certain distance between his house and school on a cycle. Having an average speed of 15 kmph, he is late by 10 min. However, with an average speed of 20 kmph, he reaches the school 5 min. earlier. Find the distance between his house and school.

- (a) 15 km      (b) 20 km  
(c) 25 km      (d) 30 km

Q.7 If A and B run at 6 km/hr and 12 km/hr on a circular track 6 km long. When will they meet for the first time if they are running in opposite direction?

- (a) 20 min      (b) 28 min  
(c) 29 min      (d) 10 min

Q.8 A and B run around a circular track of length 600 m at the respective speeds of 15 m/sec

and 20 m/sec starting from the same point and at the same time travelling in the same direction. When will they meet each other at the starting point for the first time?

- (a) 2 min (b) 4 min  
(c) 6 min (d) 7 min

**Q.9** A Car travels a distance 840 km at a uniform speed. If the speed of the car is 10 km/hr more, it takes 2 hours less to cover the same distance. The original speed of the car was

- (a) 80 km/hr (b) 70 km/hr  
(c) 60 km/hr (d) 40 km/hr

**Q.10** A tourist covers half of his journey by train at 60 km/hr, half of the remainder by bus at 30 km/hr and the rest by cycle at 10 km/hr. The average speed of the tourist in km/hr during his entire journey is \_\_\_\_\_.

**Q.11** A car travels 8 km in the first quarter of an hour, 6 km in the second quarter and 16 km in the third quarter. The average speed of the car in km per hour over the entire journey is \_\_\_\_\_.

### Try Yourself

**T12.** Ravi and Gautam are heading towards each other. If they meet at 45 km from Ravi's starting point. Now after meeting they move towards the other's starting point in 16 hrs and 25 hrs respectively, then initial separation between Ravi and Gautam.

- (a) 81 km (b) 100 km  
(c) 90 km (d) 110 km

**T13.** Two trains separated by 480 kms are approaching each other with speed 70 kmph and 50 kmph respectively. A bird with speed 100 km/hr started from the front of first train goes to front of second train and comes back to first train and continues to go to and from till the trains collide. What is the total distance travelled by the bird?

- (a) 500 kms (b) 400 kms  
(c) 480 kms (d) 600 kms

## 9. Permutation, Combination and Probability

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**Q.1** In a party every one hand shakes with each presentee exactly once. If total number of hand shakes made were 153, then the number of people present in the party.

- (a) 17 (b) 18  
(c) 19 (d) 36

**Q.2** If number of diagonals of an 'n' sided polygon is 50% higher than its number of sides, then the polygon is a/an

- (a) Quadrilateral (b) Hexagon  
(c) Octagon (d) None of these

**Q.3** Line 'l' has 6 points on it and 'm' has five points lying on it. If  $l \parallel m$ , then how many triangles can we get from these 11 points

- (a) 60 (b) 75  
(c) 135 (d) 125

**Q.4** What is the probability of getting 53 Sundays in a leap year?

- (a)  $\frac{1}{7}$  (b)  $\frac{2}{7}$   
(c)  $\frac{3}{7}$  (d)  $\frac{1}{2}$

**Q.5** Two dice are thrown at random. What is the most probable sum to obtain?

- (a) 6 (b) 12  
(c) 7 (d) None of these

**Q.6** A problem is given to four students A, B, C, D. Their respective individual probability of solving

the problem is  $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$ . Find the probability that the problem will be solved

- (a)  $\frac{1}{3}$  (b)  $\frac{2}{3}$   
(c)  $\frac{4}{5}$  (d) None of these

**Q.7** If a fair coin is tossed four times, what is the probability that two heads and two tails will result?

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- (a)  $\frac{3}{8}$  (b)  $\frac{1}{2}$   
(c)  $\frac{5}{8}$  (d)  $\frac{3}{4}$

**Q.8** A speaks truth in 60% cases and B in 75% cases. While stating the same fact in either 'yes' or 'no' only, they are likely to contradict in what percentage cases?

- (a) 25 (b) 35  
(c) 45 (d) 55

**Q.9** An automobile plant contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable.

The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is

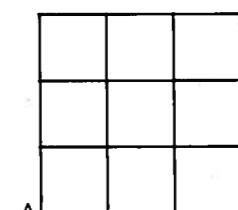
- (a) 0.288 (b) 0.334  
(c) 0.667 (d) 0.720

**Q.10** In any given year, the probability of an earthquake greater than Magnitude 6 occurring in the Garhwal Himalayas is 0.04. The average time between successive occurrences of such earthquakes is \_\_\_\_\_ years.

**Q.11** How many four digit numbers can be formed with the 10 digits 0, 1, 2, ..., 9 if no number can start with 0 and if repetitions are not allowed?

### Try Yourself

**T15.** In the adjoining figure, total number of shortest routes from A to C. If moving along only straight lines are allowed



- (a) 9 (b) 720  
(c) 120 (d) 20

**T16.** Given digits 2, 2, 3, 3, 3, 4, 4, 4, 4 how many distinct 4 digit numbers greater than 3000 can be formed?

- (a) 50 (b) 51  
(c) 52 (d) 54

**T17.** A and B are friends. They decide to meet between 1 P.M. and 2 P.M. on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (a)  $\frac{1}{4}$  (b)  $\frac{1}{16}$   
(c)  $\frac{7}{16}$  (d)  $\frac{9}{16}$

## 10. Calendar

**Q.1** What was the day on 22<sup>nd</sup> July 1992?

- (a) Friday (b) Saturday  
(c) Wednesday (d) Sunday

**Q.2** If 11<sup>th</sup> August 2010 was Wednesday, then what was the day on 11<sup>th</sup> August 2001?

- (a) Sunday (b) Saturday  
(c) Friday (d) Monday

**Q.3** Which dates of August 1988 will fall on Friday?

- (a) 6, 13, 20, 27 (b) 4, 11, 18, 25  
(c) 5, 12, 19, 26 (d) 3, 10, 17, 24

**Q.4** If 16<sup>th</sup> July 2000 was Sunday, then what will be the day on 20<sup>th</sup> December 2000?

- (a) Monday (b) Saturday  
(c) Wednesday (d) Friday
- Q.5** If any calendar consists of 385 days and 8 days in a week, how many odd days will be there in that year?  
(a) 4 (b) 3  
(c) 2 (d) 1
- Q.6** In a leap year, January 26<sup>th</sup> is Friday. What is the day of August 15<sup>th</sup> in the same year?  
(a) Monday (b) Tuesday  
(c) Thursday (d) Friday
- Q.7** What was the day on 15th August 1947?  
(a) Sunday (b) Tuesday  
(c) Wednesday (d) Friday
- Q.8** 14th February 2016 will be which day of the week?  
(a) Sunday (b) Monday  
(c) Tuesday (d) Saturday
- Q.9** Total number of odd days till first 1900 years of calendar \_\_\_\_\_.

## 11. Clocks

- Q.1** At what time between 3'O clock and 4'O clock, hands of the clock are together?  
(a)  $3:15\frac{4}{11}$  (b)  $3:16\frac{4}{11}$   
(c)  $3:17\frac{4}{11}$  (d)  $3:16\frac{11}{4}$
- Q.2** At what time between 4'O clock and 5'O clock, hands of the clock are at right angle?  
(a)  $4:5\frac{5}{11}$   
(b)  $4:38\frac{2}{11}$   
(c)  $4:5\frac{5}{11}, 4:38\frac{2}{11}$   
(d) None of these

## Try Yourself

- T18.** At what time between 2'O clock and 3'O clock, hands of the clock are at right angle?  
(a)  $2:27\frac{3}{11}$  (b) 3.00  
(c)  $2:27\frac{11}{3}$  (d)  $2:26\frac{11}{3}$
- T19.** A Clock is set right at 7 AM. and the clock loses 15 min in 24 hrs. What is the correct time when it shows 4 PM. after 2 Days.  
(a) 4 : 32 PM (b) 4 : 30 PM  
(c) 4 : 36 PM (d) 4 : 35 PM

## 12. Cubes, Dices and Directions

**Directions (Q.1-Q4):** A large cube after painting it on all faces was divided into 125 smaller equal cubes. Answer the following.

- Q.3** At what time between 8'O clock and 9'O clock, are hands of the clock opposite to each other?  
(a)  $8:10\frac{10}{11}$  (b)  $8:10\frac{9}{10}$   
(c)  $8:10\frac{11}{14}$  (d)  $8:10\frac{2}{11}$
- Q.4** What is the angle between the two hands of a clock when the clock shows 5 hours 20 minutes?  
(a)  $40^\circ$  (b)  $60^\circ$   
(c)  $30^\circ$  (d)  $70^\circ$
- Q.5** If the time in a watch is 9 hours 30 minutes, what time does it show on the mirror?  
(a) 2 : 30 (b) 2 : 45  
(c) 3 : 30 (d) 2 : 15
- Q.6** At what time between 2'O clock and 3'O clock, the angle between the hands will be  $40^\circ$ ?  
(a)  $2:3\frac{7}{11}$  (b)  $2:5\frac{6}{11}$   
(c)  $2:10\frac{5}{12}$  (d)  $2:16\frac{4}{11}$

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- Q.1** How many cubes are not painted at all?  
(a) 8 (b) 27  
(c) 64 (d) 12

- Q.2** How many cubes are painted from 3 sides?  
(a) 8 (b) 12  
(c) 24 (d) 4

- Q.3** How many cubes are painted from exactly 2 sides?  
(a) 48 (b) 24  
(c) 12 (d) 36

- Q.4** How many cubes are painted from only one side?  
(a) 54 (b) 64  
(c) 48 (d) 36

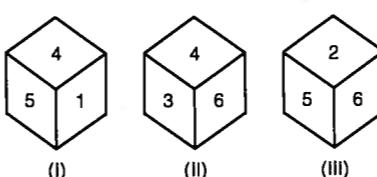
**Directions (Q.5-Q7):** A cube of side 8 cm has been painted black, red and blue on pair of opposite faces. Then it is divided into smaller equal cubes of side 2 cm each. Answer the following:

- Q.5** How many cubes will be having two face painted black  
(a) 2 (b) 4  
(c) 8 (d) None of these

- Q.6** How many cubes will have one face painted blue and one face painted red? (The other faces may or may not be painted)  
(a) 16 (b) 8  
(c) 0 (d) None of these

- Q.7** How many cubes will have exactly one face painted and that too with red colour?  
(a) 8 (b) 16  
(c) 12 (d) None of these

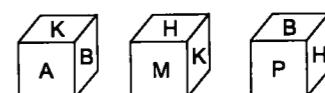
**Directions (Q.8-Q.9):** A dice having faces numbered from 1 to 6 is shown from three different orientations (I, II, III)



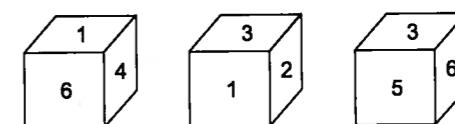
- Q.8** Which number is just opposite to 6?  
(a) 1 (b) 4  
(c) 2 (d) 5

- Q.9** Which number is opposite to 5?  
(a) 3 (b) 2  
(c) 1 (d) 6

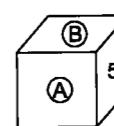
- Q.10** Three views of a dice following a particular motion are given below. Which letter is opposite to A?  
(a) H (b) P  
(c) B (d) M



- Q.11** A dice has six numbers marked 1, 2, 3, 4, 5 and 6 on its faces. Three views of the dice are shown below:



What possible numbers can exist on the two faces marked (A) and (B), respectively on the cube?



**Directions (Q.12-Q15):** Answer the following:

- Q.12** Dalbir is facing south. He turns  $135^\circ$  in the anticlockwise direction and then  $180^\circ$  in the clockwise direction. Which direction is he facing now?  
(a) North-east (b) North-west  
(c) South-east (d) South-west

- Q.13** Rakesh starts walking straight towards east. After walking 75 metres, he turns to the left and walks 25 metres straight. Again he turns to the left, walks a distance of 40 metres straight,

again he turns to the left and walks a distance of 25 metres. How far is he from the starting point?

- (a) 25 metres (b) 50 metres  
(c) 140 metres (d) none of these

**Q.14** Michael walks 20 m North. Then he turns right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Then he again turns left and walks 15 m. In which direction and how many metres away is he from his original position?

- (a) 15 metres west  
(b) 30 metres east  
(c) 30 metres west  
(d) 45 metres east

**Q.15** A child is looking for his father. He goes 90 metres in the East and turns to his right and goes 20 metres and then again turns to his right and moves 30 metres to look for his father. From here, he went 100 metres to the North and met his father in a street. How far did the son meet his father from the starting point? \_\_\_\_\_.

### Try Yourself

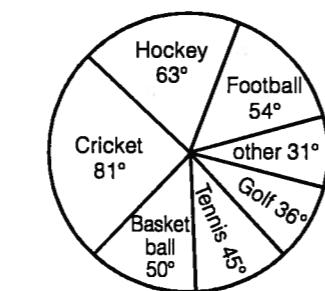
**T20.** A cube side 3 units is formed using a set of smaller cubes of side 1 unit. Find the proportion of the number of faces of the smaller cubes visible to those which are NOT visible.

- (a) 1 : 4 (b) 1 : 3  
(c) 1 : 2 (d) 2 : 3

**T21.** X is 1 km northeast of Y. Y is 1 km southeast of Z. W is 1 km west of Z. P is 1 km south of W. Q is 1 km east of P. What is the distance between X and Q in km? \_\_\_\_\_.

### 13. Data Interpretation

**Directions (Q.1-Q.3):** The pie-chart drawn here shows the spending of a country at various sports during a particular year.



**Q.1** How much percent of the total spending is done on Tennis?

- (a) 45% (b)  $22\frac{1}{2}\%$   
(c)  $12\frac{1}{2}\%$  (d) 25%

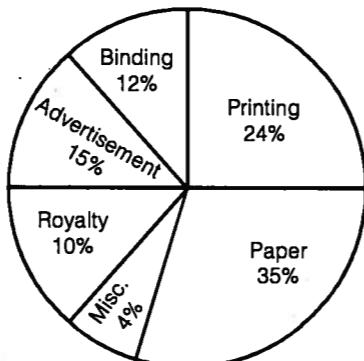
**Q.2** How much percent more is spent on Hockey than that on Golf?

- (a) 27% (b) 35%  
(c) 37.5% (d) 75%

**Q.3** If the total amount spent on sports during the year was ₹ 2 crores then the amount spent on Cricket and Hockey together was

- (a) ₹ 800,000 (b) ₹ 80,00,000  
(c) ₹ 16,000 (d) ₹ 16,00,000

**Directions (Q.4-Q.6):** The pie chart given below shows the expenditure incurred in bringing out a book by a publisher.



**Q.4** What is the central angle of the sector of the cost of the paper?

- (a) 140° (b) 105°  
(c) 122.5° (d) 126°

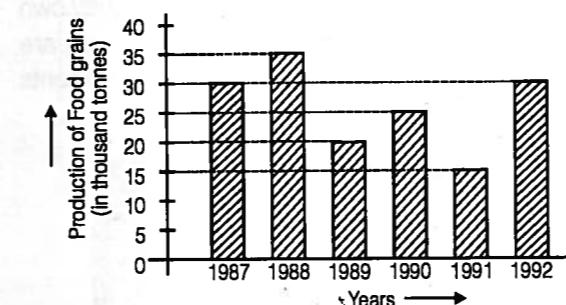
**Q.5** Royalty on the book is less than the advertisement charges by

- (a) 50% (b)  $33\frac{1}{3}\%$   
(c)  $26\frac{1}{4}\%$  (d) 5%

**Q.6** If 5500 copies are published and miscellaneous expenditure on them amount to ₹ 15,730 and the publisher earns a profit of 30%, then selling price of each copy is

- (a) ₹ 71.50 (b) ₹ 55  
(c) ₹ 74.36 (d) ₹ 92.95

### Directions (Q.7-Q.9)



The following bar chart shows the production of food grains of a country in different years

**Q.7** The percentage increase in production from 1991 to 1992 was

- (a) 15% (b) 30%  
(c) 50% (d) 100%

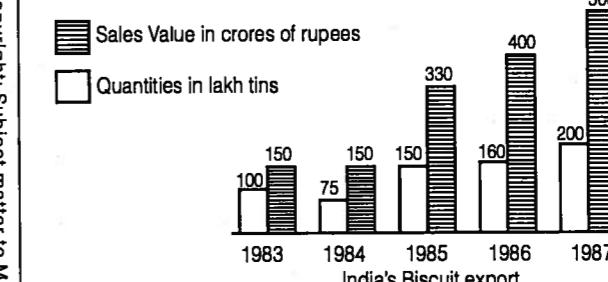
**Q.8** The two consecutive years in which rate of change of production of foodgrains is minimum are

- (a) 1987 and 1988 (b) 1989 and 1990  
(c) 1990 and 1991 (d) 1991 and 1992

**Q.9** The difference of the production of food grains for the years 1988 and 1992 is

- (a) 500 tonnes (b) 1000 tonnes  
(c) 5000 tonnes (d) 10000 tonnes

**Directions (Q.10-Q.12):** Study the following bar graph and answer the following



**Q.10** In which year the Sales Value per tin was minimum?

- (a) 1983 (b) 1984  
(c) 1985 (d) 1986

**Q.11** What was the approximate percent increase in Sales Value from 1983 to 1987?

- (a) 350 (b) 233.33  
(c) 133.33 (d) 96

**Q.12** If, in 1986, the tins were exported at the same rate per tin as that in 1985, what would be the Sales Value in crores of rupees of export in 1986?

- (a) 400 (b) 352  
(c) 375 (d) 360

**Directions (Q.13-Q.14):** Study the following table and answer the questions that follows:

Income of employees from different heads in different categories of a company.

Source of income	Employees				
	K	L	M	N	O
Salary	12000	6000	21000	9000	12000
Bonus	2400	1200	4500	2400	3000
Over Time	5400	2100	6000	5100	6000
Arrears	6000	5400	12000	4200	7500
Miscellaneous	1200	300	1800	300	1500
Total	27000	15000	45000	21000	30000

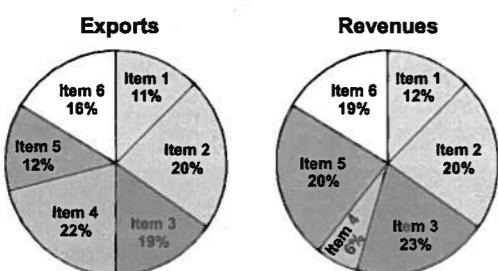
**Q.13** How many employees have their salary less than four times of their bonus?

- (a) 0 (b) 1  
(c) 2 (d) 3

Q.14 The income from overtime is what percent of income from arrears in case of employees in category O?

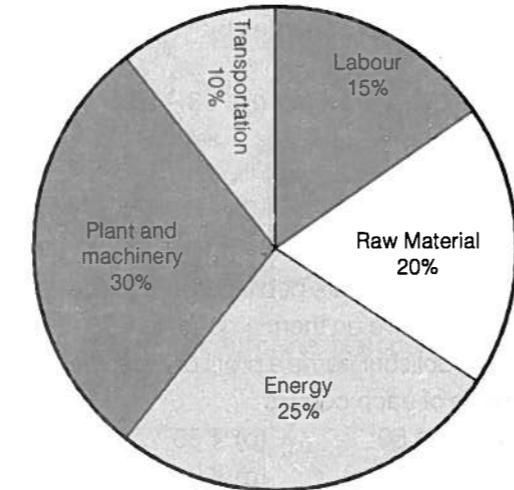
- (a) 80
- (b) 25
- (c) 70
- (d) 60

Q.15 The total exports and revenues from the exports of a country are given in the two pie charts below. The pie chart for exports shows the quantity of each item as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 5 lakh tonnes and the total revenues is/are 250 crore. What is the ratio of the revenue generated through export of Item 1 per kilogram to the revenue generated through export of Item 4 per kilogram?



- (a) 1 : 2
- (b) 2 : 1
- (c) 1 : 4
- (d) 4 : 1

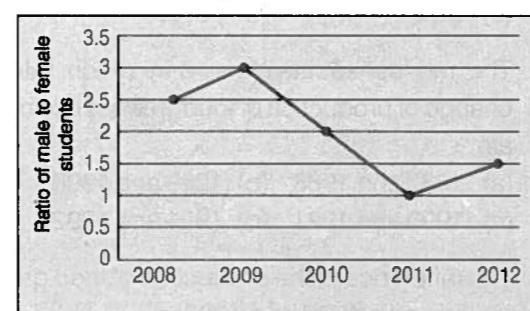
Q.16 A firm producing air purifiers sold 200 units in 2012. The following pie chart presents the share of raw material, labour, energy, plant & machinery, and transportation costs in the total manufacturing cost of the firm in 2012. The expenditure on labour in 2012 is ₹ 4,50,000. If the company registered a profit of ₹ 10 lakhs in 2012, at what price (in ₹) was each air purifier sold? \_\_\_\_\_.



Q.17 In a survey, 300 respondents were asked whether they own a vehicle or not. If yes, they were further asked to mention whether they own a car or scooter or both. Their responses are tabulated below. What percent of respondents do not own a scooter? \_\_\_\_\_.

	Men	Women	Own vehicle		
			Car	Scooter	Both
Do not own vehicle	20	50			

Q.18 The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students doubled in 2009, by what percent did the number of male students increase in 2009? \_\_\_\_\_.



Q.19 The Gross Domestic Product (GDP) in Rupees grew at 7% during 2012-2013. For international

comparison, the GDP is compared in US Dollars (USD) after conversion based on the market exchange rate. During the period 2012-2013 the exchange rate for the USD increased from ₹ 50 USD to ₹ 60 USD. India's GDP in USD during the period 2012-2013

- (a) Increased by 5%
- (b) Decreased by 13%
- (c) Decreased by 20%
- (d) Decreased by 11%

Q.20 Read the following table giving sales data of five types of batteries for years 2006 to 2012

Year	Type I	Type II	Type III	Type IV	Type V
2006	75	144	114	102	108
2007	90	126	102	84	126
2008	96	114	75	105	135
2009	105	90	150	90	75
2010	90	75	135	75	90
2011	105	60	165	45	120
2012	115	85	160	100	145

Out of the following, which type of battery achieved highest growth between the years 2006 and 2012?

- (a) Type V
- (b) Type III
- (c) Type II
- (d) Type I

## 14. Seating Arrangement

Q.1 There are five different houses A to E in a row. A is to the right of B. E is to the left of C and right of A. B is to the right of D. Which of the houses is in the middle?

- (a) A
- (b) B
- (c) D
- (d) E

Directions (Q.2-Q.3): Six friends A, B, C, D, E, F are sitting in a close circle facing the centre. E is to the left of D. C is between A and B. F is between E and A

Q.2 Who is to the left of B?

- (a) C
- (b) A
- (c) D
- (d) E

Q.3 Who is to the right of C?

- (a) E
- (b) B
- (c) A
- (d) F

Directions (Q.4-Q.6): Eight boys P, Q, R, S, T, U, V, W are sitting around a circular table facing the centre. Further information as follows:

- (i) W sits between T and Q, while Q sits opposite to U
- (ii) P sits to the immediate right of T and P sits opposite to R
- (iii) S does not sit next to R

Q.4 Who sits opposite to V?

- (a) Q
- (b) R
- (c) S
- (d) T

Q.5 Who sits two places left of S?

- (a) P
- (b) T
- (c) R
- (d) Q

Q.6 If S and Q interchange their places then who sits opposite to Q?

- (a) W
- (b) U
- (c) R
- (d) T

Directions (Q.7-Q.8): 6 persons A, B, C, D, E, F are sitting in two rows, three in each row facing each other. E is not at the end of any row. D is the second to the left of FC, who is the neighbour of E is sitting diagonally opposite to D. B is the neighbour of F.

Q.7 Which of the following are in one of the two rows?

- (a) FBC
- (b) CEB
- (c) DBF
- (d) AEF

Q.8 Who is facing B?

- (a) A
- (b) C
- (c) D
- (d) E

Directions (Q.9-Q.10): A, B, C, D, E, F are sitting in a closed circle facing the centre. D is between F and B. A is the second to the left of D and second to the right of E.

Q.9 Who is facing D?

- (a) A
- (b) C
- (c) F
- (d) Can't be determined

- Q.10 Who is facing A?  
 (a) B (b) D  
 (c) A (d) Can't be determined

## 15. Blood Relations

- Q.1 Introducing a man, a woman said, "He is the only son of my mother's mother". How is the woman related to the man?  
 (a) Sister (b) Aunt  
 (c) Niece (d) Mother
- Q.2 If Kamal says Ravi's mother is only daughter of my mother, how is the Kamal related to Ravi?  
 (a) Brother (b) Father  
 (c) Maternal uncle (d) Grand father
- Q.3 A is the brother of B, C is the father of A, D is the brother of E, E is the daughter of B, then uncle of D is  
 (a) B (b) C  
 (c) A (d) E
- Q.4 If X is the brother of the son of Y's son. How is X related to Y?  
 (a) Brother (b) Grand son  
 (c) Son (d) None of these

- Q.5 How is my paternal aunt's only brother's wife, related to me?  
 (a) Daughter (b) Mother  
 (c) Niece (d) Cousin

- Q.6 How is my wife's sister's brother's mother's husband related to me?  
 (a) Brother in law (b) son-in law  
 (c) Cousin (d) Father in law

- Q.7 A and B are brothers. C and D are sisters. A's sister is mother of C. What is C to A?  
 (a) Uncle (b) Niece  
 (a) Aunt (d) Nephew

- Q.8 Mr. A has a son B and daughter C, D is the wife of B and E is the daughter of C. How is D related to E?  
 (a) Sister (b) Grand Mother  
 (c) Uncle (d) Aunt

- Q.9 A + B means A is the brother of B,  
 A - B mean A is the mother of B  
 A × B means A is the sister of B  
 Which of the following means M is maternal uncle of R?  
 (a) M + k + R (b) M - k + R  
 (c) M + k - R (d) M + k × R

- Q.10 P × Q means P is the sister of Q,  
 P + Q means P is the father of Q,  
 P - Q means P is the mother of Q,  
 If S × m + T, then how is S related to T?  
 (a) Uncle (b) Aunt  
 (c) Nephew (d) Niece

**Directions for Q.11:** A + B means A is the daughter of B, A × B means A is the son of B and A - B means A is the wife of B

- Q.11 If P × Q - S, which of the following is True?  
 (a) S is wife of Q  
 (b) S is the father of P  
 (c) P is the daughter of Q  
 (d) Q is the Father of P

## 16. Number Series, Analogy and Number Oddman Out

**Direction (Q.1-Q17):** Find out the missing term in each of the following:

- Q.1 113, 85, 61, 41, ..... 13, 5  
 (a) 24 (b) 23  
 (c) 25 (d) 22

- Q.2 2, 5, 16, 65 .....  
 (a) 131 (b) 326  
 (c) 325 (d) 327

- Q.3 15, 10, 5, 150, 16, 12, 4, 192, 20, 15, 5  
 .....  
 (a) 400 (b) 300  
 (c) 600 (d) 700

- Q.4 3, 10, 33, 104, .....  
 (a) 318 (b) 319  
 (c) 320 (d) 321

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- Q.5 55, 66, 187, 200, 369, 386, .....  
 (a) 675 (b) 575  
 (c) 475 (d) 875

- Q.6 20, 141, 310, 599, 960, 1489, .....  
 (a) 2430 (b) 2330  
 (c) 2230 (d) 2130

- Q.7 1900, 939, ..... 377, 376  
 (a) 398 (b) 698  
 (c) 498 (d) 598

- Q.8 1, 3, 11, 47, ..... 1439  
 (a) 187 (b) 239  
 (c) 339 (d) 259

- Q.9 2, 12, 56, 182, 462, .....  
 (a) 870 (b) 990  
 (c) 992 (d) 982

- Q.10 2, 20, 110, ..... 992  
 (a) 280 (b) 380  
 (c) 480 (d) 580

- Q.11 2, 12, 36, 80, 150, .....  
 (a) 242 (b) 262  
 (c) 252 (d) 232

- Q.12 992, 552, ..... 132, 30, 6  
 (a) 305 (b) 306  
 (c) 312 (d) 326

- Q.13 1695, 1700, 1710, 1727, 1753, .....  
 (a) 1760 (b) 1790  
 (c) 1780 (d) 1770

- Q.14 4 : 9 : 25 : .....  
 (a) 36 (b) 49  
 (c) 126 (d) 30

- Q.15 196 : 169 : 81 : .....  
 (a) 64 (b) 72  
 (c) 78 (d) None

- Q.16 6 : 30 : : ..... : 992  
 (a) 552 (b) 532  
 (c) 522 (d) 562

- Q.17 23 : 125 : : 34 : .....  
 (a) 500 (b) 216  
 (c) 162 (d) 600

**Directions (Q.18-Q.22):** All of these terms have same relationship except one of the terms which is different, identify the odd one which is different.

- Q.18 (a) 43 (b) 47 (c) 53 (d) 64

- Q.19 (a) 100 (b) 125 (c) 196 (d) 225

- Q.20 2, 8, 20, 44, 92, 184, 380  
 (a) 92 (b) 184  
 (c) 380 (d) 44

- Q.21 (a) 121 (b) 100 (c) 11 (d) 111

- Q.22 (a) 12 (b) 22 (c) 56 (d) 132

- Q.23 What is the next number in the series?  
 12 35 81 173 357 \_\_\_\_\_

- Q.24 Fill in the missing number in the series.

2 3 6 15 ? 157.5 630

- Q.25 Consider the table given below in which the numbers bear certain relationship:

29	13	18
33	X	19
30	27	3

Which one of the following numbers is the missing number indicated above by X?

- (a) 19 (b) 15  
 (c) 14 (d) 8

- Q.26 Consider the following figures.

2	6
80	24

3	?
120	36

What is the missing numbers?

- (a) 7 (b) 8  
 (c) 9 (d) 10

- Q.27 Examine the following three figures in which the numbers follows a specific pattern:

84	81	88
14	12	18 9

The missing number (?) in the third figure above is

- (a) 7 (b) 16  
 (c) 71 (d) 28

## 17. Letter Series, Analogy, Letter Oddman Out and Coding Decoding

**Directions (Q.1-Q.8):** All of these have same relationship, while one is different. Identify the odd, which is different.

- Q.1 (a) PQR (b) XYZ (c) ABC (d) MLN  
 Q.2 (a) DB (b) GC (c) HD (d) JF  
 Q.3 (a) ABD (b) EFH (c) IJK (d) PQS  
 Q.4 (a) OA (b) IU (c) EB (d) AI  
 Q.5 (a) AB = E (b) CD = Y  
 (c) EA = Y (d) BC = M  
 Q.6 (a) GJ (b) MP (c) KR (d) CF  
 Q.7 (a) BE (b) EG (c) MO (d) GI  
 Q.8 (a) CAT = 24 (b) MAT = 34  
 (c) RAT = 39 (d) COT = 39

**Directions (Q.9-Q.16):** Fill in the blanks.

- Q.9 CGKO : AEIM : : DHLP :  
 (a) BFJN (b) GJFN  
 (c) FNJI (d) BJNF  
 Q.10 876 : FGH : : 345 :  
 (a) CDE (b) EDC  
 (c) DEC (d) CED  
 Q.11 BARODA : CBSPEB : :  
 CPNCBZ  
 (a) MADRAS (b) BOMBAY  
 (c) BANGURU (d) BANGLA  
 Q.12 CARPET : TCEAPR : :  
 LNAANTOI  
 (a) NATIONPL (b) NATIONAL  
 (c) NATIOLNL (d) NATERANL  
 Q.13 RANCHI : SZOBIAH : :  
 LNMJBSB  
 (a) KOLKATA (b) KOLTAKA  
 (c) KOLKACS (d) KALMADI

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Q.14 AEI : LPT : : CGK :  
 (a) CSV (b) RUY  
 (c) TXC (d) NRV

Q.15 OST : NQQ : : KFO :  
 (a) LEQ (b) JDL  
 (c) DEL (d) LDJ

Q.16 ABK : V : : BCD :  
 (a) N (b) I  
 (c) X (d) Y

**Directions (Q.17-Q.19):** Fill in the blanks.

Q.17 XUW, TQS, PMO, \_\_\_\_\_, HEG  
 (a) LKI (b) LIK  
 (c) LQR (d) LOB

Q.18 A, CD, GHI, \_\_\_\_\_, UVWXY  
 (a) LMNO (b) MIVO  
 (c) NOPQ (d) MNOP

Q.19 AB9, BC25, CD49, DE81, \_\_\_\_\_  
 (a) EF100 (b) EF64  
 (c) EF121 (d) EF144

**Directions (Q.20-Q.27):** Choose the correct answer for the following:

Q.20 If code of BOARD is CPBSE then code of CHAIR  
 (a) DIJBS (b) DIBJS  
 (c) DIJSB (d) DISJB

Q.21 If code BHOPAL is EERMDI then code of NAGPUR  
 (a) QXJMXO (b) QXJMQX  
 (c) QXMJXO (d) QXJMXP

Q.22 MONKEY is coded as XDJMNL, then code of TIGER  
 (a) QDFHS (b) SDFHS  
 (c) SHFDS (d) UJFHS

Q.23 Code of APPLE is 50. Then code of ORANGE is  
 (a) 60 (b) 70  
 (c) 80 (d) 50

Q.24 If CIRCLE is coded as DKUFNF, then code of SQUARE

(a) TSXDTF (b) TSXDTF  
 (c) TXSDFT (d) TXDTFS

Q.25 Given the sequence of terms, AD CG FK JP,  
 the next term is

(a) OV (b) OW  
 (c) PV (d) PW

Q.26 Find the odd one in the following group: ALRVX,  
 EPVZB, ITZDF, OYEIK  
 (a) ALRVX (b) EPVZB  
 (c) ITZDF (d) OYEIK

Q.27 If 'KCLFTSB' stands for 'best of luck' and  
 'SHSWDG' stands for 'good wishes', which of  
 the following indicates 'ace the exam'?  
 (a) MCHTX (b) MXHTC  
 (c) XMHCT (d) XMHTC

## 18. Logical Reasoning

**Directions (Questions 1-4):** In each question below are given two statements followed by two conclusions numbered I and II. You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusion and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

**Give answer:**

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either conclusion I or II follows
- (d) If neither conclusion I nor II follows

1. **Statements :** 1. All pens are roads.  
 2. All roads are houses.

**Conclusions:** I. All houses are pens.  
 II. Some houses are pens.

2. **Statements:** 1. All birds are tall.  
 2. Some tall are hens

**Conclusions:** I. Some birds are hens.  
 II. Some hens are tall

3. **Statements:** 1. Most teachers are boys.  
 2. Some boys are students.

**Conclusions:** I. Some students are boys.  
 II. Some teachers are students.

4. **Statements:** 1. Some books are tables.  
 2. Some tables are mirrors.

**Conclusions:** I. Some mirrors are books.  
 II. No book is a mirror.

**Directions (Questions 5-8):** In each question below are given two statements followed by two conclusions numbered I and II. You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusion and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

**Give answer**

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If neither conclusion I nor II follows
- (d) If both conclusion I and II follows

5. **Statements :** 1. All film stars are play back singers.  
 2. All film directors are film stars.

**Conclusions :** I. All film directors are play back singers.  
 II. Some film stars are film directors.

6. **Statements:** 1. All men are married.  
 2. Some men are educated.

**Conclusions:** I. Some married are educated.  
 II. Some educated are married.

7. **Statements:** 1. All roads are poles.  
 2. No pole is a house.

**Conclusions:** I. Some roads are houses.  
 II. Some houses are poles.

8. **Statements:** 1. All flowers are trees.  
 2. No fruit is a tree.

**Conclusions:** I. No fruit is a flower.  
 II. Some trees are flowers.

**Directions (Questions 9-11):** In each of the following questions, two statements are followed by four conclusions numbered I,II,III,IV. You have to take the

given statements to be true even if they seem to be at variance from the commonly known facts and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

- 9. Statements**
1. Some doors are mangoes.
  2. All mangoes are bananas.

- Conclusions :**
- I. All bananas are mangoes.
  - II. All doors are bananas.
  - III. Some doors are bananas.
  - IV. Some mangoes are doors.
- (a) Only I and II follow  
 (b) All follow  
 (c) Only III and IV follow  
 (d) Only II and III follow

- 10. Statements**
1. All stars are planets.
  2. All planets are trees.

- Conclusions :**
- I. All planets are stars.
  - II. All stars are trees.
  - III. All trees are planets.
  - IV. Some trees are stars.
- (a) Only II and IV follow  
 (b) Only I and II follow  
 (c) All follow  
 (d) Only III and IV follow

- 11. Statements:**
1. Some chairs are shoes.
  2. Some shoes are sticks.

- Conclusions:**
- I. Some chairs are sticks.
  - II. No chair is stick.
  - III. All sticks are shoes.
  - IV. All shoes are chairs.
- (a) Only I and II follows  
 (b) Only II and IV follows  
 (c) Only I and III follows  
 (d) None follows

## 19. Analytical Ability

This section of analytical ability comprises of questions put in the form of puzzles involving certain number of items, persons or things. Questions based upon analytical ability are undoubtedly the longest and time consuming. The candidate is required to analyse

the given information, condense it in the suitable form and answer the questions asked. The questions on puzzle test may be any of the following types.

**Directions (Questions 1-2):** Read the following information and answer the questions below it.

Rakesh and Kunal are good in Hockey and volleyball. Sachin and Rakesh are good in hockey and base ball, Gaurav and Kunal are good in cricket and volleyball, Sachin, Gaurav and Madan are good in football and baseball.

- Q.1** Who is good in Hockey, Cricket and Volley ball  
 (a) Gaurav                   (b) Rakesh  
 (c) Kunal                   (d) Sachin

- Q.2** Who is good in Base ball, Cricket, Volley ball and Foot ball  
 (a) Rakesh                   (b) Gaurav  
 (c) Sachin                   (d) Kunal

**Directions (Questions 3-5):** Read the following information and answer the questions below it.

A Business school with six professors A,B,C,D,E and F has decided to implement a new scheme of course management. Each professor has to coordinate one course and support another course. This semester D's support course is Finance, while three others have it in coordinators role. E and F have marketing as one of their subjects. F coordinates operations, which is a supportive course for both C and E. Finance and IT are A's subjects. Both A and D have same subjects. Strategy is a support course for exactly one of the professors.

- Q.3** Who coordinates the IT course?  
 (a) A                           (b) C  
 (c) D                           (d) None of these

- Q.4** Which course is supported by B?  
 (a) Operations              (b) IT  
 (c) Strategy                 (d) Finance

- Q.5** Who among the following are coordinating the finance course?  
 (a) A and C                 (b) C and D  
 (c) A,B,C                   (d) B,C,D

**Directions (Question 6):** Study the following information and answer the questions below it

There are 7 books one each on Psychology, Hindi, English, Sociology, Economics, Education and Accountancy lying on a table one above the other. Sociology is on the top of all the books. Accountancy is immediately below education which is immediately below sociology. Economics is immediately above Psychology but not in the middle. Hindi is immediately below Psychology.

- Q.6** Economics is between which of the following books  
 (a) Accountancy and Education  
 (b) Psychology and Hindi  
 (c) English and Psychology  
 (d) Psychology and Sociology

**Directions (Questions 7-8):** Read the following information and answer the questions below it

There is a group of five girls. Kamini is second in height but younger than Reena. Pooja is taller than Reena. Pooja is taller than Monika but younger in age. Reena and Monika are of the same age, but Reena is taller between them. Neelam is taller than Pooja and elder to Reena. Kamini is not the youngest in the group.

- Q.7** If the girls arranged in the ascending order of heights, who will be in the third position?  
 (a) Monika                   (b) Neelam  
 (c) Kamini                   (d) None of these

- Q.8** If they are arranged in the descending order of their ages, who will be in the fourth position?  
 (a) Kamini                   (b) Monika  
 (c) Pooja                   (d) None of these

- Q.9** Five children were administered psychological tests to know their intellectual levels. In the report, psychologists pointed out that the child A is less intelligent than the child B. The child C is less intelligent than the child D. The child B is less intelligent than the child C and child A is more intelligent than the child E. Which child is the most intelligent?

- (a) A                           (b) C  
 (c) D                           (d) E

**Q.10** In an examination, Raj got more marks than Mukesh but not as many as Priya. Priya got more marks than Gaurav and Kavita. Gaurav got less marks than Mukesh but his marks are not the lowest in the group. Who is the second in the descending order of marks?

- (a) Priya                   (b) Raj  
 (c) Kavita                   (d) None of these

**Directions (Questions 11-12):** Read the following information and answer the questions below it

Seven executives P,Q,R,S,T,U and W reach office in a particular sequence. U reaches immediately before P. Also U follows S but does not immediately follows S. R is the last one to reach office. T follows immediately after P and is subsequently followed by W.

- Q.11** Among the executives, who reaches the office first?

- (a) Q                           (b) S  
 (c) U                           (d) None of these

- Q.12** Who ranks fourth in the sequence of reaching office?

- (a) W                           (b) U  
 (c) P                           (d) None of these

**Directions (Questions 13-14):** Read the following information and answer the questions below it.

Five plays A,B,C,D,E are to be staged from Monday to Friday of a week. On each day, only one play will be staged. D or E should not be either the first or last to be staged. E should be immediately followed by C. B should be staged immediately after D. One play is staged between A and B.

- Q.13** Which is the first play to be staged?

- (a) A                           (b) B  
 (c) C                           (d) None of these

- Q.14** Which of the following is the correct sequence of staging all the plays?

- (a) ADBCE                   (b) AECDL  
 (c) BDAEC                   (d) ADBEC

**Directions (Questions 15-16):** Read the following information and answer the questions below it.

From amongst five doctors A,B,C,D and E ,four engineers G,H,K and L and six teachers M,N,O,P,Q and R , some teams are to be selected. Of these, A,B,G,H,O,P and Q are females and the rest are males.

The formation of teams is subject to the following conditions:

Wherever there is a male doctor, there will be no female teacher.

Wherever there is a male engineer, there will be no female doctor.

There shall not be more than two male teachers in any team.

**Q.15** If the team consists of two doctors, three female teachers and two engineers, the members of the team are

- (a) C,D,K,L,O,P,Q
- (b) A,B,O,P,Q,G,H
- (c) D,E,G,H,O,P,Q
- (d) C,D,O,P,Q,G,H

**Q.16** If the team consists of two doctors, one engineer and four teachers all the following teams are possible except

- (a) A,B,G,M,N,O,P
- (b) A,B,H,M,N,O,P
- (c) A,B,H,M,R,P,Q
- (d) A,B,K,N,R,P,Q

**Directions (Questions 17-19):** Read the following information and answer the questions below it.

A family consists of six members P,Q,R,S,T and U. There are two married couples. Q is a doctor and the father of T. U is grandfather of R and is a contractor. S is grandmother of T and is a house wife. There is one doctor,one contractor ,one nurse ,one house wife and two students in the family.

**Q.17** Who is the father of T?

- (a) Q (b) R
- (c) S (d) None of these

**Q.18** What is the profession of P?

- (a) Nurse (b) Doctor
- (c) House wife (d) Doctor or Nurse

- Q.19** Which of the following are two married couples?  
 (a) US,QT (b) TS,RU  
 (c) US,QP (d) US,RP

**Directions (Questions 20-22):** Read the following information and answer the questions below it.

(i) Five friends Amar, Kapil, Sarvesh, Rohan and Nagesh put on five shirts of different colours i.e., Red, Yellow, Blue, White and Green, while they were going to attend a party. These colours are not in order. (ii) They have different hobbies as Reading, Playing, Outing, Singing and Writing. (iii) Kapil, who likes singing, does not wear yellow shirt. Sarvesh wears red shirt and he does not like reading or writing. Nagesh likes playing and he does not wear blue or yellow shirt. Amar likes writing and Rohan does not wear yellow or green shirt.

- Q.20** What is the colour of Kapil's shirt?  
 (a) White (b) Green  
 (c) Blue (d) Can't be determined

- Q.21** Who likes reading?  
 (a) Rohan (b) Amar  
 (c) Kapil (d) None of these

- Q.22** Which is the following combination of person-colour-hobby is correct?  
 (a) Rohan-Blue-Reading  
 (b) Nagesh-White-Playing  
 (c) Amar-Yellow-Writing  
 (d) Nagesh-Green-Playing

## 20. Previous Years GATE Questions

### GATE 2010

- Q.1** 25 persons are in a room. 15 of them play Hockey, 17 of them play Football and 10 of them play both Hockey and Football. Then the number of persons playing neither Hockey nor Football is  
 (a) 2 (b) 17  
 (c) 13 (d) 3

[1 Mark]

- Q.2** If  $137 + 276 = 435$  how much is  $731 + 672$ ?  
 (a) 534 (b) 1403  
 (c) 1623 (d) 1531

[2 Marks]

- Q.3** 5 skilled workers can build a wall in 20 days; 8 semiskilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semiskilled and 5 unskilled workers, how long will it take to build the wall?  
 (a) 20 days (b) 18 days  
 (c) 16 days (d) 15 days

[2 Marks]

- Q.4** Given digits 2, 2, 3, 3, 3, 4, 4, 4, 4 how many distinct 4 digit numbers greater than 3000 can be formed?

- (a) 50 (b) 51
- (c) 52 (d) 54

[2 Marks]

- Q.5** Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1<sup>st</sup> January. The age difference between any two successive siblings (that is born one after another) is less than 3 years. Given the following facts:

1. Hari's age + Gita's age > Irfan's age + Saira's age.
2. The age difference between Gita and Saira is 1 year. However, Gita is not the oldest and Saira is not the youngest.
3. There are no twins.

In what order were they born (oldest first)?

- (a) HSIG (b) SGHI
- (c) IGSH (d) IHSG

[2 Marks]

### GATE 2011: CE, ME & CS

- Q.6** If  $\log(P) = (1/2)\log(Q) = (1/3)\log(R)$ , then which of the following options is TRUE?  
 (a)  $P^2 = Q^3R^2$  (b)  $Q^2 = PR$   
 (c)  $Q^2 = R^3P$  (d)  $R = P^2Q^2$

[1 Mark]

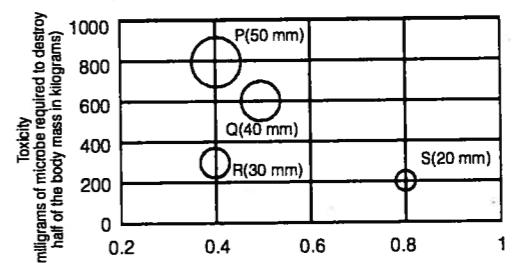
- Q.7** A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container?  
 (a) 7.58 litres (b) 7.84 litres  
 (c) 7 litres (d) 7.29 litres

[2 Marks]

- Q.8** The variable cost ( $V$ ) of manufacturing a product varies according to the equation  $V = 4q$ , where  $q$  is the quantity produced. The fixed cost ( $F$ ) of production of same product reduces with  $q$  according to the equation  $F = 100/q$ . How many units should be produced to minimize the total cost ( $V + F$ )?  
 (a) 5 (b) 4  
 (c) 7 (d) 6

[2 Marks]

- Q.9** P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:



(Probability that microbe will overcome human immunity system)

A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt?

- (a) P (b) Q
- (c) R (d) S

[2 Marks]

Q.10 A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4th day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10th day. What is the minimum number of trucks required so that there will be no pending order at the end of the 5th day?

- (a) 4      (b) 5  
(c) 6      (d) 7

[2 Marks]

**GATE 2011: EE & EC**

Q.11 There are two candidates P and Q in an election. During the campaign 40% of the voters promised to vote for P, and rest for Q. However, on the day of election 15% of the voters went back on their promise to vote for P and instead voted for Q. 25% of the voters went back on their promise to vote for Q and instead voted for P. Suppose, P lost by 2 votes, then what was the total number of voters?

- (a) 100      (b) 110  
(c) 90      (d) 95

[1 Mark]

Q.12 Three friends, R, S and T shared toffee from a bowl. R took  $\frac{1}{3}$ rd of the toffees, but returned four to the bowl. S took  $\frac{1}{4}$ th of what was left but returned three toffees to the bowl. T took half of the remainder but returned two back into the bowl. If the bowl had 17 toffees left, how many toffees were originally there in the bowl?

- (a) 38      (b) 31  
(c) 48      (d) 41

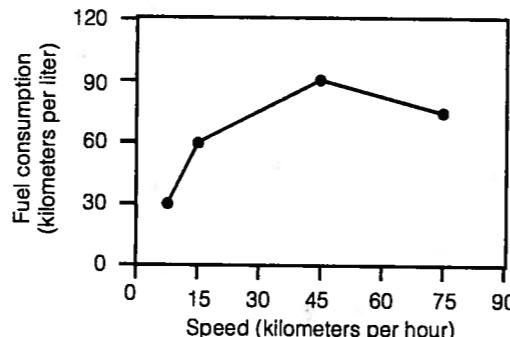
[2 Marks]

Q.13 The sum of n terms of the series

- $4 + 44 + 444 + \dots$  is  
(a)  $(4/81)[10^{n+1} - 9n - 1]$   
(b)  $(4/81)[10^{n-1} - 9n - 1]$   
(c)  $(4/81)[10^{n+1} - 9n - 10]$   
(d)  $(4/81)[10^n - 9n - 10]$

[2 Marks]

Q.14 The fuel consumed by a motorcycle during a journey while travelling at various speeds is indicated in the graph below:



The distance covered during four laps of the journey are listed in the table below:

Lap	Distance (kilometers)	Average speed (kilometers per hour)
P	15	15
Q	75	45
R	40	75
S	10	10

From the given data, we can conclude that the fuel consumed per kilometer was least during the lap

- (a) P      (b) Q  
(c) R      (d) S

[2 Marks]

Q.15 Given that  $f(y) = |y|/y$ , and q is any non-zero real number, the value of  $|f(q) - f(-q)|$  is

- (a) 0      (b) -1  
(c) 1      (d) 2

[2 Marks]

**GATE 2012: CE, ME & CS**

Q.16 The cost function for a product in a firm is given by  $5q^2$ , where q is the amount of production. The firm can sell the product at a market price of ₹ 50 per unit. The number of units to be produced by the firm such that the profit is maximized is

- (a) 5      (b) 10  
(c) 15      (d) 25

[1 Mark]

**GATE 2012: EE & EC**

Q.21 If  $(1.001)^{1259} = 3.52$  and  $(1.001)^{2062} = 7.85$ , then  $(1.001)^{3321} =$

- (a) 2.23      (b) 4.33  
(c) 11.37      (d) 27.64

[1 Mark]

Q.22 A and B are friends. They decide to meet between 1 P.M. and 2 P.M. on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (a)  $\frac{1}{4}$       (b)  $\frac{1}{16}$   
(c)  $\frac{7}{16}$       (d)  $\frac{9}{16}$

[2 Marks]

Q.23 Raju has 14 currency notes in his pocket consisting of only ₹ 20 notes and ₹ 10 notes. The total money value of the notes is ₹ 230. The number of ₹ 10 notes that Raju has is

- (a) 5      (b) 6  
(c) 9      (d) 10

[2 Marks]

Q.24 There are eight bags of rice looking alike, seven of which have equal weight and one is slightly heavier. The weighing balance is of unlimited capacity. Using this balance, the minimum number of weighings required to identify the heavier bag is

- (a) 2      (b) 3  
(c) 4      (d) 8

[2 Marks]

Q.25 The data given in the following table summarizes the monthly budget of an average household.

Category	Amount
Food	4000
Clothing	1200
Rent	2000
Savings	1500
Others	1800

The approximate percentage of the monthly budget NOT spent on savings is

- (a) 10% (b) 14%
- (c) 81% (d) 86%

[2 Marks]

**GATE 2013 : CE (Online Exam)**

Q.26 A number is as much greater than 75 as it is smaller than 117. Then the number is

- (a) 91 (b) 93
- (c) 89 (d) 96

[1 Mark]

Q.27 A reduction of 5% in price of sugar enables a housewife to buy 3 kg more for ₹ 280. Find the reduced price.

- (a) 4.67/kg (b) 5.5/kg
- (c) 3.33/kg (d) 7.76/kg

[1 Mark]

Q.28 x and y are two positive real numbers, satisfying the equations

$$2x + y \leq 6 ; x + 2y \leq 8$$

For which values of (x, y), the function  $f(x, y) = 3x + 6y$  will give maximum value

- (a) 4/3, 10/3 (b) 8/3, 20/3
- (c) 8/3, 10/3 (d) 4/3, 20/3

[2 Marks]

Q.29 A firm is selling its product at ₹ 60/unit. The total cost of production is ₹ 100 and firm is earning total profit of ₹ 500. Later the total cost increased by 30%. By what percentage selling price per unit should be increased to maintain the same profit percentage.

- (a) 5 (b) 15
- (c) 10 (d) 30

[2 Marks]

Q.30 Abhishek is elder to Savan, Savan is younger to Anshul. The correct relations is

- (a) Abhishek is elder to Anshul
- (b) Anshul is elder to Abhishek
- (c) Abhishek and Anshul are of same age
- (d) No conclusion can be drawn

[2 Marks]

Q.31 From the data given below:

	2010	2011
Raw material	5200	6240
Power & fuel	7000	9450
Salary & wages	9000	12600
Plants & machinery	20000	25000
Advertising	15000	19500
Research & development	22000	26400

Which one of the following increased by same percentage in year 2010-2011?

- (a) Raw material and Salary & wages
- (b) Salary & wages and Advertising
- (c) Power & fuel and Advertising
- (d) Raw material and Research & development

[2 Marks]

**GATE 2013 : ME, PI & CS**

Q.32 What will be the maximum sum of  
44, 42, 40, ....

- (a) 502 (b) 504
- (c) 506 (d) 500

[1 Mark]

Q.33 Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7?

- (a) 13/90 (b) 12/90
- (c) 78/90 (d) 77/90

[2 Marks]

Q.34 A tourist covers half of this journey by train at 60 km/hr, half of the remainder by bus at 30 km/hr and the rest by cycle at 10 km/hr. The average speed of the tourist in km/hr during his entire journey is

- (a) 36 (b) 30
- (c) 24 (d) 18

[2 Marks]

Q.35 Find the sum of the expression

$$\frac{1}{\sqrt{1+\sqrt{2}}} + \frac{1}{\sqrt{2+\sqrt{3}}} + \frac{1}{\sqrt{3+\sqrt{4}}} + \dots + \frac{1}{\sqrt{80+\sqrt{81}}}$$

- (a) 7 (b) 8
- (c) 9 (d) 10

[2 Marks]

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

[2 Marks]

**GATE 2014 : CE****(Online Exam) Set-1**

Q.36 The current erection cost of a structure is ₹ 13,200. If the labour wages per day increase by 1/5 of the current wages and the working hours decrease by 1/24 of the current period, then the new cost of erection in ₹, is

- (a) 16,500 (b) 15,180
- (c) 11,000 (d) 10,120

[2 Marks]

**GATE 2013 : EE, EC & IN**

Q.37 In the summer of 2012, in New Delhi, the mean temperature of Monday to Wednesday was 41°C and of Tuesday to Thursday was 43°C. If the temperature on Thursday was 15% higher than that of Monday, then the temperature in °C on Thursday was

- (a) 40 (b) 43
- (c) 46 (d) 49

[1 Mark]

Q.38 Find the sum upto n terms of the series

$$10 + 84 + 734 + \dots$$

- (a)  $\frac{9(9^n+1)}{10} + 1$  (b)  $\frac{9(9^n-1)}{8} + 1$
- (c)  $\frac{9(9^n-1)}{8} + n$  (d)  $\frac{9(9^n-1)}{8} + n^2$

[2 Marks]

Q.39 The set of values of p for which the roots of the equation  $3x^2 + 2x + p(p-1) = 0$  are of opposite sign is

- (a)  $(-\infty, 0)$  (b)  $(0, 1)$
- (c)  $(1, \infty)$  (d)  $(0, \infty)$

[2 Marks]

Q.40 A car travels 8 km in the first quarter of an hour, 6 km in the second quarter and 16 km in the third quarter. The average speed of the car in km per hour over the entire journey is

- (a) 30 (b) 36
- (c) 40 (d) 24

[2 Marks]

Q.41 What is the chance that a leap year, selected at random, will contain 53 Saturdays

Q.42 A foundry has a fixed daily cost of ₹ 50,000 whenever it operates and a variable cost of ₹ 800Q, where Q is the daily production in tonnes. What is the cost of production in ₹ per tonne for a daily production of 100 tonnes?

[1 Mark]

Q.43 Find the odd one in the following group: ALRVX, EPVZB, ITZDF, OYEIK

- (a) ALRVX (b) EPVZB
- (c) ITZDF (d) OYEIK

[2 Marks]

Q.44 Anuj, Bhola, Chandan, Dilip, Eswar and Faisal live on different floors in a six-storeyed building (the ground floor is numbered 1, the floor above it 2, and so on). Anuj lives on an even-numbered floor. Bhola does not live on an odd numbered floor. Chandan does not live on any of the floors below Faisal's floor. Dilip does not live on floor number 2. Eswar does not live on a floor immediately above or immediately below Bhola. Faisal lives three floors above Dilip. Which of the following floor-person combinations is correct?

	Anuj	Bhola	Chandan	Dilip	Eswar	Faisal
(a)	6	2	5	1	3	4
(b)	2	6	5	1	3	4
(c)	4	2	6	3	1	5
(d)	2	4	6	1	3	5

[2 Marks]

Q.45 The smallest angle of a triangle is equal to two thirds of the smallest angle of a quadrilateral. The ratio between the angles of the quadrilateral is 3:4:5:6. The largest angle of the triangle is twice its smallest angle. What is the sum, in

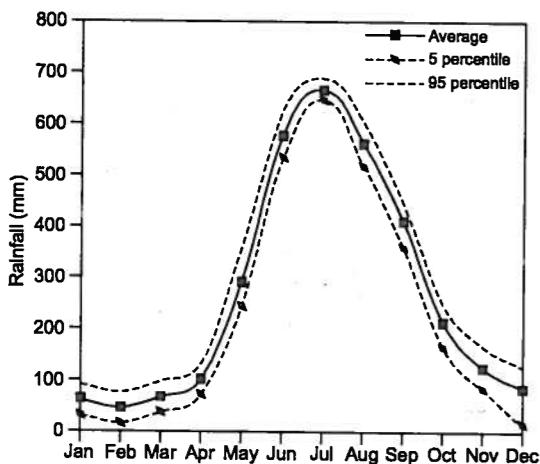
degrees, of the second largest angle of the triangle and the largest angle of the quadrilateral?

[2 Marks]

- Q.46 One percent of the people of country X are taller than 6 ft. Two percent of the people of country Y are taller than 6 ft. There are thrice as many people in country X as in country Y. Taking both countries together, what is the percentage of people taller than 6 ft?
- (a) 3.0      (b) 2.5  
(c) 1.5      (d) 1.25

[2 Marks]

- Q.47 The monthly rainfall chart based on 50 years of rainfall in Agra is shown in the following figure. Which of the following are true? (*k* percentile is the value such that *k* percent of the data fall below that value)



- (i) On average, it rains more in July than in December  
(ii) Every year, the amount of rainfall in August is more than that in January  
(iii) July rainfall can be estimated with better confidence than February rainfall  
(iv) In August, there is at least 500 mm of rainfall
- (a) (i) and (ii)      (b) (i) and (iii)  
(c) (ii) and (iii)      (d) (iii) and (iv)

[2 Marks]

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### GATE 2014 : CE & IN (Online Exam) Se-II

- Q.48 In any given year, the probability of an earthquake greater than Magnitude 6 occurring in the Garhwal Himalayas is 0.04. The average time between successive occurrences of such earthquakes is \_\_\_\_ years.

[1 Mark]

- Q.49 The population of a new city is 5 million and is growing at 20% annually. How many years would it take to double at this growth rate?

- (a) 3-4 years      (b) 4-5 years  
(c) 5-6 years      (d) 6-7 years

[1 Mark]

- Q.50 In a group of four children, Som is younger to Riaz. Shiv is elder to Ansu. Ansu is youngest in the group. Which of the following statements is/are required to find the eldest child in the group?

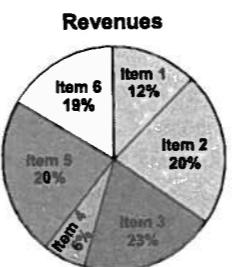
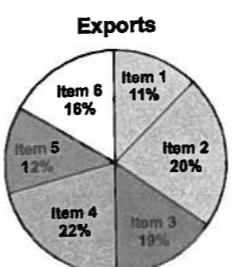
**Statements**

1. Shiv is younger to Riaz.
  2. Shiv is elder to Som.
- (a) Statement 1 by itself determines the eldest child.  
(b) Statement 2 by itself determines the eldest child.  
(c) Statements 1 and 2 are both required to determine the eldest child.  
(d) Statements 1 and 2 are not sufficient to determine the eldest child.

[2 Marks]

- Q.51 The total exports and revenues from the exports of a country are given in the two pie charts below. The pie chart for exports shows the quantity of each item as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 5 lakh tonnes and the total revenues are 250 crore rupees. What is the ratio of the revenue generated through export of Item 1 per kilogram

to the revenue generated through export of Item 4 per kilogram?



- (a) 1 : 2      (b) 2 : 1  
(c) 1 : 4      (d) 4 : 1

[2 Marks]

- Q.52 X is 1 km northeast of Y. Y is 1 km southeast of Z. W is 1 km west of Z. P is 1 km south of W. Q is 1 km east of P. What is the distance between X and Q in km?

- (A) 1      (B)  $\sqrt{2}$   
(C)  $\sqrt{3}$       (D) 2

[2 Marks]

- Q.53 10% of the population in a town is HIV+. A new diagnostic kit for HIV detection is available; this kit correctly identifies HIV+ individuals 95% of the time, and HIV- individuals 89% of the time. A particular patient is tested using this kit and is found to be positive. The probability that the individual is actually positive is \_\_\_\_.

[2 Marks]

### GATE 2014 : ME & EC (Online Exam)

- Q.54 The statistics of runs scored in a series by four batsmen are provided in the following table. Who is the most **consistent** batsman of these four?

Batsman	Average	Standard Deviation
K	31.2	5.21
L	46.0	6.35
M	54.4	6.22
N	17.9	5.90

- (a) K      (b) L  
(c) M      (d) N

[1 Mark, Set-I]

- Q.55 What is the next number in the series?

12    35    81    173    357    \_\_\_\_.

[Mark, Set-I]

- Q.56 A regular die has six sides with numbers 1 to 6 marked on its sides. If a very large number of throws show the following frequencies of occurrence:

1 → 0.167; 2 → 0.167; 3 → 0.152; 4 → 0.166;  
5 → 0.168; 6 → 0.180. We call this die

- (a) irregular      (b) biased  
(c) Gaussian      (d) insufficient

[1 Mark, Set-II]

- Q.57 Fill in the missing number in the series.

2    3    6    15    ?    157.5    630

[1 Mark, Set-II]

- Q.58 The next term in the series 81, 54, 36, 24, ... is \_\_\_\_.

[1 Mark, Set-III]

- Q.59 In which of the following options will the expression  $P < M$  be definitely true?

- (a)  $M < R > P > S$       (b)  $M > S < P < F$   
(c)  $Q < M < F = P$       (d)  $P = A < R < M$

[1 Mark, Set-III]

- Q.60 Let  $f(x, y) = x^n y^m = P$ . If  $x$  is doubled and  $y$  is halved, the new value of  $f$  is

- (a)  $2^{n-m} P$       (b)  $2^{m-n} P$   
(c)  $2(n-m)P$       (d)  $2(m-n)P$

[1 Mark, Set-IV]

- Q.61 In a sequence of 12 consecutive odd numbers, the sum of the first 5 numbers is 425. What is the sum of the last 5 numbers in the sequence?

[1 Mark, Set-IV]

- Q.62 Find the odd one from the following group:  
WEKO   IQWA   FNTX   NVBD

- (a) WEKO      (b) IQWA  
(c) FNTX      (d) NVBD

[2 Marks, Set-I]

- Q.63 For submitting tax returns, all resident males with annual income below ₹ 10 lakh should fill

up Form P and all resident females with income below ₹ 8 lakh should fill up Form Q. All people with incomes above ₹ 10 lakh should fill up Form R, except non residents with income above ₹ 15 lakhs, who should fill up Form S. All others should fill Form T. An example of a person who should fill Form T is

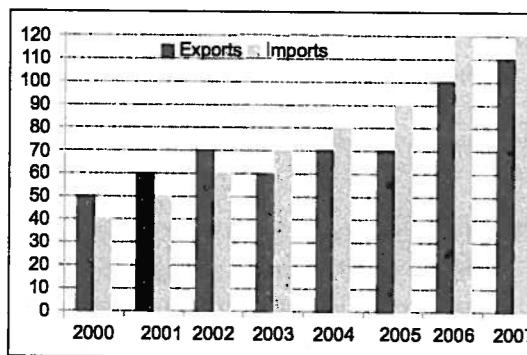
- a resident male with annual income ₹ 9 lakh
- a resident female with annual income ₹ 9 lakh
- a non-resident male with annual income ₹ 16 lakh
- a non-resident female with annual income ₹ 16 lakh

[2 Marks, Set-I]

Q.64 A train that is 280 metres long, travelling at a uniform speed, crosses a platform in 60 seconds and passes a man standing on the platform in 20 seconds. What is the length of the platform in metres?

[2 Marks, Set-I]

Q.65 The exports and imports (in crores of ₹) of a country from 2000 to 2007 are given in the following bar chart. If the trade deficit is defined as excess of imports over exports, in which year is the trade deficit 1/5th of the exports?



- 2005
- 2004
- 2007
- 2006

[2 Marks, Set-I]

Q.66 You are given three coins: one has heads on both faces, the second has tails on both faces, and the third has a head on one face and a tail on the other. You choose a coin at random and

toss it, and it comes up heads. The probability that the other face is tails is

- 1/4
- 1/3
- 1/2
- 2/3

[2 Marks, Set-I]

Q.67 Find the odd one in the following group

- QWZB, BHKM, WCGJ, MSVX,  
 (a) QWZB                   (b) BHKM  
 (c) WCGJ                   (d) MSVX

[2 Marks, Set-II]

Q.68 Lights of four colors (red, blue, green, yellow) are hung on a ladder. On every step of the ladder there are two lights. If one of the lights is red, the other light on that step will always be blue. If one of the lights on a step is green, the other light on that step will always be yellow. Which of the following statements is not necessarily correct?

- The number of red lights is equal to the number of blue lights
- The number of green lights is equal to the number of yellow lights
- The sum of the red and green lights is equal to the sum of the yellow and blue lights
- The sum of the red and blue lights is equal to the sum of the green and yellow lights

[2 Marks, Set-II]

Q.69 The sum of eight consecutive odd numbers is 656. The average of four consecutive even numbers is 87. What is the sum of the smallest odd number and second largest even number?

[2 Marks, Set-II]

Q.70 The total exports and revenues from the exports of a country are given in the two charts shown below. The pie chart for exports shows the quantity of each item exported as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 500 thousand tonnes and the total revenues are 250 crore rupees. Which item among the following has generated the maximum revenue per kg?

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- (i) Butterflies are birds
  - (ii) There are more tigers in this forest than red ants
  - (iii) All reptiles in this forest are either snakes or crocodiles
  - (iv) Elephants are the largest mammals in this forest
- (i) and (ii) only
  - (i), (ii), (iii) and (iv)
  - (i), (iii) and (iv) only
  - (i), (ii) and (iii) only

[2 Marks, Set-III]

Q.71 It takes 30 minutes to empty a half-full tank by draining it at a constant rate. It is decided to simultaneously pump water into the half-full tank while draining it. What is the rate at which water has to be pumped in so that it gets fully filled in 10 minutes?

- 4 times the draining rate
- 3 times the draining rate
- 2.5 times the draining rate
- 2 times the draining rate

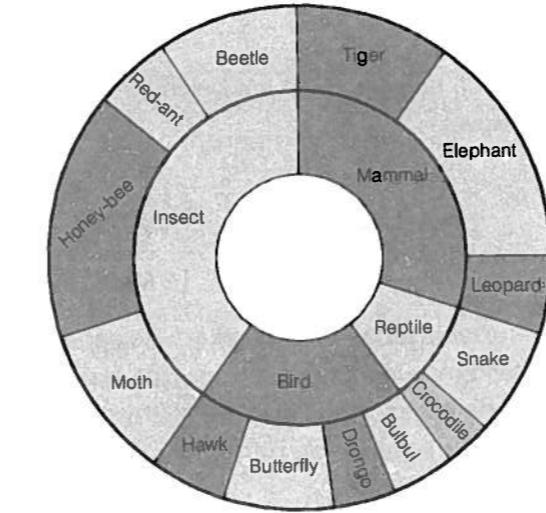
[2 Marks, Set-II]

Q.72 Find the next term in the sequence:

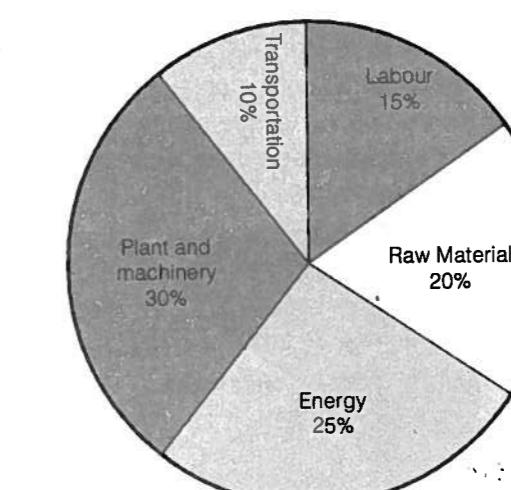
- 7G, 11K, 13M, \_\_\_\_\_.  
 (a) 15Q                   (b) 17Q  
 (c) 15P                   (d) 17P

[2 Marks, Set-III]

Q.73 The multi-level hierarchical pie chart shows the population of animals in a reserve forest. The correct conclusions from this information are:



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[2 Marks, Set-III]

Q.76 A batch of one hundred bulbs is inspected by testing four randomly chosen bulbs. The batch is rejected if even one of the bulbs is defective. A batch typically has five defective bulbs. The probability that the current batch is accepted is \_\_\_\_\_.

[2 Marks, Set-III]

Q.77 Find the next term in the sequence:

- 13M, 17Q, 19S, \_\_\_\_.  
 (a) 21W (b) 21V  
 (c) 23W (d) 23V

[2 Marks, Set-IV]

Q.78 If 'KCLFTSB' stands for 'best of luck' and 'SHSWDG' stands for 'good wishes', which of the following indicates 'ace the exam'?

- (a) MCHTX (b) MXHTC  
 (c) XMHCT (d) XMHTC

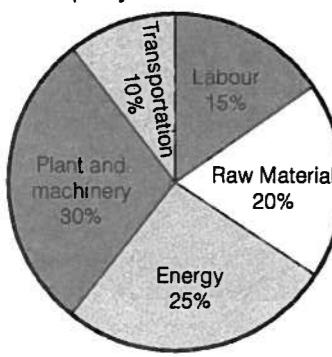
[2 Marks, Set-IV]

Q.79 Industrial consumption of power doubled from 2000-2001 to 2010-2011. Find the annual rate of increase in percent assuming it to be uniform over the years.

- (a) 5.6 (b) 7.2  
 (c) 10.0 (d) 12.2

[2 Marks, Set-IV]

Q.80 A firm producing air purifiers sold 200 units in 2012. The following pie chart presents the share of raw material, labour, energy, plant & machinery, and transportation costs in the total manufacturing cost of the firm in 2012. The expenditure on labour in 2012 is ₹ 4,50,000. In 2013, the raw material expenses increased by 30% and all other expenses increased by 20%. What is the percentage increase in total cost for the company in 2013?



[2 Marks, Set-IV]

Q.81 A five digit number is formed using the digits 1,3,5,7 and 9 without repeating any of them. What is the sum of all such possible five digit numbers?

- (a) 6666660 (b) 6666600  
 (c) 6666666 (d) 6666606

[2 Marks, Set-IV]

### GATE 2014: EE & CS (Online Exam) Set: I-III

Q.82 If  $\left(z + \frac{1}{z}\right)^2 = 98$ , compute  $\left(z^2 + \frac{1}{z^2}\right)$ .

[Mark, Set-I]

Q.83 The roots of  $ax^2 + bx + c = 0$  are real and positive. Then  $a, b$  and  $c$  are real.

- Then  $ax^2 + b|x| + c = 0$  has  
 (a) no roots (b) 2 real roots  
 (c) 3 real roots (d) 4 real roots

[1 Mark, Set-I]

Q.84 What is the average of all multiples of 10 from 2 to 198?

- (a) 90 (b) 100  
 (c) 110 (d) 120

[1 Mark, Set-II]

Q.85 The value of  $\sqrt{12} + \sqrt{12 + \sqrt{12 + \dots}}$

- (a) 3.464 (b) 3.932  
 (c) 4.000 (d) 4.444

[1 Mark, Set-II]

Q.86 Which number does not belong in the series below?

- 2, 5, 10, 17, 26, 37, 50, 64  
 (a) 17 (b) 37  
 (c) 64 (d) 26

[1 Mark, Set-III]

Q.87 The table below has question wise data on the performance of students in an examination. The marks for each question are also listed. There is no negative or partial marking in the examination.

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Q.No.	Marks	Answered Correctly	Answered Wrongly	Not Attempted
1	2	21	17	6
2	3	15	27	2
3	2	23	18	3

What is the average of the marks obtained by the class in the examination?

- (a) 1.34 (b) 1.74  
 (c) 3.02 (d) 3.91

[1 Mark, Set-III]

Q.88 Round-trip tickets to a tourist destination are eligible for a discount of 10% on the total fare. In addition, groups of 4 or more get a discount of 5% on the total fare. If the one way single person fare is ₹ 100, a group of 5 tourists purchasing round trip tickets will be charged ₹ \_\_\_\_\_.

[2 Marks, Set-I]

Q.89 In a survey, 300 respondents were asked whether they own a vehicle or not. If yes, they were further asked to mention whether they own a car or scooter or both. Their responses are tabulated below. What percent of respondents do not own a scooter?

	Men	Women
	Car	Scooter
Own vehicle	40	34
Scooter	30	20
Both	60	46
Do not own vehicle	20	50

[2 Marks, Set-I]

Q.90 When a point inside of a tetrahedron (a solid with four triangular surfaces) is connected by straight lines to corners, how many (new) internal planes are created with these lines? \_\_\_\_\_

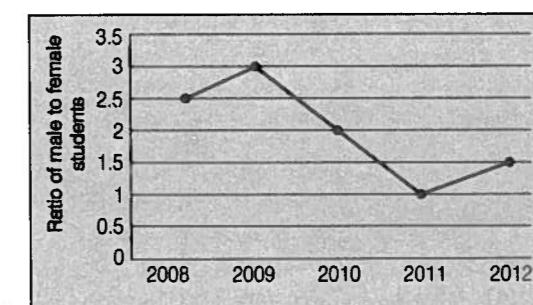
[2 Marks, Set-I]

Q.91 If  $x$  is real and  $|x^2 - 2x + 3| = 11$ , then possible values of  $|x^3 + x^2 - x|$  include

- (a) 2, 4 (b) 2, 14  
 (c) 4, 52 (d) 14, 52

[2 Marks, Set-II]

Q.92 The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students doubled in 2009, by what percent did the number of male students increase in 2009?



[2 Marks, Set-II]

Q.93 At what time between 6 a.m. and 7 a.m. will the minute hand and hour hand of a clock make an angle closest to 60°?

- (a) 6:22 a.m. (b) 6:27 a.m.  
 (c) 6:38 a.m. (d) 6:45 a.m.

[2 Marks, Set-II]

Q.94 The Gross Domestic Product (GDP) in Rupees grew at 7% during 2012-2013. For international comparison, the GDP is compared in US Dollars (USD) after conversion based on the market exchange rate. During the period 2012-2013 the exchange rate for the USD increased from ₹ 50/USD to ₹ 60/USD. India's GDP in USD during the period 2012-2013.

- (a) Increased by 5%  
 (b) Decreased by 13%  
 (c) Decreased by 20%  
 (d) Decreased by 11%

[2 Marks, Set-III]

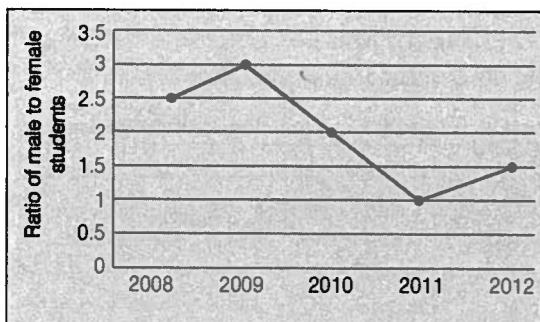
Q.95 Consider the equation:  $(7526)_8 - (Y)_8 = (4364)_8$ , where  $(X)_N$  stands for  $X$  to the base  $N$ . Find  $Y$ .

- (a) 1634 (b) 1737  
 (c) 3142 (d) 3162

[2 Marks, Set-III]

Q.96 The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students in 2011

and 2012 is equal, what is the ratio of male students in 2012 to male students in 2011?



- (a) 1 : 1      (b) 2 : 1  
 (c) 1.5 : 1    (d) 2.5 : 1

[2 Marks, Set-III]

### GATE 2015 : CE (Set: I) & CS (Set : III)

Q.97 If ROAD is written as URDG, then SWAN should be written as:

- (a) VXDQ      (b) VZDQ  
 (c) VZDP      (d) UXDQ

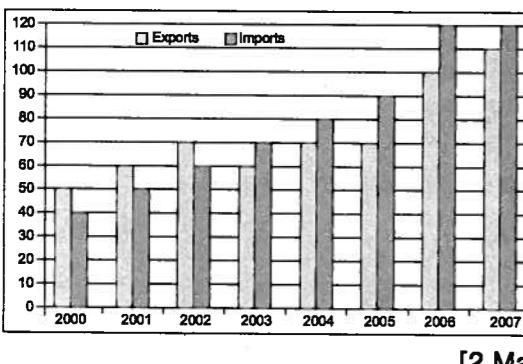
[1 Mark]

Q.98 A function  $f(x)$  is linear and has a value of 29 at  $x = -2$  and 39 at  $x = 3$ . Find its value at  $x = 5$ .

- (a) 59      (b) 45  
 (c) 43      (d) 35

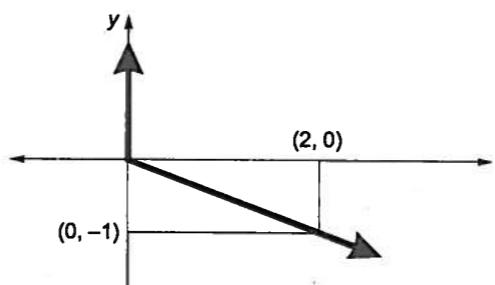
[1 Mark]

Q.99 The exports and imports (in crores of ₹) of a country from the year 2000 to 2007 are given in the following bar chart. In which year is the combined percentage increase in imports and exports the highest?



[2 Marks]

Q.100 Choose the most appropriate equation for the function drawn as a thick line, in the plot below:



- (a)  $x = y - |y|$       (b)  $x = -(y - |y|)$   
 (c)  $x = y + |y|$     (d)  $x = -(y + |y|)$

[2 Marks]

Q.101 The head of a newly formed government desires to appoint five of the six selected members  $P, Q, R, S, T$  and  $U$  to portfolios of Home, Power, Defense, Telecom, and Finance.  $U$  does not want any portfolio if  $S$  gets one of the five.  $R$  wants either Home or Finance or no portfolio.  $Q$  says that if  $S$  gets either Power or Telecom, then she must get the other one.  $T$  insists on a portfolio if  $P$  gets one.

- Which is the valid distribution of portfolios?  
 (a)  $P$ -Home,  $Q$ -Power,  $R$ -Defense,  $S$ -Telecom,  $T$ -Finance  
 (b)  $R$ -Home,  $S$ -Power,  $P$ -Defense,  $Q$ -Telecom,  $T$ -Finance  
 (c)  $P$ -Home,  $Q$ -Power,  $T$ -Defense,  $S$ -Telecom,  $U$ -Finance  
 (d)  $Q$ -Home,  $U$ -Power,  $T$ -Defense,  $R$ -Telecom,  $P$ -Finance

[2 Marks]

### GATE 2015 : CE (Set: II)

Q.102 Four cards are randomly selected from a pack of 52 cards. If the first two cards are kings, what is the probability that the third card is a king?

Q.106 The given question is followed by two statements; select the most appropriate option that solves the question

Capacity of a solution tank  $A$  is 70% of the capacity of tank  $B$ . How many gallons of solution are in tank  $A$  and tank  $B$ ?

Statements:

- I. Tank  $A$  is 80% full and tank  $B$  is 40% full.  
 II. Tank  $A$  if full contains 14,000 gallons of solution.

- (a) Statement I alone is sufficient.  
 (b) Statement II alone is sufficient.  
 (c) Either statement I or II alone is sufficient.  
 (d) Both the statements I and II together are sufficient.

[2 Marks]

Q.103 Mr. Vivek walks 6 meters North-East, then turns and walks 6 meters South-East, both at 60 degrees to East. He further moves 2 meters South and 4 meters West. What is the straight distance in meters between the point he started from and the point he finally reached?

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

[1 Mark]

Q.104 Read the following table giving sales data of five types of batteries for years 2006 to 2012

Year	Type I	Type II	Type III	Type IV	Type V
2006	75	144	114	102	108
2007	90	126	102	84	126
2008	96	114	75	105	135
2009	105	90	150	90	75
2010	90	75	135	75	90
2011	105	60	165	45	120
2012	115	85	160	100	145

Out of the following, which type of battery achieved highest growth between the years 2006 and 2012?

- (a) Type V      (b) Type III  
 (c) Type II      (d) Type I

[2 Marks]

Q.105 How many four digit numbers can be formed with the 10 digits 0, 1, 2, ..., 9 if no number can start with 0 and if repetitions are not allowed?

[2 Marks]

Q.106 Based on the given statements, select the most appropriate option to solve the given question. What will be the total weight of 10 poles each of same weight?

Statements:

- (a) 0, -1      (b) -1, 0  
 (c) 0, 1      (d) -1, 2

[1 Mark]

1. One fourth of the weight of a pole is 5 kg.  
 2. The total weight of these poles is 160 kg more than the total weight of two poles.  
 (a) Statement 1 alone is not sufficient  
 (b) Statement 2 alone is not sufficient  
 (c) Either 1 or 2 alone is sufficient  
 (d) Both statements 1 and 2 together are not sufficient

[1 Mark]

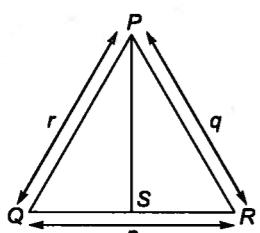
- Q.110 If the list of letters, P, R, S, T, U is an arithmetic sequence, which of the following are also in arithmetic sequence?  
 1. 2P, 2R, 2S, 2T, 2U  
 2. P-3, R-3, S-3, T-3, U-3  
 3. P<sup>2</sup>, R<sup>2</sup>, S<sup>2</sup>, T<sup>2</sup>, U<sup>2</sup>  
 (a) 1 only (b) 1 and 2  
 (c) 2 and 3 (d) 1 and 3

[2 Marks]

- Q.111 Four branches of a company are located at M, N, O and P. M is north of N at a distance of 4 km; P is south of O at a distance of 2 km; N is southeast of O by 1 km. What is the distance between M and P in km?  
 (a) 5.34 (b) 6.74  
 (c) 28.5 (d) 45.49

[2 Marks]

- Q.112 In a triangle PQR, PS is the angle bisector of  $\angle QPR$  and  $\angle QPS = 60^\circ$ . What is the length of PS?



- (a)  $\frac{(q+r)}{qr}$  (b)  $\frac{qr}{(q+r)}$   
 (c)  $\sqrt{(q^2+r^2)}$  (d)  $\frac{(q+r)^2}{qr}$

[2 Marks]

- Q.113 If p, q, r, s are distinct integers such that:  
 $f(p, q, r, s) = \max(p, q, r, s)$   
 $g(p, q, r, s) = \min(p, q, r, s)$   
 $h(p, q, r, s) = \text{remainder of } (p \times q) / (r \times s) \text{ if } (p \times q) > (r \times s) \text{ or remainder of } (r \times s) / (p \times q) \text{ if } (r \times s) > (p \times q)$   
 Also a function fgh(p, q, r, s) = f(p, q, r, s) × g(p, q, r, s) × h(p, q, r, s).  
 Also the same operation are valid with two variable functions of the form f(p, q).  
 What is the value of fg(h(2, 5, 7, 3), 4, 6, 8)?

[2 Marks]

**GATE 2015 : CS (Set: II) & EE (Set : I)**

- Q.114 Given Set A = {2, 3, 4, 5} and Set B = {11, 12, 13, 14, 15}, two numbers are randomly selected, one from each set. What is the probability that the sum of the two numbers equals 16?  
 (a) 0.20 (b) 0.25  
 (c) 0.30 (d) 0.33

[1 Mark]

- Q.115 Based on the given statements, select the most appropriate option to solve the given question. If two floors in a certain building are 9 feet apart, how many steps are there in a set of stairs that extends from the first floor to the second floor of the building?

- Statements:**  
 1. Each step is  $3/4$  foot high.  
 2. Each step is 1 foot wide.  
 (a) Statement 1 alone is sufficient, but statement 2 alone is not sufficient  
 (b) Statement 2 alone is sufficient, but statement 1 alone is not sufficient  
 (c) Both statement together are sufficient, but neither statement alone is sufficient  
 (d) Statement 1 and 2 together are not sufficient

[1 Mark]

- Q.116 The number of students in a class who have answered correctly, wrongly, or not attempted each question in an exam, are listed in the table below. The marks for each question are also listed. There is no negative or partial marking.

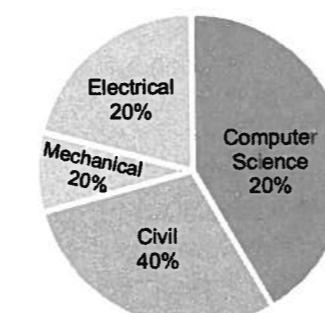
Q.No.	Marks	Answered Correctly	Answered Wrongly	Not Attempted
1	2	21	17	6
2	3	15	27	2
3	1	11	29	4
4	2	23	18	3
5	5	31	12	1

What is the average of the marks obtained by the class in the examination?

- (a) 2.290 (b) 2.970  
 (c) 6.795 (d) 8.795

[2 Marks]

- Q.117 The pie chart below has the breakup of the number of students, from different departments in an engineering college for the year 2012. The proportion of male to female students in each department is 5 : 4. There are 40 males in Electrical Engineering. What is the difference between the numbers of female students in the Civil department and the female students in the Mechanical department?



[2 Marks]

- Q.118 The probabilities that a student passes in Mathematics, Physics and Chemistry are m, p and c respectively. Of these subjects, the student has 75% chance of passing in at least one, a 50% chance of passing in at least two and a 40% chance of passing exactly two.

Following relations are drawn in m, p and c:

1.  $p + m + c = 27/20$   
 2.  $p + m + c = 13/20$   
 3.  $(p) \times (m) \times (c) = 1/10$   
 (a) Only relation 1 is true  
 (b) Only relation 2 is true  
 (c) Relations 2 and 3 are true  
 (d) Relations 1 and 3 are true

[2 Marks]

**GATE 2015 : EC (Set: I)**

- Q.119 If  $\log_x (5/7) = -1/3$ , then the value of x is  
 (a) 343/125 (b) 125/343  
 (c) -25/49 (d) -49/25

[1 Mark]

- Q.120 Operators  $\square$ ,  $\diamond$  and  $\rightarrow$  are defined by:

$$a \square b = \frac{a-b}{a+b}$$

$$a \diamond b = \frac{a+b}{a-b}; a \rightarrow b = ab.$$

Find the value of  $(66 \square 6) \rightarrow (66 \diamond 6)$

- (a) -2 (b) -1  
 (c) 1 (d) 2

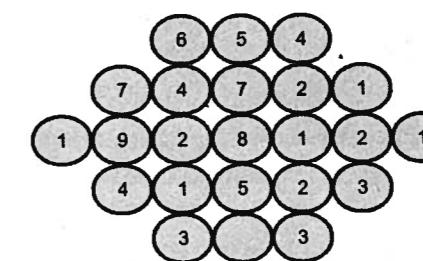
[1 Mark]

- Q.121 A cube side 3 units is formed using a set of smaller cubes of side 1 unit. Find the proportion of the number of faces of the smaller cubes visible to those which are NOT visible.

- (a) 1 : 4 (b) 1 : 3  
 (c) 1 : 2 (d) 2 : 3

[2 Marks]

- Q.122 Fill in the missing value



[2 Marks]

**GATE 2015 : EC (Set: II) & ME (Set: III)**

Q.123 An electric bus has onboard instruments that report the total electricity consumed since the start of the trip as well as the total distance covered. During a single day of operation, the bus travels on stretches  $M$ ,  $N$ ,  $O$  and  $P$ , in that order. The cumulative distance travelled and the corresponding electricity consumption are shown in the Table below:

Stretch	Cumulative distance (km)	Electricity used (kWh)
$M$	20	12
$N$	45	25
$O$	75	45
$P$	100	57

The stretch where the electricity consumption per km is minimum is

- (a)  $M$       (b)  $N$   
 (c)  $O$       (d)  $P$   
**[1 Mark]**

Q.124 Ram and Ramesh appeared in an interview for two vacancies in the same department. The probability of Ram's selection is  $1/6$  and that of Ramesh is  $1/8$ . What is the probability that only one of them will be selected?

- (a)  $47/48$       (b)  $1/4$   
 (c)  $13/48$       (d)  $35/48$   
**[1 Mark]**

Q.125 Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows.

- Statements:**  
 I. All film star are playback singers.  
 II. All film directors are film stars.

- Conclusions:**  
 I. All film directors are playback singers.  
 II. Some film stars are film directors.  
 (a) Only conclusion I follows.  
 (b) Only conclusion I nor II follows.  
 (c) Neither conclusion I nor II follows.  
 (d) Both conclusions I and II follow.

**[2 Marks]**

Q.126 If  $a^2 + b^2 + c^2 = 1$ , then  $ab + bc + ac$  lies in the interval

- (a)  $[1, 2/3]$       (b)  $[-1/2, 1]$   
 (c)  $[-1, 1/2]$       (d)  $[2, -4]$

**[2 Marks]**

Q.127 A tiger is 50 leaps of its own behind a deer. The tiger takes 5 leaps per minute to the deer's 4. If the tiger and the deer cover 8 metre and 5 metre per leap respectively, what distance in metres will the tiger have to run before it catches the deer?

**[2 Marks]**

**GATE 2015 : EC (Set: III) & ME (Set: II)**

Q.128 Find the missing sequence in the letter series below:

- A, CD, GHI?, UVWXY  
 (a) LMN      (b) MNO  
 (c) MNOP      (d) NOPQ

**[1 Mark]**

Q.129 If  $x > y > 1$ , which of the following must be true?

- (i)  $\ln x > \ln y$       (ii)  $e^x > e^y$   
 (iii)  $y^x > x^y$       (iv)  $\cos x > \cos y$   
 (a) (i) and (ii)      (b) (i) and (iii)  
 (c) (iii) and (iv)      (d) (ii) and (iv)

**[1 Mark]**

Q.130 Ms. X will be Bagdogra from 01/05/2014 to 20/05/2014 and from 22/05/2014 to 31/05/2014. On the morning of 21/05/2014, she will reach Kochi via Mumbai.

Which one of the statements below is logically valid and can be inferred from the above sentences?

- (a) Ms. X will be in Kochi for one day, only in May.  
 (b) Ms. X will be in Kochi for only one day in May.  
 (c) Ms. X will be only in Kochi for one day in May.  
 (d) Only Ms. X will be in Kochi for one day in May.

**[2 Marks]**

Q.131  $\log \tan 1^\circ + \log \tan 2^\circ + \dots + \log \tan 89^\circ$  is \_\_\_\_\_.

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

**[2 Marks]**

Q.132 From a circular sheet of paper of radius 30 cm, a sector of 10% area is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and height of the cone is \_\_\_\_\_.

**[2 Marks]**

**GATE 2015 : ME (Set: I), IN & PI**

Q.133 Five teams have to compete in a league, with every team playing every other team exactly once, before going to the next round. How many matches will have to be held to complete the league round of matches?

- (a) 20      (b) 10  
 (c) 8      (d) 5

**[1 Mark]**

Q.134 Tanya is older than Eric.

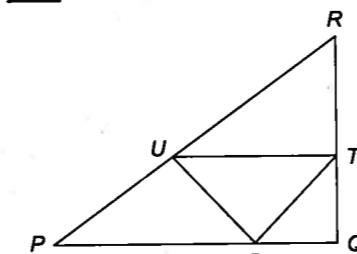
Cliff is older than Tanya.  
 Eric is older than Cliff.

If the first two statements are true, then the third statement is

- (a) True      (b) False  
 (c) Uncertain      (d) Data insufficient

**[1 Mark]**

Q.135 In the given angle  $Q$  is a right angle,  $PS : QS = 3 : 1$ ,  $RT : QT = 5 : 2$  and  $PU : UR = 1 : 1$ . If area of triangle  $QTS$  is  $20 \text{ cm}^2$ , then the area of triangle  $PQR$  in  $\text{cm}^2$  is \_\_\_\_\_.



**[2 Marks]**

Q.136 Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows:

**Statements:**

- I. No manager is a leader.  
 II. All leaders are executives.

**Conclusions:**

- I. No manager is an executive.  
 II. No executive is a manager.  
 (a) Only conclusion I follows  
 (b) Only conclusion II follows  
 (c) Neither conclusion I nor II follows  
 (d) Both conclusions I and II follow

**[2 Marks]**

Q.137 A coin is tossed thrice. Let  $X$  be the event that head occurs in each of the first two tosses. Let  $Y$  be the event that a tail occurs on the third toss. Let  $Z$  be the event that two tails occur in three tosses. Based on the above information, which one of the following statements is TRUE?

- (a)  $X$  and  $Y$  are not independent  
 (b)  $Y$  and  $Z$  are dependent  
 (c)  $Y$  and  $Z$  are independent  
 (d)  $X$  and  $Z$  are independent

**[2 Marks]**

Q.138 Right triangle  $PQR$  is to be constructed in the  $xy$ -plane so that the right angle is at  $P$  and line  $PR$  is parallel to the  $x$ -axis. The  $x$  and  $y$  coordinates of  $P$ ,  $Q$ , and  $R$  are to be integers that satisfy the inequalities:  $-4 \leq x \leq 5$  and  $6 \leq y \leq 16$ . How many different triangles could be constructed with these properties?

- (a) 110      (b) 1100  
 (c) 9900      (d) 10000

**[2 Marks]**

**GATE 2016 : EC & ME (Set- I)**

Q.139 In a huge pile of apples and oranges, both ripe and unripe mixed together, 15% are unripe fruits. Of the unripe fruits, 45% are apples. Of the ripe ones, 66% are oranges. If the pile contains a total of 5692000 fruits, how many of them are apples?

- (a) 2029198      (b) 2467482  
 (c) 2789080      (d) 3577422  
 [1 Mark]

**Q.140** Michael lives 10 km away from where I live. Ahmed lives 5 km away and Susan lives 7 km away from where I live. Arun is farther away than Ahmed but closer than Susan from where I live. From the information provided here, what is one possible distance (in km) at which I live from Arun's place?

- (a) 3.00      (b) 4.99  
 (c) 6.02      (d) 7.01  
 [1 Mark]

**Q.141** A person moving through a tuberculosis prone zone has a 50% probability of becoming infected. However, only 30% of infected people develop the disease. What percentage of people moving through a tuberculosis prone zone remains infected but does not show symptoms of disease?

- (a) 15      (b) 33  
 (c) 35      (d) 37  
 [2 Marks]

**Q.142** Leela is older than her cousin Pavithra. Pavithra's brother Shiva is older than Leela. When Pavithra and Shiva are visiting Leela, all three like to play chess. Pavithra wins more often than Leela does.

- Which one of the following statements must be TRUE based on the above?  
 (a) When Shiva plays chess with Leela and Pavithra, he often loses.  
 (b) Leela is the oldest of three.  
 (c) Shiva is better chess player than Pavithra.  
 (d) Pavithra is the youngest of the three.

[2 Marks]

**Q.143** If  $q^{-1} = \frac{1}{r}$  and  $r^{-b} = \frac{1}{s}$  and  $s^{-c} = \frac{1}{q}$ , the value of  $abc$  is \_\_\_\_\_.

- (a)  $(rqs)^{-1}$       (b) 0  
 (c) 1      (d)  $r+q+s$

[2 Marks]

- Q.144** *P, Q, R and S* are working on a project. *Q* can finish the task in 25 days, working alone for 12 hours a day. *R* can finish the task in 50 days, working alone for 12 hours per day. *Q* worked 12 hours a day but took sick leave in the beginning for two days. *R* worked 18 hours a day on all days. What is the ratio of work done by *Q* and *R* after 7 days from the start of the projects?
- (a) 10:11      (b) 11:10  
 (c) 20:21      (d) 21:20  
 [2 Marks]

### GATE 2016 : EC (Set-II) & ME (Set-III)

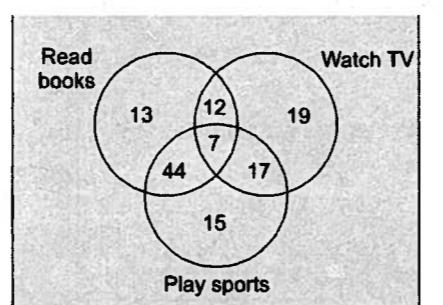
- Q.145** Given  $(9 \text{ inches})^{1/2} = (0.25 \text{ yards})^{1/2}$ , which one of the following statements is TRUE?
- (a) 3 inches = 0.5 yards  
 (b) 9 inches = 1.5 yards  
 (c) 9 inches = 0.25 yards  
 (d) 81 inches = 0.0625 yards

[1 Mark]

- Q.146** *S, M, E* and *F* are working in shifts in a team to finish a project. *M* works with twice the efficiency of others but for half as many days as *E* worked. *S* and *M* have 6 hour shifts in a day, whereas *E* and *F* have 12 hours shifts. What is the ratio of contribution of *M* to contribution of *E* in the project?
- (a) 1 : 1      (b) 1 : 2  
 (c) 1 : 4      (d) 2 : 1

[1 Mark]

- Q.147** The Venn diagram shows the preference of the student population for leisure activities.



[2 Marks]

From the data given, the number of students who like to read books or play sports is \_\_\_\_\_.

- (a) 44      (b) 51  
 (c) 79      (d) 108

[2 Marks]

**Q.148** Two and a quarter hours back, when seen in a mirror, the reflection of a wall clock without number markings seemed to show 1 : 30. What is the actual current time shown by the clock?

- (a) 8:15      (b) 11:15  
 (c) 12:15      (d) 12:45

[2 Marks]

**Q.149** *M* and *N* start from the same location. *M* travels 10 km East and then 10 km North-East. *N* travels 5 km South and then 4 km south-East. What is the shortest distance (in km) between *M* and *N* at the end of their travel?

- (a) 18.60      (b) 22.50  
 (c) 20.61      (d) 25.00

[2 Marks]

**Q.150** A wire of length 340 mm is to be cut into two parts. One of the parts is to be made into a square and the other into a rectangle where sides are in the ratio of 1:2. What is the length of the side of the square (in mm) such that the combined area of the square and the rectangle is a MINIMUM?

- (a) 30      (b) 40  
 (c) 120      (d) 180

[2 Marks]

### GATE 2016 : EC (Set-III) & IN

**Q.151** *M* has a son *Q* and a daughter *R*. He has no other children. *E* is the mother of *P* and daughter-in-law of *M*. How is *P* related to *M*?

- (a) *P* is the son-in-law of *M*  
 (b) *P* is the grandchild of *M*  
 (c) *P* is the daughter-in law of *M*  
 (d) *P* is the grandfather of *M*

[1 Mark]

**Q.152** The number that least fits this set: (324, 441, 97 and 64) is \_\_\_\_\_.

- (a) 324      (b) 441  
 (c) 97      (d) 64

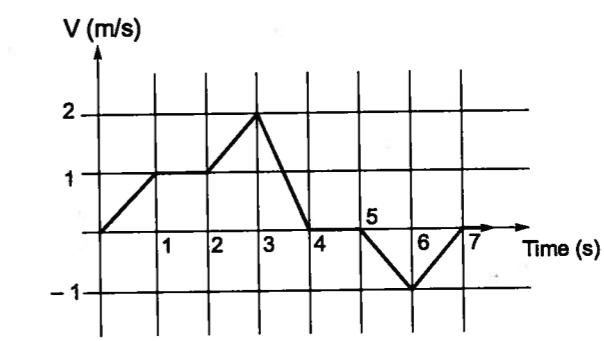
[1 Mark]

**Q.153** It takes 10s and 15s, respectively, for two trains travelling at different constant speeds to completely pass a telegraph post. The length of the first train is 120 m and that of the second train is 150 m. The magnitude of the difference in the speeds of the two trains (in m/s) is \_\_\_\_\_.

- (a) 2.0      (b) 10.0  
 (c) 12.0      (d) 22.0

[1 Mark]

**Q.154** The velocity *V* of a vehicle along a straight line is measured in m/s and plotted as shown with respect to time in seconds. At the end of the 7 seconds, how much will the odometer reading increase by (in m)?



- (a) 0      (b) 3  
 (c) 4      (d) 5

[2 Marks]

**Q.155** A flat is shared by four first year undergraduate students. They agreed to allow the oldest of them to enjoy some extra space in the flat. Manu is two months older than Sravan, who is three months younger than Trideep. Pavan is one month older than Sravan. Who should occupy the extra space in the flat?

- (a) Manu      (b) Sravan  
 (c) Trideep      (d) Pavan

[2 Marks]

**Q.156** Find the area bounded by the lines  $3x + 2y = 14$ ,  $2x - 3y = 5$  in the first quadrant.

- (a) 14.95      (b) 15.25  
(c) 15.70      (d) 20.35

[2 Marks]

**Q.157** A straight line is fit to a data set ( $\ln x, y$ ). The line intercepts the abscissa at  $\ln x = 0.1$  and has a slope of  $-0.02$ . What is the value of  $y$  at  $x = 5$  from the fit?

- (a) -0.030      (b) -0.014  
(c) 0.014      (d) 0.030

[2 Marks]

**GATE 2016 : CE & CS (Set-I)**

**Q.158** If 'relftaga' means carefree, 'otaga' means careful and 'fertaga' means careless, which of the following could mean 'aftercare'?

- (a) zentaga      (b) tagafer  
(c) tagazen      (d) reliffer

[1 Marks]

**Q.159** A cube is built using 64 cubic blocks of side one unit. After it is built, one cubic block is removed from every corner of the cube. The resulting surface area of the body (in square units) after the removal is \_\_\_\_\_.

- (a) 56      (b) 64  
(c) 72      (d) 96

[1 Mark]

**Q.160** A shaving set company sells 4 different types of razors, Elegance, Smooth, Soft and Executive. Elegance sells at Rs. 48, Smooth at Rs. 63, Soft at Rs. 78 and Executive at Rs. 173 per piece. The table below shows the numbers of each razor sold in each quarter of a year.

Quarter/ Product	Elegance	Smooth	Soft	Executive
Q1	27300	20009	17602	9999
Q2	25222	19392	18445	8942
Q3	28976	22429	19544	10234
Q4	21012	18229	16595	10109

Which product contributes the greatest fraction to the revenue of the company in that year?

- (a) Elegance      (b) Executive  
(c) Smooth      (d) Soft

[2 Marks]

**Q.161** Consider the following statements relating to the level of poker play of four players *P, Q, R* and *S*.

- I. *P* always beats *Q*
- II. *R* always beats *S*
- III. *S* loses to *P* only sometimes
- IV. *R* always loses to *Q*

Which of the following can be logically inferred from the above statements?

- (i) *P* is likely to beat all the three other players
- (ii) *S* is the absolute worst player in the set
- (a) (i) only      (b) (ii) only  
(c) (i) and (ii)      (d) neither (i) nor (ii)

[2 Marks]

**Q.162** If  $f(x) = 2x^7 + 3x - 5$ , which of the following is a factor of  $f(x)$ ?

- (a)  $(x^3 + 8)$       (b)  $(x - 1)$   
(c)  $(2x - 5)$       (d)  $(x + 1)$

[2 Marks]

**Q.163** In a process, the number of cycles to failure decreases exponentially with an increase in load. At a load of 80 units, it takes 100 cycles for failure. When the load is halved, it takes 10000 cycles for failure. The load for which the failure will happen in 5000 cycles is \_\_\_\_\_.

- (a) 40.00      (b) 46.02  
(c) 60.01      (d) 92.02

[2 Marks]

**GATE 2016 : EE (Set-I) & CS (Set-II)**

**Q.164** Pick the odd one from the following options.

- (a) CADBE      (b) JHKIL  
(c) XVYWZ      (d) ONPMQ

[1 Mark]

**Q.165** In a quadratic function, the value of the product of the roots ( $\alpha, \beta$ ) is 4. Find the value of

$$\frac{\alpha^n + \beta^n}{\alpha^{-n} + \beta^{-n}}$$

- (a)  $r^n$       (b)  $4^n$   
(c)  $2^{n-1}$       (d)  $4^{n-1}$

[1 Marks]

**Q.166** Among 150 faculty members in an institute, 55 are connected with each other through Facebook® and 85 are connected through WhatsApp®. 30 faculty members do not have Facebook® or WhatsApp® accounts. The number of faculty members connected only through Facebook® accounts is \_\_\_\_\_.

- (a) 35      (b) 45  
(c) 65      (d) 90

[2 Marks]

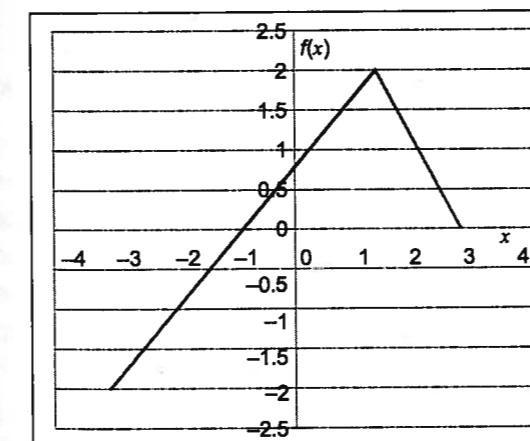
**Q.167** In a  $2 \times 4$  rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid?



- (a) 21      (b) 27  
(c) 30      (d) 36

[2 Marks]

**Q.168** Choose the correct expression for  $f(x)$  given in the graph.



- (a)  $f(x) = 1 - |x - 1|$   
(b)  $f(x) = 1 + |x - 1|$   
(c)  $f(x) = 2 - |x - 1|$   
(d)  $f(x) = 2 + |x - 1|$

[2 Marks]

**GATE 2016 : CE (Set-II)**

**Q.169**  $(x\% \text{ of } y) + (y\% \text{ of } x)$  is equivalent to \_\_\_\_\_.

- (a) 2% of  $xy$       (b) 2% of  $(xy/100)$   
(c)  $xy\% \text{ of } 100$       (d) 100% of  $xy$

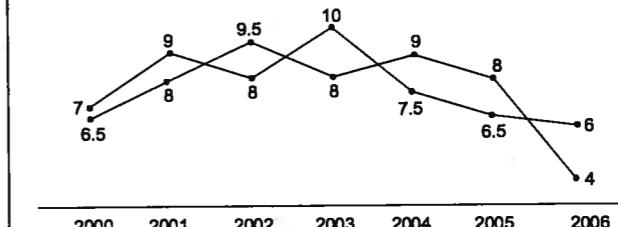
[1 Mark]

**Q.170** The sum of the digits of a two digit number is 12. If the new number formed by reversing the digits is greater than the original number by 54, find the original number.

- (a) 39      (b) 57  
(c) 66      (d) 93

[1 Mark]

**Q.171** Two finance companies, *P* and *Q* declared fixed annual rates of interest on the amounts invested with them. The rates of interest offered by these companies may differ from year to year. Year-wise annual rates of interest offered by these companies are shown by the line graph provided below.



If the amounts invested in the companies, *P* and *Q* in 2006 are in the ratio 8 : 9, then the amounts received after one year as interest from companies *P* and *Q* would be the ratio

- (a) 2 : 3      (b) 3 : 4  
(c) 6 : 7      (d) 4 : 3

[2 Marks]

**Q.172** A square pyramid has a base perimeter  $x$ , and the slant height is half of the perimeter. What is the lateral surface area of the pyramid?

- (a)  $x^2$       (b)  $0.75x^2$   
(c)  $0.50x^2$       (d)  $0.25x^2$

[2 Marks]

**Q.173** Ananth takes 6 hours and Bharath takes 4 hours to read a book. Both started reading

copies of the book at the same time. After how many hours is the number of pages to be read by Ananth, twice that to be read by Bharath? Assume Ananth and Bharath read all the pages with constant pace.

(a) 1    (b) 2  
 (c) 3    (d) 4

[2 Marks]

**GATE 2016 : EE (Set-II)**

Q.174 Pick the odd one out in the following:

- 13, 23, 33, 43, 53  
 (a) 23    (b) 33  
 (c) 43    (d) 53

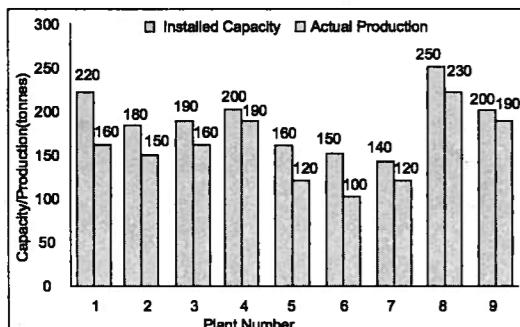
[1 Mark]

Q.175 If  $|9y - 6| = 3$ , then  $y^2 - 4y/3$  is \_\_\_\_\_.

- (a) 0    (b) +1/3  
 (c) -1/3                                     (d) undefined

[1 Marks]

Q.176 The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is \_\_\_\_\_.



[2 Marks]

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Q.177 Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

(a) 0.2508                                    (b) 0.2816  
 (c) 0.2934                                    (d) 0.6000

[2 Marks]

Q.178 The numeral in the units position of  $211^{870} + 146^{127} \times 3^{424}$  is \_\_\_\_\_.

[2 Marks]

**GATE 2016 : ME (Set-II)**

Q.179 The volume of a sphere of diameter 1 unit is \_\_\_\_\_ than the volume of a cube of side 1 unit.

- (a) least                                        (b) less  
 (c) lesser                                      (d) low

[1 Mark]

Q.180 A window is made up of a square portion and an equilateral triangular portion above it. The base of the triangular portion coincides with the upper side of the square. If the perimeter of the window is 6 m, the area of the window in  $\text{m}^2$  is \_\_\_\_\_.

- (a) 1.43                                        (b) 2.06  
 (c) 2.68                                        (d) 2.88

[1 Mark]

Q.181 Students taking an exam are divided into two groups, P and Q such that each group has the same number of students. The performance of each of the students in a test was evaluated out of 200 marks. It was observed that the mean of group P was 105, while that of group Q was 85. The standard deviation of group P was 25, while that of group Q was 5. Assuming that the marks were distributed on a normal distribution, which of the following statements will have the highest probability of being TRUE?

- (a) No student in group Q scored less marks than any student in group P.

- (b) No student in group P scored less marks than any student in group Q.  
 (c) Most students of group Q scored marks in a narrower range than students in group P.  
 (d) The median of the marks of group P is 100.

[2 Marks]

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Q.182 Find the missing sequence in the letter series.

B, FH, LNP, \_\_\_\_\_.

- (a) SUWY                                    (b) TUWV  
 (c) TVXZ                                    (d) TWXZ

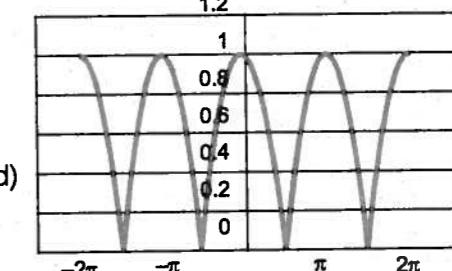
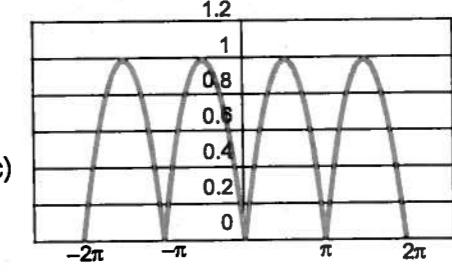
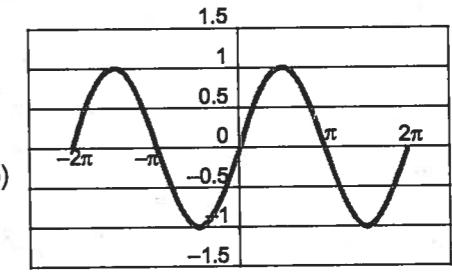
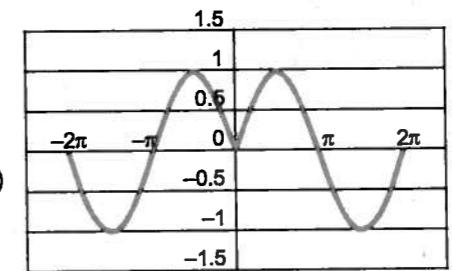
[2 Marks]

Q.183 The binary operation  $\square$  is defined as  $a \square b = ab + (a + b)$ , where  $a$  and  $b$  are any two real numbers. The value of the identity element of this operation, defined as the number  $x$  such that  $a \square x = a$ , for any  $a$ , is

- (a) 0    (b) 1  
 (c) 2    (d) 10

[2 Marks]

Q.184 Which of the following curves represents the function  $y = \ln(|e^{[\sin(x)]}|)$  for  $|x| < 2\pi$ ? here,  $x$  represents the abscissa and  $y$  represents the ordinate.



[2 Marks]



**Answers****1. Number System**

1. (b)    2. (c)    3. (a)    4. (c)    5. (c)    6. (c)    7. (d)    8. (a)  
 9. (c)    10. (3)    11. (8)    12. (12)    13. (2880)

**2. Time and Work**

1. (a)    2. (b)    3. (a)    4. (b)    5. (a)    6. (a)    7. (b)    8. (b)  
 9. (14)    10. (500)    12. (d)    13. (12)

**3. Set Theory and Logical Venn Diagram**

1. (a)    2. (b)    3. (b)    4. (a)    5. (c)    6. (a)    7. (550)    8. (a)  
 9. (c)    10. (c)    11. (a)    12. (a)    13. (a)    14. (d)    15. (b)    16. (c)  
 17. (b)    18. (d)    19. (c)    20. (d)

**4. Ratio, Proportional & Mixtures**

1. (a)    2. (b)    3. (c)    4. (b)    5. (a)    6. (a)    7. (a)    8. (b)  
 9. (1.4)    10. (b)    11. (b)    12. (a)    13. (7.29)

**5. Percentages**

1. (a)    2. (a)    3. (b)    4. (b)    5. (a)    6. (c)    7. (a)  
 8. (3024)    9. (9.09)

**6. Profit and Loss**

1. (b)    2. (0)    3. (c)    4. (b)    5. (b)    6. (28)    7. (a)    8. (b)  
 9. (b)    10. (c)    11. (a)    12. (b)    13. (b)

**7. Simple and Compound Interest**

1. (c)    2. (a)    3. (d)    4. (c)    5. (a)    6. (c)    7. (b)    8. (b)  
 9. (35)

**8. Time, Speed and Distance**

1. (c)    2. (d)    3. (c)    4. (b)    5. (b)    6. (a)    7. (a)    8. (a)  
 9. (c)    10. (24)    11. (40)

**9. Permutation, Combination and Probability**

1. (b)    2. (b)    3. (c)    4. (b)    5. (c)    6. (b)    7. (a)    8. (c)  
 9. (b)    10. (25)    11. (4536)

**10. Calendar**

1. (c)    2. (b)    3. (c)    4. (c)    5. (d)    6. (c)    7. (d)    8. (a)  
 9. (1)

**11. Clocks**

1. (b)    2. (c)    3. (a)    4. (a)    5. (a)    6. (a)

**12. Cubes, Dices and Directions**

1. (b)    2. (a)    3. (d)    4. (a)    5. (d)    6. (a)    7. (a)    8. (a)  
 9. (a)    10. (a)    11. (a)    12. (d)    13. (d)    14. (d)    15. (100)

**13. Data Interpretation**

1. (c)    2. (d)    3. (b)    4. (d)    5. (b)    6. (d)    7. (d)    8. (a)  
 9. (c)    10. (a)    11. (b)    12. (b)    13. (b)    14. (a)    15. (d)  
 16. (20,000)    17. (48)    18. (140)    19. (d)    20. (d)

**14. Seating Arrangement**

1. (a)    2. (c)    3. (c)    4. (d)    5. (a)    6. (a)    7. (c)    8. (d)  
 9. (b)    10. (d)

**15. Blood Relations**

1. (c)    2. (c)    3. (c)    4. (b)    5. (b)    6. (d)    7. (b)    8. (d)  
 9. (c)    10. (b)    11. (b)

**16. Number Series, Analogy and Number Oddman Out**

1. (c)    2. (b)    3. (b)    4. (b)    5. (a)    6. (b)    7. (c)    8. (b)  
 9. (c)    10. (b)    11. (c)    12. (b)    13. (b)    14. (b)    15. (a)    16. (a)  
 17. (b)    18. (d)    19. (b)    20. (b)    21. (c)    22. (b)    23. (725)    24. (45)  
 25. (d)    26. (c)    27. (b)

**17. Letter Series, Analogy, Letter Oddman Out and Coding-Decoding**

1. (d)    2. (a)    3. (c)    4. (c)    5. (c)    6. (c)    7. (a)    8. (d)  
 9. (a)    10. (b)    11. (b)    12. (b)    13. (a)    14. (d)    15. (b)    16. (c)  
 17. (b)    18. (d)    19. (c)    20. (b)    21. (a)    22. (a)    23. (a)    24. (b)  
 25. (a)    26. (d)    27. (b)

**18. Logical Reasoning**

1. (b)    2. (b)    3. (a)    4. (d)    5. (d)    6. (d)    7. (c)    8. (d)  
 9. (c)    10. (a)    11. (d)

**19. Analytical Ability**

1. (c)    2. (b)    3. (c)    4. (c)    5. (c)    6. (c)    7. (d)    8. (a)  
 9. (c)    10. (b)    11. (b)    12. (c)    13. (a)    14. (d)    15. (b)    16. (d)  
 17. (a)    18. (a)    19. (c)    20. (d)    21. (a)    22. (c)

## 20. Previous Years GATE Questions

- |            |            |            |              |              |              |             |
|------------|------------|------------|--------------|--------------|--------------|-------------|
| 1. (d)     | 2. (c)     | 3. (d)     | 4. (b)       | 5. (b)       | 6. (b)       | 7. (d)      |
| 8. (a)     | 9. (d)     | 10. (c)    | 11. (a)      | 12. (c)      | 13. (c)      | 14. (b)     |
| 15. (d)    | 16. (a)    | 17. (b)    | 18. (a)      | 19. (c)      | 20. (b)      | 21. (d)     |
| 22. (c)    | 23. (a)    | 24. (a)    | 25. (d)      | 26. (d)      | 27. (a)      | 28. (a)     |
| 29. (d)    | 30. (d)    | 31. (d)    | 32. (c)      | 33. (d)      | 34. (c)      | 35. (b)     |
| 36. (b)    | 37. (c)    | 38. (d)    | 39. (b)      | 40. (c)      | 41. (a)      | 42. (1300)  |
| 43. (d)    | 44. (b)    | 45. (180)  | 46. (d)      | 47. (b)      | 48. (25)     | 49. (a)     |
| 50. (a)    | 51. (d)    | 52. (c)    | 53. (0.4896) | 54. (a)      | 55. (725)    | 56. (b)     |
| 57. (45)   | 58. (16)   | 59. (d)    | 60. (a)      | 61. (495)    | 62. (d)      | 63. (b)     |
| 64. (560)  | 65. (d)    | 66. (b)    | 67. (c)      | 68. (d)      | 69. (163)    | 70. (d)     |
| 71. (a)    | 72. (b)    | 73. (d)    | 74. (4)      | 75. (20,000) | 76. (0.81)   | 77. (c)     |
| 78. (b)    | 79. (b)    | 80. (22)   | 81. (b)      | 82. (96)     | 83. (d)      | 84. (b)     |
| 85. (c)    | 86. (c)    | 87. (c)    | 88. (850)    | 89. (48)     | 90. (6)      | 91. (d)     |
| 92. (140)  | 93. (a)    | 94. (d)    | 95. (c)      | 96. (c)      | 97. (b)      | 98. (c)     |
| 99. (2006) | 100. (b)   | 101. (b)   | 102. (b)     | 103. (a)     | 104. (d)     | 105. (4536) |
| 106. (d)   | 107. (a)   | 108. (c)   | 109. (c)     | 110. (b)     | 111. (a)     | 112. (b)    |
| 113. (8)   | 114. (a)   | 115. (a)   | 116. (c)     | 117. (32)    | 118. (d)     | 119. (a)    |
| 120. (c)   | 121. (c)   | 122. (3)   | 123. (d)     | 124. (b)     | 125. (d)     | 126. (b)    |
| 127. (800) | 128. (c)   | 129. (a)   | 130. (b)     | 131. (c)     | 132. (2.064) |             |
| 133. (b)   | 134. (b)   | 135. (280) | 136. (c)     | 137. (b)     | 138. (c)     | 139. (a)    |
| 140. (c)   | 141. (c)   | 142. (d)   | 143. (c)     | 144. (c)     | 145. (c)     | 146. (b)    |
| 147. (d)   | 148. (d)   | 149. (c)   | 150. (b)     | 151. (b)     | 152. (c)     | 153. (a)    |
| 154. (d)   | 155. (c)   | 156. (b)   | 157. (a)     | 158. (c)     | 159. (d)     | 160. (b)    |
| 161. (d)   | 162. (b)   | 163. (b)   | 164. (d)     | 165. (b)     | 166. (a)     | 167. (c)    |
| 168. (c)   | 169. (a)   | 170. (a)   | 171. (d)     | 172. (d)     | 173. (c)     | 174. (b)    |
| 175. (c)   | 176. (120) | 177. (a)   | 178. (7)     | 179. (b)     | 180. (b)     | 181. (c)    |
| 182. (c)   | 183. (a)   | 184. (c)   |              |              |              |             |

## 21. Try Yourself

- |          |          |          |            |          |          |              |
|----------|----------|----------|------------|----------|----------|--------------|
| T1. (d)  | T2. (b)  | T3. (c)  | T4. (a)    | T5. (48) | T6. (b)  | T7. (b)      |
| T8. (4)  | T9. (b)  | T10. (d) | T11. (244) | T12. (a) | T13. (b) | T14. (b)     |
| T15. (d) | T16. (b) | T17. (c) | T18. (a)   | T19. (b) | T20. (c) | T21. (1.732) |

**2017**

**MADE EASY WORKBOOK**

**Engg. Mathematics + Reasoning & Aptitude + General English**

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# Preface

Made Easy General English Workbook is a practice workbook prepared in accordance with the syllabus of IES, GATE & PSUs Entrance Examinations.

The units cover the areas in such a manner that students will find the workbook a valuable aid to their English Sessions. This book includes a lot of variety in terms of the Class Exercises which would provide a value addition to the students as well as make them enjoy the exercises as they are solving them.

This workbook is intended to be used in conjunction with the **General English Book of MADE EASY**. The detailed answers and approaches to solve these questions will be discussed at length in the classroom. Some of the exercises in this workbook replicate the step by-step instructions illustrated and interpreted in the General English Book. I recommend that you read each chapter in the General English Book prior to your English Classroom session on the topics covered in the assigned readings.

The Exercises are planned to give students a systematic guidance in developing an understanding of grammatical concepts. The Exercises are purposeful, provide variety and encourage active participation.

## Features of Made Easy English Workbook

- The **topic selection** is based on the areas asked in the English Section of GATE, IES and PSUs as observed over many years.
- The **coverage of topics** is broad, more complete than the limited amount usually provided by books.
- The Exercises go into the **detail of every topic and cover a variety of questions related to that topic**.
- Many real questions of IES and GATE have been included in the exercises so as to give the students an actual feel of what kind of questions appear in different exams.

Enjoy yourself. Despite what you might believe, Learning English can be fun. You will develop new skills and learn about different areas being asked in GATE, IES and PSUs' English Section.

Wishing you All the Best,

MADE EASY Team.

# 1

## Grammar

### 1. Parts of Speech

#### Practice Exercise: (1)

#### (Understanding Building Blocks of English: Parts of Speech)

Directions: Identify Part of Speech of each of the underlined words in the sentences given below:

1. There should be a better way to get from here to Grandma's house.
2. I can work faster without any help.
3. Unfortunately, they haven't been paying on time recently.
5. Art lovers can visit the Metropolitan Museum of Art on the Upper Eastside next to Central Park.
6. However there are a number of places and events that really must be seen and enjoyed if you are in London.
7. To experience the famous eccentric side of British life, make sure to visit Speakers' Corner in Hyde Park.
9. I often feel we've forgotten to communicate with our surroundings.
10. I think we need to rethink how addicted we are becoming for being available to everyone and everything at all times.

#### Practice Exercise: (2)

1. The adverb form of the word "FAST" is \_\_\_\_\_.  
(a) fasting                          (b) fastly  
(c) fast                                (d) fasty
2. The Noun form of the word "CREDULOUS" is \_\_\_\_\_.  
(a) Credulity                        (b) Creed  
(c) Credibility                      (d) Credit
3. The adjective form of the word 'OSTENTATION' is \_\_\_\_\_.  
(a) Ostentatious                    (b) Ostentious  
(c) Ostensibly                      (d) Ostensic
4. The verb form of the word "CONSENSUS".  
(a) Connseense                    (b) Consent  
(c) Consensed                      (d) Consize
5. The verb form of the word "FALTERING" is \_\_\_\_\_.  
(a) Falter                            (b) Faltering  
(c) Faltery                           (d) Falty
6. The verb form of the word "GAG" is \_\_\_\_\_.  
(a) Gaggy                            (b) Gagging  
(c) Gag                              (d) Gags
7. Choose the adverb of the word "HARD".  
(a) Hardly                           (b) Hardened  
(c) Hard                             (d) Hardness
8. He is conspicuously lucky to have got it. The adjective form of the underlined word is \_\_\_\_\_.  
(a) conspicuous                    (b) conspicuousness  
(c) conspicuity                    (d) conspicured
9. Cancer is a fatal disease. The noun form of the underlined word is \_\_\_\_\_.  
(a) fatalism                        (b) fatal  
(c) fatalise                        (d) fatality

**Practice Exercise: (3)**

Find out the error in each of the following sentences, if any. If there is no error, our answer is 'E'.

1. Although he is my bosqm friend, I cannot ask him for money without any vividly reason.  
 (A) (B) (C) (D)

No error  
 (E)

2. The amount which the company has paid to the dependents of the dead worker was fairly unjustified  
 (A) (B) (C) (D)

No error  
 (E)

3. I was thrilled to receive a brown fat leather bound book from my uncle No error  
 (A) (B) (C) (D)

4. The imported articles which you sell are enough costly to allow the pocket

(A) (B) (C)

of an ordinary man to buy them. No error  
 (D) (E)

5. There were only two soldiers but each and every soldier was equal to five policemen  
 (A) (B) (C) (D)

No error  
 (E)

6. Her voice was shaking inspite all her efforts to control it No error  
 (A) (B) (C) (D) (E)

7. Because he is intelligent, therefore everybody likes him No error  
 (A) (B) (C) (D)

8. Supposing if he misses the train, will he come back? No error  
 (A) (B) (C) (D) (E)

9. As soon as the bell rang, then the students rushed out of their class No error  
 (A) (B) (C) (D) (E)

10. He was so ashamed and he left the place No error  
 (A) (B) (C) (D) (E)

**2. Subject Verb Agreement****Practice Exercise: 1)**

1. Rahul's natural ability and his desire to help others has/have led to a career in the ministry.

2. Everybody who signed up for the ski trip was/were taking lessons.

3. Some of our luggage was/were lost.

4. None of his advice make/makes sense.

5. One out of every three sunsets was/were covered with clouds.

6. The teeth in a crocodile's mouth is/are sharp.
7. The leaders of the expedition was/were looking for a campsite.
8. During the trip bread and butter was/were the favourite meal for the two drivers.
9. On the side is/are political correspondents hoping for an interview.
10. The trunk of the elephant and the belly of the hippo make/makes me laugh.

**Practice Exercise: (2)**

Directions: Mark the answer choice that contains an error. If you think, there is no error in the sentence. Mark Choice (D) which is No error.

1. The college Board, as well as the local citizens were pleased with the plans for the new college  
 A B C  
 No error  
 D
2. The intelligence of many wild animals is indeed amazing No error  
 A B C D
3. Every man, woman and child were taken from the town No error  
 A B C D
4. Either a certified cheque on deposit or a valid major credit card is required for one to bid on the goods  
 A B C  
 No error  
 D
6. One of these detergents have proved to be harmful to the delicate skin of the house wife No error  
 A B C D
7. None of the soldiers was able to pass the physical fitness test No error  
 A B C D
8. The principal was displeased to learn that none of the foreign students was majoring in Education of Chemistry No error  
 A B C D
9. Here comes the trainers and the players for both teams No error  
 A B C D
10. Each organization has its own selected officers who conduct the business of the organization No error  
 A B C D
11. This Master book concludes with pages that contain lists of American colleges and universities  
 A B C  
 No error  
 D

**Practice Exercise: (3)**

**(Subject Verb Agreement- Check whether the verb agrees with the given subject)**

**Directions: Identify parts of the sentence/ sentences which are grammatically incorrect.**

1. A. Either the manager or the workers in the factory is incompetent.  
 B. Incompetence often leads to failure.  
 C. Failure as well as incompetence are like the measles.  
 D. Which irritate the able and competent people.  
 E. My boss and mentor advise me to stay away from incompetence.  
 (1) A, C, D and E      (2) A and B  
 (3) Only C      (4) A, C and E  
 (5) Only E
2. A. By the death of Mahatma Gandhi, a great statesman and patriot were lost by India.  
 B. Gandhi was one of the founding social and political leader during the Indian Independence Movement against the British Empire in India.  
 C. Gandhi, along with other leaders like Gokhale, Sarojini Naidu, Tilak and Dadabhai Naroji were instrumental in the fight for Independence.  
 D. Gandhi was not only an astute politician but also a good orator.  
 E. A great statesman and educationist is how most of us remember him.  
 (1) A, B and C      (2) only E  
 (3) D and E      (4) A and B  
 (5) B, D and E
3. A. Five miles are a lot of distance for a nature walk.  
 B. Ten thousand rupees are a good amount for this work.  
 C. The scissor used by the barber for the murder was recovered by the police.  
 D. 10 sheeps were grazing on the meadow.  
 E. 40 years are a good enough age for a man to become the CEO of a company.  
 (1) A, C and E  
 (2) Only B

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- (3) Only C  
 (4) Only D  
 (5) All of the above
4. A. The student council were unanimous in requesting for leniency in the firecracker prank.  
 B. The majority believe that the country can progress.  
 C. The number of residents who have been residing in Santa Vihar are quite small.  
 D. What he believes in and what he practices is two different things.  
 E. His means were much reduced owing to the heavy loss.  
 (1) A, B and C      (2) A, C and D  
 (3) Only E      (4) A, B, C and D  
 (5) All of the above
5. A. Even others whose notions about mortality differ from Moore's seem to share his basic conviction that they can only be intuited, not defined or explained.  
 B. Every form of idealism, Moore noted, rely on the principle expressed by Berkeley in the popular Latin phrase defined by him.  
 C. Along with metaphysics, logic, and ethics, epistemology is one of the four main branch of philosophy have contributed to it.  
 D. During Deng's reign, a series of economic reforms were made.  
 E. Gene Forrester's difficult journey towards maturity and adult world are the main focus of the novel, A Separate Peace, by John Knowles.  
 (1) A and E      (2) B, C and D  
 (3) B, C, D and E      (4) A, C, D, and E  
 (5) All of the above
6. A. Some of the pocket money were used by Rajiv.  
 B. before the remaining went missing.  
 C. The discipline committee have ordered a probe in the matter.  
 D. A thorough search of the suspects' belongings was carried out, and the committee chairman gave a statement, in which he said,

- E. "Neither Rajiv's suitcase nor the other suitcases we checked in the dorm has helped us in our search"  
 (1) A, B and E      (2) A, C and E  
 (3) A, C and D      (4) A, B and C  
 (5) None of the above
7. A. Each of the students must log in to the system using their ID and password.  
 B. If I was you, I wouldn't go there and do that.  
 C. Politics are an issue in R. K. Narayan's Malgudi Days.  
 D. None of the information is particularly useful to me.  
 E. The English plays more football than the Americans.  
 (1) A, C, D, and E      (2) A, B, C and E  
 (3) B, D and E      (4) Only D  
 (5) B and C
8. A. Each of his sisters are clever.  
 B. Slow and steady wins the race.  
 C. 80 miles is too far to travel.  
 D. Neither my flowers nor my garden grows in May.  
 E. Many a traveller are missing.  
 (1) A, B, C      (2) A and E  
 (3) C and D      (4) A, B, D and E  
 (5) None of the above

**3. Verb****Practice Exercise: (1)**

**Directions for question 1 to 10 : Fill in the blank using appropriate form of verb.**

1. When she (start) \_\_\_\_\_ learning English she (already/learn) \_\_\_\_\_ French.
2. Before that day we (never/think) \_\_\_\_\_ of travelling to Japan.
3. They (not/know) \_\_\_\_\_ where to meet because nobody (tell) \_\_\_\_\_ them.
4. Martha (turn) \_\_\_\_\_ of the light and (go) to bed.
5. Unless you (suggest) \_\_\_\_\_ it, I wouldn't have phoned him.

- (c) On Monday, we will live in this guest house for a week.  
 (d) On Monday, we will have lived living in this guest house for a week.
4. (a) We had looked at the portrait for about fifteen minutes before we realised who the artist was.  
 (b) We will have been looking at the portrait for about fifteen minutes before we realised who the artist was.  
 (c) We had been looking at the portrait for about fifteen minutes before we realised who the artist was.  
 (d) We had been looking at the portrait for about fifteen minutes before we will realise who the artist was.
5. (a) Mr Chopra will have decided to speak out after the murder of his Aunt, an opposition activist, three months ago.  
 (b) Mr Chopra will have been deciding to speak out after the murder of his Aunt, an opposition activist, three months ago.  
 (c) Mr Chopra has been deciding to speak out after the murder of his Aunt, an opposition activist, three months ago.  
 (d) Mr Chopra decided to speak out after the murder of his Aunt, an opposition activist, three months ago.
6. (a) During haltime, the teacher told the spectators that a player was injured and needed a doctor's aid.  
 (b) During haltime, the teacher told the spectators that a player had been injured and needed a doctor's aid.  
 (c) During haltime, the teacher told the spectators that a player had been injured and will have needed a doctor's aid.  
 (d) During haltime, the teacher told the spectators that a player has been injured and needed a doctor's aid.
7. (a) A request for more help has been coming from the hospital staff this morning. We will

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**Practice Exercise: (3)**

- Most of the residents were inside the building when it was collapsed. No error  
 (A) (B) (C) (D)
- Does it matters whether a cat is white or black as long as it catches mice? No error  
 (A) (B) (C) (D)
- My friend worked hard with a view to pass the examination No error  
 (A) (B) (C) (D)
- Though it is a month since he has left us, he has not written to us yet,  
and we do not known what he has been doing. No error  
 (A) (B) (C) (D)
- She was ashamed when she remebered that she did not visit her mother for a year No error.  
 (A) (B) (C) (D)
- Respectfully I beg to state that I am suffering from fever for the past fortnight No error.  
 (A) (B) (C) (D)
- I have sent you a letter last month. No error.  
 (A) (B) (C) (D)
- Were they having a car when they were living in Bangalore No error  
 (A) (B) (C) (D)
- When Rima came to India she had to get used to drive on the left No error  
 (A) (B) (C) (D)

**4. Article****Practice Exercise: (1)**

- U.S.A. is richest country of the World.
- gold is a precious metal.
- Honesty is the best policy.
- He is heir of Mughal dynasty.
- He is man whom I met yesterday.
- He was first man to arrive.
- I have black and white dog.
- I go to bed at eight every night.
- It is written in Gita that 'God incarnates himself in times of trouble.'

**Practice Exercise: (2)**

1. I don't like that type of a man who does nothing but find out faults in others. No error  
 (A) (B) (C) (D)
2. When the house was set on the fire, all the people started crying at the top of their voices. No error  
 (A) (B) (C) (D)
3. He is the best artist of the time but unfortunately least recognised. No error  
 (A) (B) (C) (D)
4. The moment Amit was admitted to the hospital the warden decided to inform his parents. No error  
 (A) (B) (C) (D)
5. The most happy marriage would be a union of a deaf man to a blind woman. No error  
 (A) (B) (C) (D)
6. I can't forget \_\_\_\_\_ kindness with which he treated me.

**Practice Exercise: (3)**

1. He is Vivekananda of our college. He gives lucid explanations about lofty things.
2. Higher we go, cooler it is.
3. The teacher knows that cleverer of the two boys is Ravi.
4. What is real essence of life?
5. It has almost been a year, since he joined our institute.
6. You cannot be in this place in the summer.
7. The breakfast should be light, but the breakfast we had this morning was heavy.
8. He is extremely good at playing guitar.
9. I go to college every day to drop my son.
10. English are good at playing cricket.
11. Although the police officer sympathized with poor/he refused to / take an action against the rich man/ NE.

**5. Nouns and Pronouns****Practice Exercise: (1)****Choose the appropriate option:**

1. The scenery of Kashmir \_\_\_\_ (is/are) enchanting.
2. Where \_\_\_\_\_ (is/are) the scissors?
3. The cattle \_\_\_\_\_ (is/are) grazing in the ground.
4. The clergy \_\_\_\_\_ (has/have) visited the church.
5. He is six \_\_\_\_\_ (feet/foot) tall.
6. I want \_\_\_\_\_ (an advice/a piece of advice) from you.
7. One must take care of \_\_\_\_\_ (his/one's) own health.
8. Four \_\_\_\_\_ (hundreds/hundred) miles is a long distance.
9. The manager asked me \_\_\_\_\_ (a cheque/ a leaf of cheque).
10. The \_\_\_\_\_ (off-springs/off spring) of animals are very much dependent on mothers for survival.

**Practice Exercise: (2)**

1. The leaders of our party in this region are not in good terms of each other. No error  
 (A) (B) (C) (D)
2. The analyses of the organization are very reliable. No error  
 (A) (B) (C) (D)
3. Females are not appointed in our college. No error  
 (A) (B) (C) (D)
4. The table's legs have been elaborately carved. No error  
 (A) (B) (C) (D)
5. This misogynist hates all mother in laws lady doctors and house maids. No error  
 (A) (B) (C) (D)
6. There are so many filths all around the place. No error  
 (A) (B) (C) (D)
7. The company has ordered some new equipments. No error  
 (A) (B) (C) (D)
8. Science and religion are both necessary for man and for their outer and inner self respectively. No error  
 (A) (B) (C) (D)
9. One of the most dangerous disease is AIDS. No error  
 (A) (B) (C) (D)
10. John, I and Hari have finished our studies. No error  
 (A) (B) (C) (D)

**6. Question Tags****Moderate level:**

1. I needn't get up early tomorrow, \_\_\_\_ ?
2. Lets go to the beach, \_\_\_\_ ?
3. Somebody has called, \_\_\_\_ ?
4. Few students attended the party, \_\_\_\_ ?
5. She won't receive the guests tomorrow, \_\_\_\_ ?
6. This performance was exceptionally impressive, \_\_\_\_ ?
7. He never sleeps in the afternoon, \_\_\_\_ ?  
 (a) doesn't he? (b) does he  
 (c) isn't he (d) is he

**Advanced level:**

1. Neither of them has completed the task, \_\_\_\_ ?  
(a) from                                  (b) since
2. We must follow the rules, \_\_\_\_ ?  
(c) for
3. None of the students has attended the class, \_\_\_\_ ?  
heart.  
(a) to                                      (b) at
4. He has been preparing for the examination since 2014, \_\_\_\_ ?  
(c) of
5. Little progress was mad, \_\_\_\_ ?  
consideration.  
(a) is                                        (b) out
6. It's obvious that they are trying to cheat us, \_\_\_\_ ?  
(c) from
7. My father suggested that I should be more serious towards my career, \_\_\_\_ ?

**7. Prepositions****Basic level:**

1. There is no cure \_\_\_\_ AIDS.
2. I am suspicious \_\_\_\_ his intensions.
3. The lecture was accompanied \_\_\_\_ subtle analysis of concepts.
4. Life is compared \_\_\_\_ a battle.
5. We are responsible \_\_\_\_ God \_\_\_\_ our actions.
6. You are prohibited \_\_\_\_ taking photographs.
7. We must have the ability to cope \_\_\_\_ adverse situations in life.
8. A terrorist lives \_\_\_\_ the gun.
9. I have no taste \_\_\_\_ painting.
10. I don't agree \_\_\_\_ this proposal.

**Moderate level:****Fill in the blanks:**

1. The British could conquer India because the Indian kings were fighting \_\_\_\_ themselves.  
(a) among                                    (b) between  
(c) with                                      (d) for
2. The history of Hindu religion dates \_\_\_\_ ancient times.  
(a) from                                      (b) since
3. No one believes him because he is false \_\_\_\_ heart.  
(a) to    (b) at
4. Cooperation between friends stens \_\_\_\_ mutual consideration.  
(a) is    (b) out
5. Infact there is no library in our town to speak \_\_\_\_.  
(a) for    (b) about
6. Dishonesty is always determinate \_\_\_\_ progress in life.  
(a) to    (b) for
7. In the long run, drinking proved fatal both \_\_\_\_ his reputation and health.  
(a) for    (b) to
8. Disintegration of the country is inimical \_\_\_\_ the progress of the people.  
(a) to    (b) for
9. He has great antipathy \_\_\_\_ those who are hypocrites.  
(a) for    (b) to
10. As a dancer she has aptitude \_\_\_\_ classical system.  
(a) for    (b) to

**Advance level:**

1. On a holiday Madhu prefers reading \_\_\_\_ than going out visiting friends. No error  
(A)    (B)  
(C)    (D)
2. My brother has ordered for a new book. No error  
(A)    (B)  
(C)    (D)
3. My niece has been married with the richest man of the town. No error  
(A)    (B)  
(C)    (D)
4. All the doctors were puzzled on the strange symptoms reported by the patients. No error  
(A)    (B)  
(C)    (D)
5. When he parted with his sister at London airport there were tears in his eyes. No error  
(A)    (B)  
(C)    (D)
6. He was honorably acquitted from the charge. No error  
(A)    (B)  
(C)    (D)
7. He was very much engaged in his work when the thieves entered into his house  
(A)    (B)  
(C)    (D)  
and took away a lot of things. No error  
(E)
8. Somebody reported to me that a boy has fallen in the well and nobody had tried to save him. No error  
(A)    (B)  
(C)    (D)  
(E)
9. He wants to resign his job because he is unable to cope up with the work pressure at the office  
(A)    (B)  
(C)    (D)  
No error  
(D)
10. Despite of air few in some areas, minor communal incidents were reported  
(A)    (B)  
(C)    (D)  
from different areas of the walled city. No error  
(E)

## 8. Conditional Sentences

### (Conditional Sentences)

Directions for Qs 1 to 15: Complete each sentence below by filling the correct form of the verb.

- If the airplane had not had a mechanical problem, we probably \_\_\_\_\_ (arrive) in Delhi by now.  
 (A) Had arrived  
 (B) Would have arrived  
 (C) Would arrive  
 (D) Will arrive
- We \_\_\_\_ (lie) on the airport of Mumbai right now if we had been able to get our visas on time.  
 (A) Would lie  
 (B) Would have lied  
 (C) Will lie  
 (D) Would be lying
- If Delhi Administration \_\_\_\_\_ (expand) the parking lot space, we would not have to park so far away from the movie theatre.  
 (A) Expanded  
 (B) Had expanded  
 (C) Would expand  
 (D) Would have expanded
- Whenever my roommate \_\_\_\_\_ (snore) loudly, I cannot sleep.  
 (A) Snores  
 (B) Will snore  
 (C) Would snore  
 (D) Would have snored
- Children may be disappointed if they \_\_\_\_\_ (not receive) good grades.  
 (A) Don't receive  
 (B) Didn't receive  
 (C) Hadn't received  
 (D) Would not have received

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- If we \_\_\_\_\_ (not take) an exam on the conditional, we might not have learned it.  
 (A) Had not taken  
 (B) Did not take  
 (C) Do not take  
 (D) Would not have taken
- Maya \_\_\_\_\_ (not pass) her driving test unless she calms down.  
 (A) Doesn't pass  
 (B) Didn't pass  
 (C) Will not pass  
 (D) Wouldn't be passing
- If it \_\_\_\_\_ (be) winter, all these trees would be covered in snow.  
 (A) Was  
 (B) Were  
 (C) Would be  
 (D) Would have been
- Had it not rained, the farmers \_\_\_\_\_ (lose) all of their crops.  
 (A) Would be losing  
 (B) Would lose  
 (C) Would have lost  
 (D) Will have lost
- I \_\_\_\_\_ (try) to find more opportunities to write in English if I were you.  
 (A) Would have tried  
 (B) Will try  
 (C) Will be trying  
 (D) Would try
- If I had more time, I \_\_\_\_\_ (come) to your party yesterday.  
 (A) Would come  
 (B) Come  
 (C) Came  
 (D) Will come
- It \_\_\_\_\_ (be) silly if we tried to walk there.  
 (A) Would be  
 (B) Will be  
 (C) Would have been  
 (D) Had been

- I \_\_\_\_\_ (watch) the film only if the reviews are good.  
 (A) Would watch  
 (B) Will watch  
 (C) Would be watching  
 (D) Will have watched
- She'd have taken me to the station if her car \_\_\_\_\_ (break) down.  
 (A) Hadn't broken  
 (B) Wouldn't have broken  
 (C) Wouldn't break  
 (D) Won't have broken
- If you don't ask, he \_\_\_\_\_ (help) you.  
 (A) Won't help  
 (B) Wouldn't help  
 (C) Wouldn't have helped  
 (D) Wouldn't be helping

## 9. Parallelism

### (Parallel Constructions)

Directions for questions 1 to 10: Each of the given statement has an error, replace it with the best option.

- The mathematics section was both rigorous and a challenge.  
 (a) The mathematics section was a both rigorous and a challenge.  
 (b) The mathematics section was both rigorous and challenging.  
 (c) The mathematics section was both rigorously and challenging.  
 (d) The mathematics section was both a rigorous and a challenge.
- During his trip to UK, the President will discuss ways to stimulate trade, offer economic aid, and trying to forge a new coalition with moderate forces in Afghanistan.  
 (a) During his trip to UK, the President will discuss ways to stimulating trade, offer economic aid and trying to forge a new coalition with moderate forces in Afghanistan.  
 (b) During his trip to UK, the President will be discussing ways to stimulate trade, offer economic aid and try to forge a new coalition with moderate forces in Afghanistan.  
 (c) During his trip to UK, the President will discuss ways to stimulate trade, offer economic aid and try to forge a new coalition with moderate forces in Afghanistan.  
 (d) During his trip to UK, the President will be discussing ways to stimulate trade, offer economic aid and try to forge a new coalition with moderate forces in Afghanistan.
- Johnny told the director that he had been pulled out of a line of fast-moving traffic and he was having a perfect driving record.  
 (a) Johnny told the director that he had been pulled out of a line of fast-moving traffic and he had been having a perfect driving record.  
 (b) Johnny told the director that he had been pulled out of a line of fast-moving traffic while he was having a perfect driving record.  
 (c) Johnny told the director that he had been pulling out of a line of fast-moving traffic and he had a perfect driving record.  
 (d) Johnny told the director that he had been pulled out of a line of fast-moving traffic and he had a perfect driving record.
- His arguments were boring, childish and showed how ignorant he was.  
 (a) His arguments were boring, childish and showed his ignorance.  
 (b) His arguments were boring, childish and ignorant.  
 (c) His arguments bored, childish and ignorant.  
 (d) His arguments were bored, childish and ignorant.
- To accept, that one is an addict is taking the first and the hardest step to recovery.  
 (a) To accepting, that one is an addict is taking the first and the hardest step to recovery.  
 (b) To accept, that one is an addict is to taking the first and the hardest step to recovery.  
 (c) To accept, that one is an addict is to take the first and the hardest step to recovery.  
 (d) To accept, that one is an addict is not taking the first and the hardest step to recovery.

6. She worked late in the night not only to catch up on her studies, but also typing her assignment.
- She worked late in the night not only to catch up on her studies, but also to typing her assignment.
  - She worked late in the night not only to catch up on her studies, but also will be typing her assignment.
  - She worked late in the night not only catching up on her studies, but also to type her assignment.
  - She worked late in the night not only to catch up on her studies, but also to type her assignment.

7. I want to learn how to drive a car, be a captain of a ship, and how to speak Burmese.

- I want to learn how to driving a car, be a captain of a ship, and how to speak Burmese.
- I want to learn how to be able to drive a car, captaining of a ship, and how to speak Burmese.
- I want to learn how to drive a car, become the captain of a ship, and how to speak Burmese.
- I want to learn how to drive a car, to captain a ship, and to speak Burmese.

8. It is better to tell the truth than lying to your family and friends.

- It is better to tell the truthful than lying to your family and friends.
- It is better to truth than lie to your family and friends.
- It is better to tell the truth than to lie to your family and friends.
- It is better to tell the truth than lying to your family and friends.

## 10. Miscellaneous

Practice Exercise: (1)

1. Hardly the inspector had arrived there to investigate the crime  
 (A) (B)  
when the house was set ablaze No error  
 (C) (D)

2. He lay the watch on the table and then forgot all about it when he went out. No error  
 (A) (B) (C) (D)

3. Being a sunny day I decided to skip work and stay at home. No error  
 (A) (B) (C) (D)
4. The company not only manufactures leather goods but also plastic ware. No error  
 (A) (B) (C) (D)
5. In future when I shall meet you I shall explain the causes of solar and lunar eclipses. No error  
 (A) (B) (C) (D)
6. He has left home yesterday, though there was no need for him to do so. No error  
 (A) (B) (C) (D)
7. Since I drew his attention to some of his faults he became angry upon me  
 (A) (B)  
but I have great regard for him. No error  
 (C) (D)
8. No sooner did the cat move away when the mice began to play. No error  
 (A) (B) (C) (D)
9. He walked till the end of the street. No error  
 (A) (B) (C) (D)
10. He lost his new knife shortly after he bought it. No error  
 (A) (B) (C) (D)
11. Many a student are frustrated because of unemployment. No error  
 (A) (B) (C) (D)
12. The articles should not exceed more than five hundred words. No error  
 (A) (B) (C) (D)
13. The Chief Minister couldn't but help shedding tears at the plight of the  
 (A) (B)  
villagers rendered homeless by a devastating cyclone. No error  
 (C) (D)
14. Emphasis on equality of life ensures for the health and happiness of every individual. No error  
 (A) (B) (C) (D)
15. Please understand that the dispute on this issue is between my brother and myself  
 (A) (B)  
and concerns no body else. No error  
 (C) (D)
16. There were gapes of horror from the spectators as the performer fell from the tightrope. No error  
 (A) (B) (C) (D)

17. She gazed at me in misbelief when I told her the news. No error  
 (A) (B) (C) (D)
18. Acting from inside information the police were able to arrest the gang before the robbery occurred. No error  
 (A) (B)  
 (C) (D)
19. She wanted to be an actress, but her father soon nipped that idea in the bud. No error  
 (A) (B) (C) (D)
20. As monsoon failed this year drinking water will be supplied on alternative days. No error  
 (A) (B) (C) (D)
21. Many a student in our college are extremely fond of the new game. No error  
 (A) (B) (C) (D)
22. During India's struggle for freedom many brilliant students gave up their studies by Mahatma Gandhi's call. No error  
 (A) (B)  
 (C) (D)
23. The world we live presents an infinite variety of experiences everyday. No error  
 (A) (B) (C) (D)
24. Any meaningful discussion of national integration must take stock about the tendencies which threaten it. No error  
 (A) (B)  
 (C) (D)
25. The lion told the fox the he is very weak and that he had no appetite. No error  
 (A) (B) (C) (D)
26. The travller was no hungry that he gulped all the food placed over the table. No error  
 (A) (B) (C) (D)
27. You may have to regret later if you do not start living within your mean. No error  
 (A) (B) (C) (D)
28. What made him to do it, or who provoked him is still not known. No error  
 (A) (B) (C) (D)
29. The job wasn't interesting but on the contrary it was well paid. No error  
 (A) (B) (C) (D)
30. How birds know when to fly south for the winter? No error  
 (A) (B) (C) (D)

31. These are his conclusion remarks. No error  
 (A) (B) (C) (D)
32. The shopkeeper either offered to exchange the goods or refund the money. No error  
 (A) (B) (C) (D)
33. Churchill was one of the greatest war leaders. No error  
 (A) (B) (C) (D)
34. We should keep such people at an arm's length. No error  
 (A) (B) (C) (D)
35. That was very dangerous; you might have been killed. No error  
 (A) (B) (C) (D)
36. I started early for the station lest I should not miss the train. No error  
 (A) (B) (C) (D)
37. They made him treasurer because they considered him as honest and efficient. No error  
 (A) (B) (C) (D)
38. The President reached back this morning after a visit to the southern States. No error  
 (A) (B) (C) (D)
39. Egyptian cotton is superior than Indian. No error  
 (A) (B) (C) (D)
40. Your shirt looks so good. Where you bought it from? No error  
 (A) (B) (C) (D)
41. A miser man spends very little even on food. No error  
 (A) (B) (C) (D)
42. All the glitters is not gold. No error  
 (A) (B) (C) (D)
43. The administrator is entrusted the responsibility of the overall management of an industry while the technical personnel remain advisors to the administration. No error  
 (A) (B)  
 (C) (D)
44. My friend worked hard with a view to pass the examination. No error  
 (A) (B) (C) (D)
45. We shall see him after the dinner. No error  
 (A) (B) (C) (D)
46. He looked up into the matter with keen interest. No error  
 (A) (B) (C) (D)

47. He went to the house is and I followed with him. No error  
 (A) (B) (C) (D)
48. My oldest son is coming back from the USA this month. No error  
 (A) (B) (C) (D)
49. The police entered into the house and questioned the head of the family about the theft. No error  
 (A) (B) (C) (D)

**Practice Exercise: (2)**

1. Either Ram or you is responsible for this action. No error  
 (a) (b) (c) (d)
2. By the time you arrive tomorrow I have finished my work. No error  
 (a) (b) (c) (d)
3. The captain with the members of his team are returning after a fortnight. No error  
 (a) (b) (c) (d)
4. After returning from an all-India tour I had to describe about it. No error  
 (a) (b) (c) (d)
5. The teacher asked his students if they had gone through either of the three chapters included in the prescribed text. No error  
 (a) (b) (c) (d)
6. Although they are living in the country since they were married.  
 (a) (b)  
 they are now moving to the town No error  
 (c) (d)
7. Do you know how old were you when you came here? No error  
 (a) (b) (c) (d)
8. None of the applicants have turned up for the interview on time. No error  
 (a) (b) (c) (d)
9. Her mother did not reply when I asked her why was she weeping. No error  
 (a) (b) (c) (d)
10. The oxygen content of Mars is not sufficient enough to support life as we know it. No error  
 (a) (b) (c) (d)

11. He told his friends that each of them should be able to carry out the orders oneself. No error  
 (a) (b) (c) (d)
12. If the police would have worked in time the riot would not have occurred. No error  
 (a) (b) (c) (d)
13. The flag is risen in the morning and taken down at night by the guards. No error  
 (a) (b) (c) (d)
14. I have seen him going to the theatre with his friends yesterday evening. No error  
 (a) (b) (c) (d)
15. He was charged of murder though the evidence did every thing to convince the judge of his innocence. No error  
 (a) (b) (c) (d)
16. Neither he nor his brother is a good student but both are good players. No error  
 (a) (b) (c) (d)
17. Suppose if you were left alone to live on a desert island what would you do? No error  
 (a) (b) (c) (d)
18. He wondered that what would be the next move of his opponents who had vowed to see him dislodged from power. No error  
 (a) (b) (c) (d)
19. The nation should be grateful to the armed forces for protecting them. No error  
 (a) (b) (c) (d)
20. I do not know what is he doing to solve the problem. No error  
 (a) (b) (c) (d)
21. For so many years it is almost his habit to go to the bed at 10 p.m. daily. No error  
 (a) (b) (c) (d)
22. He took down after his father. No error  
 (a) (b) (c) (d)
23. His honesty has never been called the question. No error  
 (a) (b) (c) (d)



## Vocabulary

### 1. Synonyms

#### Practice Exercise: (1)

1. BEMOAN
 

(a) Lament	(b) Pacify
(c) Request	(d) Imagine
2. PROSAIC
 

(a) Dull and ordinary	(b) Slow and steady
(c) Grand	(d) Precious
3. OMINOUS
 

(a) Helpless	(b) Humble
(c) Restless	(d) Sinister
4. ELOQUENT
 

(a) Ambiguous	(b) Graceful
(c) Fluent	(d) Productive
5. FRAIL
 

(a) Astute	(b) Delicate
(c) Foolish	(d) Immature
6. DERELICT
 

(a) Derogatory	(b) Depressing
(c) Ramshackle	(d) Sluggish
7. INJUNCTION
 

(a) Bruise	(b) Injustice
(c) Ruling	(d) Reproach
8. IMPOLE
 

(a) Entreat	(b) Put into practice
(c) Interfere	(d) Transmit

#### 9. GROTESQUE

- |               |               |
|---------------|---------------|
| (a) Boring    | (b) Gripping  |
| (c) Monstrous | (d) Obnoxious |

#### 10. PERTINENT

- |                |              |
|----------------|--------------|
| (a) Dependable | (b) Relevant |
| (c) Remarkable | (d) Sensible |

#### Practice Exercise: (2)

1. A judicious use of resources is necessary for planned development.
 

(a) biased	(b) sensible
(c) exact	(d) honest
2. No one knows exactly what transpired at the meeting of the two captains.
 

(a) was communicated	(b) was discussed
(c) happened	(d) conspired
3. She is obstinate in refusing to see a doctor.
 

(a) foolish	(b) unyielding
(c) unreasonable	(d) mischievous
4. Though she has two maidservants, she is always busy attending to sundry household tasks.
 

(a) countless	(b) various
(c) certain	(d) several
5. He is prepared to undertake even menial jobs.
 

(a) lowly	(b) tough
(c) dangerous	(d) low-paid
6. The new policy will provide added impetus to the development programs.
 

(a) financial support	(b) accelerated growth
(c) retarded growth	(d) driving force

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7. Let us try to emulate the great man's achievements.
 

(a) praise	(b) find out
(c) follow	(d) assess
  8. He soon got fed up with his sedentary job.
 

(a) involving sitting	(b) routine
(c) roving	(d) drab
  9. One must not be callous to women folk.
 

(a) kind	(b) hard hearted
(c) arrogant	(d) proud
  10. In exasperation she railed at the shopkeeper.
 

(a) irritation	(b) fear
(c) astonishment	(d) disappointment

#### Practice Exercise: (3)

1. Furtive glances were exchanged between the lovers at the feast.
 

(a) unknown	(b) secret
(c) unsuspecting	(d) clandestine
2. The newspapers are clamouring against the injustice to the landless labourers.
 

(a) protesting	(b) noising
(c) complaining	(d) demonstrating
3. The resignation of the Chief Minister is intriguing.
 

(a) curious	(b) interesting
(c) secret	(d) diplomatic
4. Mohinder Amarnath had penchant for hook shots.
 

(a) art	(b) inclination
(c) helpless	(d) desire
5. This is a lucrative business.
 

(a) profitable	(b) dangerous
(c) challenging	(d) questionable
6. Improvident
 

(a) Shabby	(b) Incapable of proof
(c) Prophetic	(d) Thriftless
7. Ostracize
 

(a) To exclude	(b) To show off
(c) To point out	(d) To offend

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8. Pejorative
 

(a) Arduous	
(b) Disparaging	
(c) Exorbitantly costly	
(d) Extrovert	

9. Garner
 

(a) Compute	(b) Collect
(c) Prevent	(d) Assist
10. Miffed
 

(a) Annoyed	(b) Arrested
(c) Neglected	(d) Orthodox

#### Practice Exercise: (4)

1. Sleuth
 

(a) Warrior	(b) Ghost
(c) Detective	(d) Sailor
2. Insolent
 

(a) Impure	(b) Extremely rude
(c) Extremely poor	(d) Insoluble
3. Caprice
 

(a) Resoluteness	
(b) Joke	
(c) Sudden change in attitude	
(d) Attraction	
4. Surreptitious
 

(a) Deceitful	(b) Savoury
(c) Inskipid	(d) Painful
5. Exaction
 

(a) Demand	(b) Aggravation
(c) Accuracy	(d) Collaboration
6. Wraith
 

(a) Dead body	(b) Ghost
(c) Extreme anger	(d) Circle of flowers
7. Escalate
 

(a) Rise	(b) Diminish
(c) Roll on	(d) Spiral
8. Alacrity
 

(a) Cleanliness	(b) Cleverness
(c) Eagerness	(d) Reluctance

9. **Incessant**  
(a) Uncertain (b) Ceaseless  
(c) Unshaken (d) Successive
10. **Clemency**  
(a) Harshness (b) Mercy  
(c) Stiffness (d) Seriousness

**Practice Exercise: (5)**

1. **Bemoan**  
(a) Lament (b) Pacify  
(c) Request (d) Imagine
2. **Incumbent**  
(a) Mandatory (b) Present  
(c) Incapable (d) Officious
3. **Ploys**  
(a) Surveys (b) Entreaties  
(c) Reuse (d) Sliders
4. **Aggrieved**  
(a) Vindicated (b) Intimidated  
(c) Offensive (d) Wronged
5. **Plethora**  
(a) Death (b) Missing  
(c) Superfamous (d) Sufficient
6. **Allocation**  
(a) Divide (b) Decide  
(c) Cut (d) Squabble
7. **Sacrosanct**  
(a) Prayer (b) Sanctuary  
(c) Pious (d) Sacred

**2. Antonyms****Practice Exercise: (1)**

1. **Craven**  
(a) Direct (b) Desirous  
(c) Bold (d) Controlled

2. **Carping**  
(a) Rapid (b) Uncritical  
(c) Illegal (d) Terse
3. **Sage**  
(a) Fool (b) Miser  
(c) Zealot (d) Braggart
4. **Amelioration**  
(a) Prevention (b) Indifference  
(c) Dissuasion (d) Aggravation
5. **Alacrity**  
(a) Courtesy (b) Slowness  
(c) Plenty (d) Despair
6. **Assuage**  
(a) Describe (b) Introduce  
(c) Worsen (d) Wince
7. **Bland**  
(a) Caustic (b) Meagre  
(c) Uncooked (d) Helpless
8. **Latent**  
(a) Trim (b) Forbidding  
(c) Early (d) Obvious
9. **Jaded**  
(a) Upright (b) Stimulated  
(c) Void (d) Aspiring
10. **Lampoon**  
(a) Abandon (b) Praise  
(c) Darken (d) Sail

**Practice Exercise: (2)**

1. **Spunk**  
(a) Success (b) Lack of intelligence  
(c) Timidity (d) Loss of prestige
2. **Hiatus**  
(a) Fashionable (b) Continuity  
(c) Impression (d) Expansion
3. **Hearsay**  
(a) Precious (b) Authentic  
(c) Estimate (d) Indecent

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4. **Deft**  
(a) Subordinate (b) Scholarly  
(c) Arrogant (d) Clumsy
5. **Implicate**  
(a) Exonerate (b) Exceptional  
(c) Explicit (d) Embarrass
6. **Veneration**  
(a) Unison (b) Cowardice  
(c) Disrespect (d) Appalling
7. **Thwart**  
(a) Obstruct (b) Encourage  
(c) Shine (d) Avoid
8. **Tenuous**  
(a) Self-restrained (b) Mystifying  
(c) Non-sticky (d) Substantial
9. **Vehemence**  
(a) Apathy (b) Passion  
(c) Risk (d) Disturbance
10. **Vexed**  
(a) Oily (b) Delightful  
(c) Volatile (d) Loyal

**Practice Exercise: (3)**

1. **Unbridled**  
(a) Restrained (b) Arrogant  
(c) Diligent (d) Admired
2. **Erudite**  
(a) Unflappable (b) Ignoramus  
(c) Coward (d) Enthusiastic
3. **Approbation**  
(a) Support (b) Prediction  
(c) Uncertainty (d) disapproval
4. **Contumacious**  
(a) Astute (b) Pliable  
(c) Stoical (d) Humorous
5. **Sterile**  
(a) Imbecile (b) Solitary  
(c) Fertile (d) Unscrupulous

6. **Prodigious**  
(a) Careless (b) Negligible  
(c) Miserly (d) Critical
7. **Assiduity**  
(a) Moroseness (b) Mortification  
(c) Judiciousness (d) Lack of careful attention to a task
8. **Choleric**  
(a) Unreasonable (b) Even-tempered  
(c) Quarrelsome (d) Weird
9. **Supercilious**  
(a) Excited (b) Modest  
(c) Fatigued (d) An improved version
10. **Inchoate**  
(a) Articulate (b) Corruptible  
(c) Fully developed (d) Sincere

**Practice Exercise: (4)**

1. **PAROCHIAL**  
(a) Broad-minded (b) Contradictory  
(c) Paranoid (d) Overriding
2. **FICKLE**  
(a) Belligerent (b) Constant  
(c) Disinterested (d) Proud
3. **DISGRUNTLED**  
(a) Contended (b) Detached  
(c) Obedient (d) Vigorous
4. **VIBRANT**  
(a) Feel aggrieved at (b) Occasional  
(c) Pale (d) Shabby
5. **FORBIDDING**  
(a) Declaring (b) Forcing  
(c) Exposing (d) Inviting
6. **REPRIMAND**  
(a) Bequeath (b) Petition  
(c) Praise (d) Scold
7. **LUSH**  
(a) Cramped (b) Ridiculous  
(c) Rampant (d) Sparse
8. **TENTATIVE**  
(a) Definite (b) Outdated  
(c) Preliminary (d) Universal

**9. MARVELLOUS**

- (a) Awful                          (b) Contentious  
 (c) Fictitious                      (d) Malicious

**10. PASSIONATE**

- (a) Abnormal                      (b) Apathetic  
 (c) Oppressive                    (d) Superficial

**Practice Exercise: (5)**

1. He failed in many interviews because of his diffidence.

- (a) boldness                      (b) outspokenness  
 (c) fluency                        (d) obstinacy

2. The manner in which the inquiry was conducted can only be described as superficial.

- (a) careful                        (b) detailed  
 (c) thorough                      (d) casual

3. She is very reckless in her financial affairs.

- (a) careful                        (b) frank  
 (c) diffident                     (d) smart

4. His heart was full of scorn for the boys in his class.

- (a) contempt                     (b) joy  
 (c) admiration                   (d) pity

5. A grandiose speech was delivered by the orator at the inaugural function.

- (a) simple                        (b) false  
 (c) ideal                           (d) proud

6. After all, the mistake committed by him is trivial.

- (a) serious                       (b) violent  
 (c) wild                           (d) unimportant

7. The lurid atmosphere in the hall frightened him.

- (a) dismal                        (b) mild  
 (c) murky                        (d) mysterious

8. As he grew older, he became more loquacious.

- (a) reserved                      (b) miserly  
 (c) eloquent                     (d) healthy

9. His unscrupulous pursuit of wealth finally landed him in the prison.

- (a) conscientious               (b) dedicated  
 (c) single-minded               (d) superfluous

10. The court ordered the police to confiscate all the documents relating to the deal.

- (a) produce                      (b) release  
 (c) destroy                      (d) exhibit

**3. Analogies****Practice Exercise: (1)****1. GULLIBLE: DUPED**

- (a) Architect : Blueprint  
 (b) Miser : Penurious  
 (c) Malleable : Moulded  
 (d) Articulate : Silenced

**2. EULOGY: BLAME**

- (a) Impulsive : Reflection  
 (b) Testimony : Court  
 (c) Tirade : Abuse  
 (d) Benediction : Curse

**3. ROUT: DEFEAT**

- (a) Celebrity : Wealthy  
 (b) Ovation : Applause  
 (c) Testify : Witness  
 (d) Tepid : Temperance

**4. SKINFLINT: STINGY**

- (a) Diehard : Stubborn  
 (b) Braggart : Carefree  
 (c) Wicked : Survive  
 (d) Wrathful : Ire

**5. INDOLENT: WORK**

- (a) Decisive : Act  
 (b) Intolerable : Defect  
 (c) Taciturn : Speak  
 (d) Confide : Tell

**6. FIRE: ASHES**

- (a) Road : Vehicles  
 (b) Event : Memories  
 (c) Water : Waves  
 (d) Soldier : Ambush

**7. FOX: CUNNING**

- (a) Beaver : Industrious  
 (b) Dog : Playful  
 (c) Dismiss : Jury  
 (d) Diehard : Quit

**8. EVENTS: CONTEMPORANEOUS**

- (a) Measures : Temporary  
 (b) Objects : Adjacent  
 (c) Steps : Repetitive  
 (d) Times : Victories

**9. PUNISHMENT: MITIGATE**

- (a) Mandate : Execute  
 (b) Wealth : Aggregate  
 (c) Sentence : Commute  
 (d) Fine : Collect

**10. SKULDUGGERY: SWINDLER**

- (a) Chicanery : Trickster  
 (b) Forgery : Speculator  
 (c) Quandary : Craven  
 (d) Surgery : Quack

**11. MINATORY: THREATEN**

- (a) Salutary : Greet  
 (b) Defamatory : Publicize  
 (c) Mandatory : Complete  
 (d) Laudatory : Praise

**12. RAMSHACKLE: SOUNDNESS**

- (a) Humdrum : Monotony  
 (b) Garbled : Clarity  
 (c) Flimsy : Transparency  
 (d) Steadfast : Speed

**13. DISPASSIONATE: PARTISANSHIP**

- (a) Disconsolate : Sorrow  
 (b) Ardent : Involvement  
 (c) Enthusiastic : Zealousness  
 (d) Intemperate : Moderation

**14. LAUGH: GUFFAW**

- (a) Drink : Sip  
 (b) Quarrel : Squabble  
 (c) Cough : Sneeze  
 (d) Deluge : Tickle

**15. CALLOW: MATURITY**

- (a) Eager : Anxiety  
 (b) Incipient : Fruition  
 (c) Apathetic : Disinterest  
 (d) Exposure : Weathering

**16. DAMPEN: ENTHUSIASM**

- (a) Moisten : Throat  
 (b) Test : Commitment  
 (c) Reverse : Direction  
 (d) Mute : Sound

**17. RUFFLE: COMPOSURE**

- (a) Flourish : Prosperity  
 (b) Adjust : Balance  
 (c) Upset : Equilibrium  
 (d) Chaff : Wheat

**18. LATENT: MANIFESTATION**

- (a) Dormant : Awakening  
 (b) Patent : Appearance  
 (c) Redoubtable : Impress  
 (d) Aggrieved : Distress

**19. CELERITY: SNAIL**

- (a) Indolence : Sloth  
 (b) Humility : Peacock  
 (c) Nervous : Energy  
 (d) Emulation : Rivalry

**Practice Exercise: (2)****1. Bereaved : Condolences**

- (a) guilty : trial  
 (b) victorious : plunder  
 (c) robbed : insurance  
 (d) destitute : charity

**2. Nibble : Bite**

- (a) swallow : gulp              (b) job : spring  
 (c) call : holler                (d) smile : laugh

**3. Lungs : Blood**

- (a) chest : heart               (b) arteries : veins  
 (c) carburetor : gasoline    (d) carburetor : car

**4. Water : Conduit**

- (a) rifle : shells               (b) breath : nostrils  
 (c) falter : waver             (d) divine : earthly

**5. Progeny : Progenitor**

- (a) creation : artist           (b) children : parent  
 (c) merchandise : manufacturer    (d) fruit : slice

6. Believer : Fanatic  
 (a) religious : atheist (b) fir : intransigent  
 (c) dominate : yield (d) proclaim : announce
7. Design : Intricate  
 (a) scrap : general (b) dress : ornate  
 (c) frills : border (d) heritage : rich
8. Petite : Mammoth  
 (a) curious : yearning  
 (b) compact : clumsy  
 (c) avalanche : snow  
 (d) friend : acquaintance
9. Dilettante : Meticulous  
 (a) spendthrift : money  
 (b) vagabond : gaudy  
 (c) cheat : honest  
 (d) thinker : practical
10. Perfection : Utopian  
 (a) consumption : epicurean  
 (b) excellence : sincerity  
 (c) alternative : remedy  
 (d) songs : saintly
11. Gentry : Aristocracy  
 (a) serfs : slaves  
 (b) bourgeois : craftsman  
 (c) barons : noblemen  
 (d) servant : domestics
12. Estrangement : Divorce  
 (a) drug : soothe (b) marriage : bind  
 (c) jail : prison (d) death : lament
13. Order : Anarchy  
 (a) amicable : hostile  
 (b) amenable : responsive  
 (c) quiet : noisy  
 (d) mend : destroy
14. Sample : Universe  
 (a) Plan : Research  
 (b) Individual : Population  
 (c) Mathematics : Statistics  
 (d) Element : Electron  
 (e) tactic : Strategy

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15. Carbohydrates : Obesity  
 (a) Aversion : Regression  
 (b) Sugar : Cavities  
 (c) Pressure : Extrusion  
 (d) Hostility : War  
 (e) Sickness : Hospital
16. Addicted : Dedicated  
 (a) Slavish : Kindly  
 (b) Fanatical : Enthusiastic  
 (c) Acute : Chronic  
 (d) Temporary : Permanent
17. Quixotic : Feasible  
 (a) Sudden : Workable  
 (b) Theoretical : Practical  
 (c) Fashionable : Efficient  
 (d) Precise : Practicable  
 (e) Sad : Adept
18. Anthology : Poems  
 (a) Antipasto : Hors-d' oeuvre  
 (b) Volume : Book  
 (c) Encyclopedia : Words  
 (d) Thesaurus : Synonyms  
 (e) Medley : Arrangement
19. Anhydrous : Saturated  
 (a) Dry : Wet (b) Sweet : Wet  
 (c) Cloying : Full (d) Solid : Liquid  
 (e) Physics : Chemistry
20. Actor : Soliloquy  
 (a) Playwright : Tragedy  
 (b) Director : Movie  
 (c) Musician : Solo  
 (d) Drummer : March

**Practice Exercise: (3)**

1. Ernest : Immoral  
 (a) Land : Evil  
 (b) Dissolute : Lascivious  
 (c) Restrained : Wanton  
 (d) Shore : Reef  
 (e) Conscience : Sin

2. Sad : Dolorous  
 (a) Rich : Wealthy (b) Smart : Smattering  
 (c) Grief : Healthy (d) Giver : Free  
 (e) Gratitude
3. Naive : Ingenuous  
 (a) Ordinary : Ingenious  
 (b) Old : Wise  
 (c) Simple : Kind  
 (d) Eager : Reserved  
 (e) Sophisticated : Urbane
4. Bread : Oven  
 (a) Ceramics : Kiln (b) Silo : Corn  
 (c) Pottery : Wheel (d) Iron : Furnace  
 (e) Cake : Stove
5. Abundance : Luxury  
 (a) Silence : Stealth  
 (b) Humility : Pretension  
 (c) Poverty : Indigence  
 (d) Pilot : Plane  
 (e) Wealth : Miserliness
6. Cynosure : Brilliant  
 (a) Student : Attentive  
 (b) Map : Legible  
 (c) Rock : Large  
 (d) Word : Common  
 (e) Magnet : Attractive
7. Mendicant : Impecunious  
 (a) Critic : Quizzical  
 (b) Complainier : Petulant  
 (c) Hat : Askew  
 (d) Liar : Poor  
 (e) Philanthropist : Prodigal
8. Always : Never  
 (a) Often : Rarely  
 (b) Frequently : Occasionally  
 (c) Constantly : Frequently  
 (d) Intermittently : Casually  
 (e) Occasionally : Constantly
9. Permanent : Evanescence  
 (a) Durable : Fleeting  
 (b) Lasting : Glittering  
 (c) Eternal : Everlasting  
 (d) Hairdo : Bleach  
 (e) Leader : Religion
10. Ornithologist : Birds  
 (a) Aquarium : Fish  
 (b) Anthropologist : Insects  
 (c) Archaeologist : Artifacts  
 (d) Architect : Buildings  
 (e) Botanist : Animals
11. Vindicable : Reprehensible  
 (a) Mild : Serious (b) Bitter : Sad  
 (c) Mild : Mad (d) Solid : Porous  
 (e) Vivid : Dull
12. Sonnet : Line  
 (a) Ballad : Poetry (b) Symphony : Harmony  
 (c) Novel : Chapter (d) Game : Score  
 (e) Epic : Ode
13. Mad : Insane  
 (a) Healthy : Fat (b) Brave : Tumid  
 (c) Red : Green (d) Slim : Thin
14. Vindicable : Reprehensible  
 (a) Bitter : Sad (b) Mild : Serious  
 (c) Solid : Porous (d) Vivid : Dull
15. Scales : Justice  
 (a) Weights : Measures  
 (b) Markets : Courts  
 (c) Torch : Liberty  
 (d) Laurel : Peace
16. Falcon : Bird :: Toad :  
 (a) Frog (b) Water  
 (c) Snake (d) Pond
17. Fortitude : Resolution  
 (a) Timidity : Cowardice  
 (b) Heroics : Stoicism  
 (c) Medal : Bravery  
 (d) Poem : Poet  
 (e) Plan : Execution
18. Abhorrence : Distaste  
 (a) Shower : Deluge  
 (b) Ecstasy : Happiness  
 (c) Ache : Pain  
 (d) Altruism : Philanthropy  
 (e) Hatred : Odium

**19. Diaphanous : Cacophonous**

- (a) Twofold : Multiple  
 (b) Sheer : Transparent  
 (c) Sheer : Opaque  
 (d) Harmonious : Discordant  
 (e) Transparent : Noisy

**20. Murder : Genocide**

- (a) Accident : Assault  
 (b) Attack : War  
 (c) Fire : Holocaust  
 (d) Wasteland : Desert  
 (e) Mortuary : Sanctuary

**21. Goose : Gander**

- (a) Lion : Lioness (b) Shark : Shark  
 (c) Duck : Drake (d) Male : Female  
 (e) Master : Slave

**22. Synonym : Homonym**

- (a) Verb : Noun (b) Meaning : Sound  
 (c) Look : Say (d) Same : Different

**23. Misogynist : Women**

- (a) Books : Novel (b) Misanthrope : Man  
 (c) Teacher : Pupil (d) traveller : Sojourn

**4. Sentence Completion****Practice Exercise: (1)**

1. The model of \_\_\_, he displayed impeccable manners and excellent taste.  
 (A) Duplicity  
 (B) Decorum  
 (C) Depravity  
 (D) Versatility  
 (E) Efficiency
2. The detectives believed that the fingerprints on the glass were \_\_\_\_ evidence; it definitely placed the defendant at the scene of the crime.  
 (A) Negligible  
 (B) Incorrigible  
 (C) Incriminating  
 (D) Inevitable  
 (E) Inadmissible

3. Carl had a reputation for being a \_\_\_ because he fearlessly skied down the steepest trail.  
 (A) Leader  
 (B) Dreamer  
 (C) Coward  
 (D) Clown  
 (E) Daredevil

4. Just as congestion plagues every important highway, so it \_\_\_\_\_ the streets of every city.  
 (A) Delimits  
 (B) Delays  
 (C) Clogs  
 (D) Obviates  
 (E) Destroys

5. Some microbiologists believe that the attempt to kill the microbes that live on or in our bodies is a mistake and that the use of antiseptics cannot always be \_\_\_\_\_.  
 (A) Justified  
 (B) Spurious  
 (C) Rejected  
 (D) Estimated  
 (E) Anticipated

6. Eastlake is a colourful and \_\_\_\_\_ commentator, equally at home in high art, folk rock, theology, and economics.  
 (A) Obtuse  
 (B) Austere  
 (C) Insipid  
 (D) Versatile  
 (E) Provincial

7. Ms. Wilson urged patience and \_\_\_\_\_ in dealing with the protesters rather than the unyielding attitude the administration had adopted.  
 (A) Obstinacy  
 (B) Desperation  
 (C) Arrogance  
 (D) Compromise  
 (E) Retaliation

8. His subjection bred a longing for self-direction, all the stronger for his underlying sense of the \_\_\_\_\_. of ever achieving it.

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- (A) Irrevocability  
 (B) Impossibility  
 (C) Inevitability  
 (D) Credibility  
 (E) Predictability

9. Mexico has twice \_\_\_\_ the most memorable World cups of the past 32 years.  
 (a) adjudicated (b) harbingered  
 (c) triumphed (d) staged

10. The orator was so \_\_\_\_\_ that the audience became \_\_\_\_\_.  
 (a) soporific, drowsy  
 (b) inaudible, elated  
 (c) pompous, bombastic  
 (d) convincing, moribound

11. We must try to understand his moment\_\_\_\_\_ for he has \_\_\_\_ more and anxiety than any among us.  
 (a) outcry, described  
 (b) senility, understood  
 (c) vision, forgotten  
 (d) aberration, undergone

12. Ambili finally gave up the argument as she found all her efforts at convincing him were \_\_\_\_\_.  
 (a) foolish (b) insurmountable  
 (c) unburdened (d) futile

13. Unemployment is not only \_\_\_\_\_ throughout the emerging world, but is growing worse, especially in urban areas.  
 (a) endemic (b) peripheral  
 (c) absorbing (d) prolific

**Practice Exercise: (2)**

**Directions for question 1 to 5 :** Choose the word or phrase which best completes the sentence. Rely on the choice that would complete the meaning of the sentence.

1. Upon hearing the \_\_\_ words from him, she left the place \_\_\_\_\_.  
 (a) wrongful, abashed  
 (b) misuse, immediately  
 (c) obnoxious, abashed  
 (d) acrimonious, amicably

2. How can the plans of the government \_\_\_ the poor, if they are totally \_\_\_\_?  
 (a) educate, illiterate (b) help, impractical  
 (c) benefit, selfish (d) enrich, penniless

3. The \_\_\_\_\_ that 'A bird in hand is worth two in the bush' is \_\_\_\_ in the present context.  
 (a) metaphor, cail  
 (b) adage, inappropriate  
 (c) talk, evil  
 (d) sentence, anomalous

4. The thought of a nuclear \_\_\_ sparked off by a misunderstanding posés an awesome \_\_\_\_\_.  
 (a) device, reverberation  
 (b) holocaust, spectre  
 (c) liaison, probability  
 (d) explosion, calamity

5. A \_\_\_\_ person is not \_\_\_\_\_.  
 (a) dishonest, untrustworthy  
 (b) handsome, presentable  
 (c) talkative, precise  
 (d) healthy, robust

**Directions for questions 6 to 15 :** Fill in the blanks with the most appropriate pair of words from the options.

6. The \_\_\_\_ that she was experiencing because of isolation in that lonely house was creating a feeling of \_\_\_\_ within her.  
 (a) dissatisfaction, calmness  
 (b) ennui, discontentment  
 (c) excitement, elation  
 (d) loneliness, satisfaction  
 (e) confusion, listlessness

7. The copperhead is a \_\_\_\_ serpent, found as far North as the Blue Hills in Massachusetts and \_\_\_\_ bite has proved dangerous to hikers and joggers.  
 (a) harmful, his (b) famous, the  
 (c) significant, who (d) harmless, their  
 (e) venomous, its

8. It's pointless to give a \_\_\_\_ ring to a friend who is a plain Jane or an/a \_\_\_\_ piece to someone who can't make out a Kangra painting from a Mithila painting.  
 (a) decorative, ordinary  
 (b) genuine, old  
 (c) flashy, antique  
 (d) gold, wooden  
 (e) dull, prehistoric
9. It is a proven fact that higher the speed, greater the \_\_\_, since you are trying to \_\_\_\_ the frontiers and you are keeping your brain on alert, to come to your help in comprehending whatever you are reading.  
 (a) intelligence, join (b) awareness, push  
 (c) judgement, throw (d) comprehension, break  
 (e) aptitude, pass
10. Physical health and physical \_\_\_\_ are obtained through specific exercises designed to clean the physical system of toxins, excessive fat and also \_\_\_\_ to external infections.  
 (a) well being, flab  
 (b) well being, vulnerability  
 (c) toughness, happiness  
 (d) toughness, prone  
 (e) roughness, resistance
11. Nazi Germany \_\_\_\_ the world when it rounded bombs over Poland. Two days later what is known as Black Sunday, Great Britain and France \_\_\_\_ war on Germany.  
 (a) shocked, declared  
 (b) disturbed, decided  
 (c) amazed, penned  
 (d) surprised, declaimed  
 (e) blew, expressed
12. An important account in the federal Highway Trust Fund will run out of money which can \_\_\_\_ completion of road and bridge construction projects. Because the trust fund's highway account is \_\_\_\_ away, the Transport Department will have to delay payments for projects.  
 (a) dwindle, hording  
 (b) plummet, wiping

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- (c) enhance, drowning  
 (d) hamper, draining  
 (e) ruin, losing
13. Ashoka the great is said to have set up the first \_\_\_\_ to protect forests and all life in it. The Mughal rulers were \_\_\_\_ hunters and spent a great deal of time in the forests.  
 (a) ministry, durable (b) sanctuary, avid  
 (c) court, dutiful (d) discipline, courageous  
 (e) reserve, dynamic
14. Throughout human history, there have been many threats to the \_\_\_\_ of nations. These threats have brought about losses of life and \_\_\_\_ economic loss.  
 (a) parity, blistering  
 (b) routine, buoyant  
 (c) security, devastating  
 (d) resemblance, trenchant  
 (e) identity, generic
15. The state Government's growing \_\_\_\_ on private business raises ever-greater risks of corruption and the \_\_\_\_ of citizen rights.  
 (a) reliance, denial  
 (b) defiance, enhancement  
 (c) support, abuse  
 (d) quota, acceptance  
 (e) momentum, rejection

**Practice Exercise: (3)**

**Directions for questions 1 to 10:** In each of the following sentences, a part of the sentence is kept blank. Beneath each sentence five different alternatives are provided. Choose the best alternative to fill in the blank.

1. The \_\_\_\_ of fish in our streams \_\_\_\_ our looking further afield for either sustenance or sporting entertainment.  
 (a) paucity, discouraged  
 (b) plethora, encouraged  
 (c) absence, assisted  
 (d) meagerness, obviated  
 (e) abundance, forestalled

2. While critics praised the play highly, viewers did not flock to the theatre, and the playwright reaped only a/an \_\_\_\_ reward from its brief run.  
 (a) just (b) modest  
 (c) embarrassed (d) monetary  
 (e) precise
3. Although our preparations for the debate were \_\_\_\_, the actual debate turned into a surprising and \_\_\_\_ victory for our school.  
 (a) acceptable, stunning  
 (b) excellent, thrilling  
 (c) flimsy, amateur  
 (d) efficient, welcome  
 (e) inadequate, heartwarming
4. It is not possible to say with \_\_\_\_ how effective the special panel of judges was in selecting this year's best movie star.  
 (a) certainly (b) conviction  
 (c) misgiving (d) concentration  
 (e) convincingly
5. It is quite a surprise that sports is enjoying an unparalleled \_\_\_\_ though it has not yet \_\_\_\_ to this.  
 (a) resurgence, responded  
 (b) improvement, accepted  
 (c) popularity, adjusted  
 (d) refinement, settled  
 (e) passion, adopt
6. Parenting has undergone redefinition in recent years, yet child psychologists believe that the basic parent role has essentially remained \_\_\_\_.  
 (a) unique (b) altered  
 (c) valueless (d) protected  
 (e) unchanged
7. Marlene's concern and \_\_\_\_ for orphaned children have at times been misconstrued as \_\_\_\_ and overly protective.  
 (a) compassion, obsessive  
 (b) solicitude, considerate  
 (c) apathy, compulsive  
 (d) empathy, corrective  
 (e) sympathy, corrective
8. He was so consumed by the belief that people were driven by \_\_\_\_ motives that he could not believe anyone to be unselfish.  
 (a) abominable (b) passionate  
 (c) interior (d) ulterior  
 (e) noble
9. I could not expect more \_\_\_\_ occasion to announce our wedding plans.  
 (a) spurious (b) ominous  
 (c) suitable (d) sanguine  
 (e) virtuous
10. To imagine, create and to touch the old world \_\_\_\_ is what makes the magical journey of the artist.  
 (a) antique (b) sporadic  
 (c) anew (d) often  
 (e) weirdly

**Practice Exercise: (4)**

1. The model of ----, he displayed impeccable manners and excellent taste.  
 (a) duplicity (b) decorum  
 (c) depravity (d) versatility
2. The detectives believed that the fingerprint on the glass was---- evidence; it definitely placed the defendant at the scene of the crime.  
 (a) negligible (b) incorrigible  
 (c) incriminating (d) inevitable
3. Carl had a reputation for being a ---- because he fearlessly skied down the steepest trails.  
 (a) leader (b) dreamer  
 (c) coward (d) daredevil
4. The museum's panel of experts was ---- collection of former curators and art historians; so each of them had ---- knowledge of the Renaissance.  
 (A) an erudite, ample  
 (B) a tenacious, extensive  
 (C) a scholarly, scant  
 (D) an educated, corpulent

5. Paradoxically, the effects of the hurricane were both ---- and ----; it demolished homes and businesses in its wake, but it spurred an economic revival by creating jobs for many previously unemployed workers.  
 (a) destructive, constructive  
 (b) tangible, intangible  
 (c) empirical, scientific  
 (d) practical, theoretical
6. Despite our best efforts to protect the environment and keep it safe, until the problems of pollution are ----, the future of our environment seems, at best, ----.  
 (a) created, gloomy  
 (b) revoked, secure  
 (c) solved, uncertain  
 (d) replaced, revered
7. Despite its innocuous appearance, the fish has a ---- sting.  
 (a) deadly  
 (b) benign  
 (c) persistent  
 (d) complacent
8. Having suffered numerous injuries over the course of her career, the gymnast demonstrated her ---- by overcoming adversity and winning the gold medal.  
 (a) Conternation (b) Apprehension  
 (c) viscosity (d) resilience
9. It is said that as a legal team Charles Houston and Thurgood Marshall complemented each other thoroughly: Houston's sedate manner was ---- Marshall's ----.  
 (a) analogous to, trepidation  
 (b) commensurate with, formality  
 (c) tempered by, jocularity  
 (d) adverse to, gregariousness
10. In a society that abhors ----, the nonconformist is persistently ----.  
 (a) creativity, glorified  
 (b) rebelliousness, suppressed  
 (c) insurgency, heeded  
 (d) smugness, persecuted

11. Ravens appear to behave \_\_\_\_, actively helping one another to find food.  
 (a) mysteriously (b) warily  
 (c) aggressively (d) cooperatively
12. Alice Walker's *The Temple of My Familiar*, far from being a tight, ---- narrative, is instead ---- novel that roams freely and imaginatively over a half million years.  
 (a) traditional, a chronological  
 (b) provocative, an insensitive  
 (c) forceful, a concise  
 (d) focused, an expansive
- 5. Idioms and Phrasal Verbs**
- Practice Exercise: (1)**
- Directions of questions 1 to 15:** Select the meaning of the following idioms.
1. **Kick the bucket**  
 (a) to win a deal (b) to throw a tantrum  
 (c) to get angry (d) to die
  2. **Feather one's own nest**  
 (a) to enrich oneself  
 (b) to prepare for a family  
 (c) to beautify one's house  
 (d) to be greedy
  3. **To go off the deep end**  
 (a) to be silent  
 (b) to fall into further trouble  
 (c) to be caught doing a wrong act  
 (d) to give way to anger or emotion
  4. **Call a spade a spade**  
 (a) to be rude  
 (b) to speak bluntly  
 (c) to force your views on others  
 (d) to support a theory
  5. **To sit on the fence**  
 (a) to shirk off responsibility  
 (b) to become lazy  
 (c) to do no work  
 (d) to remain undecided

6. **All Greek to me**  
 (a) incomprehensible  
 (b) foreign  
 (c) new to me  
 (d) difficult
7. **Cut to the chase**  
 (a) run fast (b) take part in the chase  
 (c) get to the point (d) take a short cut
8. **Field day**  
 (a) a day of working in a field  
 (b) a day of hard work  
 (c) an enjoyable situation  
 (d) an outdoor picnic
9. **Gut feeling**  
 (a) feeling hungry (b) feeling unwell  
 (c) stomach ache (d) intuition
10. **Give someone the slip**  
 (a) to fire some  
 (b) to cheat someone  
 (c) to escape from the someone  
 (d) to hide from someone
11. **Have your back to the wall**  
 (a) to talk to someone again in order to give them some information  
 (b) to have very serious problems that limit the ways in which you can act  
 (c) to not allow people to know about your intentions that you have kept secret.  
 (d) to behave stubbornly or in a childlike manner
12. **Can of worms**  
 (a) a situation that causes a lot of problems for you when you start to deal with it  
 (b) a sight or situation which brings the feeling of disgust or abhorrence  
 (c) to accept blame or take responsibility for something that goes wrong  
 (d) To begin to worry because of a problem that you weren't expecting
13. **Half the battle**  
 (a) an important step towards achieving something
- (b) the slightest opportunity  
 (c) not as much as you want but better than nothing  
 (d) most important part of something
14. **Put the hard word on**  
 (a) to raise a topic of conversation  
 (b) to make a mess of things  
 (c) to adopt an aloof attitude  
 (d) to ask a favour of someone
15. **Be chilled to the marrow**  
 (a) to be completely shameless  
 (b) to your innermost being  
 (c) to be extremely cold  
 (d) to vigorously engage in an argument
- Practice Exercise: (2)**
- Directions for questions 1 to 5:** Select the idiom or phrase from the given alternatives that best completes the sentence.
1. It finally \_\_\_\_\_ him that she was the Principal's daughter.  
 (a) dawned on (b) come on  
 (c) came to (d) took to
  2. Ritesh has started his own business and he has been \_\_\_\_\_ money since then.  
 (a) raking in (b) making in  
 (c) raking for (d) taking in
  3. You are not in a good mood today: \_\_\_\_\_.  
 (a) why aren't you  
 (b) what is happening to you  
 (c) what eating you  
 (d) what's picking you
  4. Rahul came into the kitchen and made a \_\_\_\_\_.  
 (a) beeline for (b) beeline of  
 (c) deck for (d) route at
  5. Her poems are definitely a \_\_\_\_\_ the poems of other competitors.  
 (a) cut in (b) cut above  
 (c) cut for (d) cut below

**Directions for questions 6 to 10:** In the given questions, some idioms or phrases are listed with their meaning. One of the options does not have correct meaning attached to it. Identify the option.

6. (a) Come what may : To succeed in a venture  
(b) Come to blows : To begin a physical fight  
(c) Come across : To meet or find by chance  
(d) Come off : To all of
7. (a) Beat off: To drive away  
(b) Cut a wide swath : To attract a lot of attention  
(c) Cry over split milk : To avoid making mistakes  
(d) Come home to roost : To have repercussions or after effects
8. (a) Rule the roost : To revel  
(b) Bring to mind : To cause to be remembered  
(c) Bring to (one's) knees: To reduce to a position of subservience or submission  
(d) Bring to terms : To force (another) to agree
9. (a) Call forth : To evoke or elicit  
(b) Call in : To challenge someone  
(c) Call off : To cancel or postpone  
(d) Call on : To court someone
10. (a) Have eyes for : To be interested in  
(b) In one's mind eye: In imagination or memory  
(c) In the public eye: Exposed to public curiosity or publicity  
(d) Keep one's eyes skinned : To ignore

#### Practice Exercise: (3)

**Directions for questions 1 to 15:** In each of the following questions, the given sentence contains an idiom which has been underlined. From the given options, choose the one which gives the correct meaning of the idiom.

1. Even during the holidays I had my hands full.  
(a) was very busy (b) was extremely worried  
(c) was tired (d) carried heavy loads
2. The long and the short of it is that it ended in a fiasco.  
(a) the outcome or result  
(b) the whole matter in brief
3. (c) the multiple effects  
(d) the disastrous result
4. There's no doubt that stress can lead to physical illness.  
(a) begin a process  
(b) invite something  
(c) uphold something  
(d) attract something
5. He cut a poor figure at the presentation ceremony.  
(a) spoke loudly  
(b) used indecent language  
(c) appear badly  
(d) was critical of the arrangement
6. The labour strike is only the tip of the iceberg.  
(a) indication of a big problem  
(b) biggest hurdle  
(c) cause of agitation  
(d) last problem
7. Have you ever been talked out of doing something foolish?  
(a) persuaded for not doing something  
(b) held responsible for doing something  
(c) scolded for doing something  
(d) insulted for doing something
8. Can you put me up for the weekend?  
(a) give me company  
(b) leave me alone  
(c) accommodate me  
(d) make friends with me
9. Last evening my sister Nidhi, had a whale of a time.  
(a) enjoyed greatly  
(b) wasted her time  
(c) utilized her time  
(d) experienced the worst time
10. The teenager spent hour cranking out volumes of bad poetry.  
(a) thinking about  
(b) producing quickly  
(c) analyzing  
(d) understanding the meaning of
11. Ted was feeling under the weather yesterday, so he decided not to work.  
(a) unwell (b) disappointed  
(c) romantic (d) in a poetic mood
12. Don't be so wishy-washy. Tell us how you really feel.  
(a) so irritated  
(b) feeble in quality or character  
(c) to evade from the main issue  
(d) to make a fool of someone
13. Mrs. Gill started acting like a bull in a China shop after getting drunk and ended up breaking all the glasses.  
(a) careless in walking or behaving  
(b) shouting at someone  
(c) hitting everyone  
(d) accusing someone badly
14. That story is pretty far-fetched and I am not going to excuse you this time.  
(a) an old story (b) implausible  
(c) something rare (d) unexpected
15. The terrible fiend pursued him everywhere and Yavakrida fled for his life, with the demon hot on his heels.  
(a) to run  
(b) to run very fast  
(c) to follow someone and try to catch up  
(d) to be after someone's life

1. On seeing the table piled with a variety of dishes I realized that taking food to my grandmother's house was like carrying coals to Newcastle.  
(a) to give something to someone who already has a lot of it  
(b) to perform a boring task  
(c) to do something essential  
(d) to do something substandard
2. Due to lack of concerted effort to tackle global warming, environmentalists have accused the government of fiddling while Rome burns.  
(a) to be indecisive in an emergency  
(b) to work as normal in a crisis  
(c) to run away from trouble  
(d) a late response
3. The aged actor admitted making a lot of wrong choices in his salad days.  
(a) time of youth and inexperience  
(b) the days of one's first job  
(c) period of unemployment  
(d) period of success
4. I'd give anything to be a fly on the wall during the upcoming board meeting on the company's future plans.  
(a) a significant participant  
(b) a decision maker  
(c) a secret observer  
(d) a record keeper
5. On going through his medical report the doctor declared that the patient was out of the woods and could go home.  
(a) healthy (b) cured  
(c) safe (d) recovered
6. Having seen the flipside of instant fame and success he tried to hide his light under the bushel and stayed away from media attention.  
(a) to avoid knowledge  
(b) to hide the truth  
(c) to stay away from the limelight  
(d) to hide one's talents

#### Practice Exercise: (4)

**Directions for questions 1 to 15 :** In the following questions, four alternatives are given for the idiom marked in bold. Choose the alternative which best expresses the meaning of the idiom from the options given.

7. Being a swimming instructors, it felt like a **busman's holiday** to me when my nephew came home on Sunday and wanted swimming lessons.
- a holiday where one is not able to rest
  - a holiday spent in teaching others some activity
  - a holiday spent in doing that which one does for a living
  - a holiday spent doing household chores.
8. Any celebrity scandal and the press rushes to cover the story, like a **moth to a flame**.
- dangerously attracted to something
  - to be in search of knowledge
  - in a hurry to achieve
  - impulsively seeking success
9. In spite of several warnings the general **threw caution to the wind** and went ahead with the attack on the enemy headquarters.
- to be impatient
  - to be ambitious
  - to behave in a reckless manner
  - to act suddenly, without warning
10. Facing multiple charges of corruption he finally agreed to surrender and **talk turkey** about his misdeeds.
- to discuss frankly
  - to talk at length
  - to speak under oath
  - to answer questions

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11. There are **wheels within wheels** in the system and most refugees do not know which government agency to approach for assistance.
- complex and intricate processes
  - complex technology
  - difficult to understand
  - lot of paperwork
12. Schools are **riding a wave** of renewed public interest.
- receive appreciation for a short period
  - relinquishing for a short period
  - enjoy for a short period
  - successful for a short period
13. I caught her **nosing around** my desk.
- look around a place
  - plan a visit to a place
  - move freely
  - feel the aroma
14. I'd love to have lunch with you but we're **rushed off our feet** at the moment.
- in a very difficult situation
  - injured
  - having no money
  - extremely busy
15. The refugees are living **cheek by jowl** in a temporary camp.
- depressed and unhappy
  - very close together
  - full of optimism and hope
  - in harmony



3

## Critical Reasoning

Read the paragraph carefully and determine the main point the author is trying to make. What conclusion can be drawn from the argument? Each paragraph is followed by five statements. One statement supports the author's argument better than the others do.

1. One New York publisher has estimated that 50,000 to 60,000 people in the United States want an anthology that includes the complete works of William Shakespeare. And what accounts for this renewed interest in Shakespeare? As scholars point out, his psychological insights into both male and female characters are amazing even today. This paragraph best supports the statement that
- Shakespeare's characters are more interesting than fictional characters today.
  - People even today are interested in Shakespeare's work because of the characters.
  - Academic scholars are putting together an anthology of Shakespeare's work.
  - New Yorkers have a renewed interest in the work of Shakespeare.
  - Shakespeare was a psychiatrist as well as a playwright.
2. One of the warmest winters on record has put consumers in the mood to spend money. Spending is likely to be the strongest in thirteen years. During the month of February, sales of existing single-family homes hit an annual record rate of 4.75 million. This paragraph best supports the statement that
- Consumer spending will be higher thirteen years from now than it is today.
  - More people buy houses in the month of February than in any other month.
3. Generation Xers are those people born roughly between 1965 and 1981. As employees, Generation Xers tend to be more challenged when they can carry out tasks independently. This makes Generation Xers the most entrepreneurial generation in history. This paragraph best supports the statement that Generation Xers.
- Work harder than people from other generations.
  - Have a tendency to be self-directed workers
  - Have an interest in making history
  - Tend to work in jobs that require risk-taking behaviour.
  - Like to challenge their bosses work attitudes.
4. If you're a fitness walker, there is no need for a commute to a health club. Your neighbourhood can be your health club. You don't need a lot of fancy equipment to get a good workout either. All you need is a well-designed pair of athletic shoes. This paragraph best supports the statement that
- Fitness walking is a better form of exercise than weight lifting.
  - A membership in a health club is a poor investment.
  - Walking outdoors provides a better workout than walking indoors.
  - Fitness walking is a convenient and valuable form of exercise.
  - Poorly designed athletic shoes can cause major foot injuries.

C. During the winter months, the prices of single-family homes are the lowest.  
D. There were about 4 million homes for sale during the month of February.  
E. Warm winter weather is likely to affect the rate of home sales.

7. The criminal justice system needs to change. The system could be more just if it allowed victims the opportunity to confront the person who has harmed them. Also, mediation between victims and their offenders would give the offenders a chance to apologize for the harm they have done.

This paragraph best supports the statement that victims of a crime should

- A. Learn to forgive their offenders.
- B. Have the right to confront their offenders.
- C. Learn the art of mediation.
- D. Insist that their offenders be punished.
- E. Have the right to impose a sentence on their offenders.

8. A few states in this country are considering legislation that would prohibit schools from using calculators before the sixth grade. Other states take a different position. Some states are insisting on the purchase of graphing calculators for every student in middle school. This paragraph best supports the statement that in this country

- A. There are at least two opinions about the use of calculators in schools.
- B. Calculators are frequently a detriment to learning math.
- C. State legislators are more involved in education than ever before.
- D. The price of graphing calculators is less when schools buy in bulk.
- E. The argument against calculators in schools is unfounded.

9. Today's work force has a new set of social values. Ten years ago, a manager who was offered a promotion in a distant city would not have questioned the move. Today, a manager in that same situation might choose family happiness instead of career advancement.

This paragraph best supports the statement that

- A. Most managers are not loyal to the corporations for which they work.
- B. Businesses today do not understand their employees' needs.
- C. Employees' social values have changed over the past ten years.

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- D. Career advancement is not important to today's business managers.
- E. Companies should require their employees to accept promotions.

2. Cars are safer than trains. Thirty percent of train accidents result in death, while only two percent of car accidents result in death.

Which of the following, if true, would most seriously weaken the argument above?

- (A) Trains are inspected more often than cars.
- (B) The number of car accidents is several times higher than the number of train accidents.
- (C) Train drivers never drive under the influence of alcohol, while car drivers often do.
- (D) Train accidents are usually the fault of missing fishplates, not drivers.
- (E) Train drivers have to have a minimum educational qualification which is not necessary for car drivers.

12. What's in store for humanity? We will surely use our technological powers to transform not only the world around us but ourselves, too.

Which of the following statements weakens the argument above?

- (A) Many new forms of technologies have been embraced even by the third world countries.
- (B) Human nature and patterns of existence have remained the same throughout the ages.
- (C) Human beings are picking and choosing their futures in a pragmatic manner.
- (D) Advances in genetics, nano technology and robotics will eventually make humans a super-race.
- (E) The internet- a new age technology has been success on all counts.

10. It is well known that the world urgently needs adequate distribution of food, so that everyone gets enough. Adequate distribution of medicine is just as urgent. Medical expertise and medical supplies need to be redistributed throughout the world so that people in emerging nations will have proper medical care.

This paragraph best supports the statement that

- A. The majority of the people in the world have never been seen by a doctor.

- B. Food production in emerging nations has slowed during the past several years.
- C. Most of the world's doctors are selfish about giving time and money to the poor.
- D. The medical-supply industry should step up production of its products.
- E. Many people who live in emerging nations are not receiving proper medical care

**Moderate level:**

1. After two years in reverse gear, when the competitors dented the market share of MCL, the company has moved into top gear. From a low of 42 percent in June 2000, the MCL market share swelled to 60 percent in June 2001.

Which among the following can be inferred from the above argument?

- (a) MCL will again be the leading share holder in the market.
- (b) MCL will be the leading car share holder in the market.
- (c) MCL will be at the centre stage once again.
- (d) MCL may be at the centre stage once again.

2. Last year the rate of inflation was 1.2 percent, but for the current year it has been 4 percent.

We can conclude that inflation is on an upward trend and the rate will be still higher next year. Which of the following, if true, most seriously weakens the conclusion above?

- (a) The inflation figures were computed on the basis of a representative sample of economic data rather than all of the available data.
- (b) Last year a dip in oil prices brought inflation temporarily below its recent stable annual level of 4 percent.
- (c) Increases in the pay of some workers are tied to the level of inflation, and at an inflation rate of 4 percent or above, these pay raises constitute a.
- (d) Government intervention cannot affect the rate of inflation to any significant degree.

4. A drug that is highly effective in treating many types of infection can, at present be obtained only from the bark of the ibora, a tree that is quite rare in the wild. It takes the bark of 5,000

trees to make one kilogram of the drug. It follows, therefore, that continued production of the drug must inevitably lead to the ibora's extinction. Which of the following, if true, most seriously weakens the argument above?

- (a) The drug made from ibora bark is dispensed to doctors from a central authority.
- (b) The leaves of the ibora are used in a number of medical products.
- (c) The ibora can be propagated from cuttings and grown under cultivation.
- (d) The ibora generally grows in largely inaccessible places.

5. In an attempt to abate the destructive decline in Micro Chip's revenue brought about by shrinking demand that is accompanying an economic recession, Micro Chip is offering customers a 50% discount for the next three months on all purchases fully paid for within 15 days.

Which of the following assumptions most underlies the chip maker's offer of a discount?

- (a) Micro Chip expects this discount to help the company retain existing customers and gain new ones, enabling the firm to survive in the long-term.
- (b) The government will provide massive technology tax credits to businesses, spurring them to purchase chips and other related products.
- (c) The government will not pursue Micro Chip if in fact its behaviour in offering a deep discount amounts to a violation of predatory pricing laws.
- (d) The decrease in revenue brought about by the reduction in price will be smaller than the anticipated increase in revenue about by the increase.

6. The cost of manufacturing tractors in Korea is twenty percent less than the cost of manufacturing tractors in Germany. Even after transportation fees and import taxes are added, it is still cheaper to import tractors from Korea to Germany than to produce tractors in Germany. Which of the following assertions is best supported by the above information?

- (a) Labour costs in Korea are twenty percent below those in Germany.  
 (b) Importing tractors into Germany will eliminate twenty percent of the manufacturing jobs in Germany.  
 (c) The costs of transporting a tractor from Korea to Germany is more than twenty percent of the cost of manufacturing the tractor in Korea.  
 (d) The import taxes on a tractor imported from Korea to Germany is less than twenty percent of the cost manufacturing the tractor in Germany.

6. Most scientists believe that the decay of the ozone layer is a cause of global warming. With a weaker ozone layer, additional wavelengths of light reach the earth. However, the danger posed by ozone decay is not limited to global warming. The decay of the ozone layer, which enables more harmful wavelengths of light to reach the earth's surface, is also believed to cause permanent eye damage in some animals. Which of the following is most strongly supported by the statements above?

- (a) All wavelengths of light from the sun that damage the eyes of animals are blocked by a healthy ozone layer.  
 (b) Some animals do not experience damage to their eyes when exposed to unfiltered waves of light.  
 (c) Only a handful of animal species live in places where they are exposed to the damaging light waves.  
 (d) The rising temperature of the earth poses a severe threat to animals.  
 (e) Some wavelengths of light that engender eye damage in certain animals are more likely to hit the earth due to ozone decay.

7. Virtually all health experts agree that second-hand smoke poses a serious health risk. After the publication of yet another research paper explicating the link between exposure to second-hand smoke and a shorter life span, some members of the State House of Representatives proposed a ban on smoking in most public places in an attempt to promote quality of life and length of life span.

Which of the following, if true, provides the most support for the actions of the State Representatives?

- (a) The amount of damaging chemicals and fumes released into the air by cigarette smoke is far less than the amount released from automobiles, especially from older models.  
 (b) Banning smoking in most public places will not considerably reduce the percent of the population in the state in question that smokes.  
 (c) The state whose legislators are proposing the tough smoking legislation has a relatively high percent of its population that smoke.  
 (d) Another state that enacted a similar law a decade ago saw a statistically significant drop in lung-cancer rates among non-smokers.  
 (e) A nearby state up-wind has the highest number of smokers in the country.

9. Net Neutrality stipulates that Internet Service Providers (ISP) cannot partition their bandwidth such that different types of Internet communications have different maximum bandwidth capacities. For example, an ISP cannot relegate high bandwidth voice-over-IP (VoIP) traffic to a separate tunnel in an attempt to ensure that users of low-bandwidth functions such as plain-text email are not slowed down by the high-bandwidth users. Some individuals support implementing Net Neutrality on the principle that one group (i.e., users of high-bandwidth services) should not be effectively penalized for the actions of another group (i.e., users of slow-bandwidth services, who have a special traffic lane carved out for them, thereby slowing high bandwidth users.)

Which of the following, if true, most seriously weakens the argument of the supporters of Net Neutrality mentioned above?

- (a) The jobs of many high-bandwidth users require these individuals to use high bandwidth services.  
 (b) Placing no restrictions on the bandwidth of individuals who use high-bandwidth services would force ISPs to purchase massive amounts of expensive additional bandwidth, disproportionately increasing the price of access for low-bandwidth users.

- (c) A strong and well-respected lobbying firm recently revealed it has been hired by large telecommunications firms to oppose Net Neutrality on the grounds that it infringes upon a private company's ability to do business.  
 (d) One country that mandated Net Neutrality saw a decrease in satisfaction of Internet users.  
 (e) A recent court ruling upheld the principle that technology companies cannot discriminate in whom they serve or how they serve users.

10. During the past 20 years, computer scientists focused increasingly on starting and running successful businesses. However, since businesses must be profitable, computer scientists must focus on developing products that generate profit. Consequently, computer science has lost its creative aspect.

Which of the following assumptions is most necessary in order for the conclusion above to be drawn from the argument above?

- (a) All computer programs must lack creativity in order to be well received.  
 (b) Some computer scientists entirely disregarded creativity and chose instead to pursue profit.  
 (c) A program cannot be both creative and profitable.  
 (d) Computer scientists are obsessed with the profitability of their work.  
 (e) Non-profit institutions use large amounts of software.

1. If fuel is the driving force behind the city, adulterating seems to have driven it up the wall. With the city flooded with the complaints of quality of petrol and diesel being sold at service stations across the city, besides reports of kerosene and naphtha mixing in unleaded petrol, the city administration needs to take some action.

The author of the passage above assumes which of the following statements?

- (A) The city administration is unable to function with the adulterated fuel crisis.  
 (B) Petrol pumps are selling smaller quantities of fuel than they had ever done in the past year.  
 (C) Most people are driving to other cities for obtaining unadulterated fuel.

- (D) Adulteration of fuel can be checked if the city administration takes relevant steps.  
 (E) People in the city are corrupt and nothing much can be done by the city administration.

3. Every house on the Outer Ring Road in Delhi has a canopy, and all of these canopies are either black or white.

If the above statement is true, which one of the following must also be true?

- (i) Some canopies in Delhi are black.  
 (ii) If a house in Delhi does not have a canopy, then it is not on the Outer Ring Road.  
 (iii) If a house in Delhi has a white canopy, then it is on the Outer Ring Road.  
 (A) 1 only. (B) 2 only  
 (C) 1 and 2 only (D) 1 and 3 only.  
 (E) 1, 2 and 3

4. Catalytic Converters, which were designed to clean up car exhausts, are polluting the environment. It is a global problem. It is not just restricted to the cities or highways.

All of the statements below, if true, will strengthen the above argument EXCEPT

- (A) Workers involved in refineries using catalytic converters are known to suffer from higher than severe levels of asthma.  
 (B) Exhausts from fast-moving cars erode catalytic converters emitting micro catalytic particles containing polluting elements.  
 (C) Americans and Canadian researchers have found heavy metals that cause pollution from catalytic converters in remote regions of Greenland.  
 (D) Because of its cheap price, catalytic converters are being used by an increasing number of car owners.  
 (E) An Ohio research paper states that catalytic converters emit oxides which turn into pollutants.

5. Real Estate taxes are typically set at a flat rate per Rs. 50,000 of the officially assessed value. Reassessments should be frequent in order to remove the distortions that arise when property value changes at differential rates. In practice, however, reassessments typically occur when they benefit the government, i.e. when their effect is to increase total tax revenue.

- If the above statement is true, which of the following describes a situation in which a reassessment should occur but it is unlikely to do so?
- Real Estate values have risen sharply and uniformly.
  - Real Estate values have all risen- some very sharply, some less so.
  - Real Estate values have for the most part risen sharply; yet some have dropped slightly.
  - Real Estate values have for them most part dropped significantly; yet some have risen slightly.
  - Real Estate values have fallen drastically.
7. This summer, Infosys Corporation had its best recruiting season ever, hiring more than 350 new employees. Infosys, perhaps the leading e-commerce consulting firm, swelled to 1900 people, up from fewer than 300 at its first public offering. And unlike so many of its dotcom clients, the company was making a profit. The author's argument that Infosys had its best recruiting season loses strength if it is true:
- Like most of its clients, Infosys will lose business soon and will be unable to pay its employees.
  - The referred public offering was made just two years back.
  - Infosys Corporation laid off 30 percent of its employees it recruited a decade ago, four years ago.
  - Most of the recruits of this season are those who were working part-time with Infosys.
  - Many of the recruits plan to leave in a year or so for further studies or other job opportunities.
8. It looks so juicy, so rich and so fresh. Each component of the dish in the photograph indescribably delicious, such highly mannered and aggressively perfect images of food have become popular in recent years and can be seen as a culinary ideal. On the other hand, the dissonance between these photos and the reality of a well-cooked meal may leave us continually, though subliminally dissatisfied. From the above information, it may be safely concluded that

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- Food photography has become an indispensable part of our daily life.
- The reality is rarely as delicious as the fantasy.
- Just as the sexual revolution raised expectations food photography has created visual images.
- Never has the food been more beautiful or unattainable.
- Food photography has created the art of delectable- visual delights that will never taste as good as they look.

9. When the Human development Report was first published, its attraction was the very idea of 'human development'. That well-being was not just about a higher income and concomitantly, that a nation's well-being could not be measured by its per capita income alone; Human Development also deals with people's choices to live a productive and healthy life. It can be correctly concluded on the basis of the above statement
- The Human development report aims at increasing the per capita income of any country.
  - One of the basic premises of human development is that what is important is not only a higher average income but also what use a society put this income to.
  - The first Human Development report was published when it occurred to social scientists that well-being implied more and more income.
  - A man's productivity is indirectly proportioned to his average annual income.
  - The attraction of the first Human Development report was short-lived.

12. What's in store for humanity? We will surely use our technological powers to transform not only the world around us but ourselves, too.

Which of the following statements weakens the argument above?

- Many new forms of technologies have been embraced even by the third world countries.
- Human nature and patterns of existence have remained the same throughout the ages.

- Human beings are picking and choosing their futures in a pragmatic manner.
  - Advances in genetics, nano technology and robotics will eventually make humans a super-race.
  - The internet- a new age technology has been success on all counts.
16. Paul Michael of the University of California and his colleagues tested four patients who had experienced damage to the left angular gyrus region of their brains. All of the volunteers were fluent in English and otherwise intelligent, mentally lucid and able to engage in normal conversations. But when the researchers presented them with common proverbs and metaphors such as "the grass is always greener on the other side" and "reaching for the stars", the subjects interpreted the sayings literally almost all of the time. After being pressed by the interviewers to provide deeper meaning, "the patients often came up with elaborate, even ingenious interpretations, that were completely off the mark", Paul remarks. For example, patient SJ expounded on "all that glitters is not gold" by noting that you should be careful when buying jewellery because the sellers could rob you of your money.
- Which of the following statements summarizes the above argument in the best manner?
- An experiment revealed that damage to the left angular gyrus of the brain impacts the use of learned language.
  - An experiment revealed that people don't understand subtleties in case of damage to the left angular gyrus region of the brain.
  - An experiment revealed that people don't understand the idea behind metaphors in case of damage to the left angular gyrus region of the brain.
  - Metaphors are the highest form of use of language and are the acid test to determine a subject's facility with a language.
  - An experiment revealed that people don't understand language when the left side of the brain is damaged.



## 4

## Previous Years GATE Questions

### GATE : 2010

1. Which of the following options is the closest in meaning to the word below?

Circuitous

- (a) Cyclic
- (b) Indirect
- (c) Confusing
- (d) Crooked

2. The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.

Unemployed : Worker

- (a) Fallow : Land
- (b) Unaware : Sleeper
- (c) Wit : Jester
- (d) Renovated : House

3. Choose the most appropriate word from the options given below to complete the following sentence:

If we manage to..... our natural resources, we would leave a better planet for our children.

- (a) uphold
  - (b) restrain
  - (c) cherish
  - (d) conserve
4. Choose the most appropriate word from the options given below to complete the following sentence:

His rather casual remarks on politics ..... his lack of seriousness about the subject.

- (a) masked
- (b) belied
- (c) betrayed
- (d) suppressed

5. Modern warfare has changed from large scale clashes of armies to suppression of civilian populations. Chemical agents that do their

work silently appear to be suited to such warfare; and regrettably, there exist people in military establishments who think that chemical agents are useful tools for their cause.

Which of the following statements best sums up the meaning of the above passage?

- (a) Modern warfare has resulted in civil strife.
- (b) Chemical agents are useful in modern warfare.
- (c) Use of chemical agents in warfare would be undesirable.
- (d) People in military establishments like to use chemical agents in war.

### GATE : 2011

6. The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair:

Gladiator : Arena

- (a) Dancer: stage
- (b) Commuter: train
- (c) Teacher: classroom
- (d) Lawyer: courtroom

7. Choose the most appropriate word from the options given below to complete the following sentence:

It was her view that the country's problems had been ..... by foreign technocrats, so that to invite them to come back would be counter-productive.

- (a) Identified
- (b) ascertained
- (c) exacerbated
- (d) analysed

8. Choose the word from the options given below that is most nearly opposite in meaning to the given word:

Frequency

- (a) Periodicity
- (b) rarity
- (c) Gradualness
- (d) persistency

9. Choose the most appropriate word from the options given below to complete the following sentence:

Under ethical guidelines recently adopted by the Indian Medical Association, human genes are to be manipulated only to correct diseases for which \_\_\_\_\_ treatments are unsatisfactory.

- (a) Similar
- (b) most
- (c) uncommon
- (d) available

10. The horse has played a little known but very important role in the field of medicine. Horses were injected with toxins of diseases until their blood built up immunities. Then a serum was made from their blood. Serums to fight with diphtheria and tetanus were developed this way. It can be inferred from the passage that horses were

- (a) Given immunity to diseases
- (b) Generally quite immune to diseases
- (c) Given medicines to fight toxins
- (d) Given diphtheria and tetanus serums

### GATE : 2012 (CS, MECHANICAL & CIVIL)

11. Choose the most appropriate alternative from the options given below to complete the following sentence:

Despite several ..... the mission succeeded in its attempt to resolve the conflict.

- (a) attempts
- (b) setbacks
- (c) meetings
- (d) delegations

12. Which one of the following options is the closest in meaning to the word given below?

Mitigate

- (a) Diminish
- (b) Divulge
- (c) Dedicate
- (d) Denote

13. Choose the grammatically INCORRECT sentence:

- (a) They gave us the money back less the service charges to Three Hundred rupees.
- (b) This country's expenditure is not less than that of Bangladesh.
- (c) The committee initially asked for a funding of Fifty Lakh rupees, but later settled for a lesser sum.
- (d) This country's expenditure on educational reforms is very less.

14. Choose the most appropriate alternative from the options given below to complete the following sentence:

Suresh's dog is the one ..... was hurt in the stampede.

- (a) that
- (b) which
- (c) who
- (d) whom

15. Wanted Temporary, Part-time persons for the post of Field Interviewer to conduct personal interviews to collect and collate economic data. Requirements: High School- pass, must be available for Day, Evening and Saturday work. Transportation paid, expenses reimbursed.

Which one of the following is the best inference from the above advertisement?

- (a) Gender-discriminatory
- (b) Xenophobic
- (c) Not designed to make the post attractive
- (d) Not gender-discriminatory

### GATE : 2012 (ELECTRONICS & ELECTRICAL)

16. Choose the most appropriate word from the options given below to complete the following sentence:

Given the seriousness of the situation that he had to face, his ..... was impressive.

- (a) beggary      (b) nomenclature  
 (c) jealousy      (d) nonchalance

17. Which one of the following options is the closest in meaning to the word given below?

- Latitude**  
 (a) Eligibility  
 (b) Freedom  
 (c) Coercion  
 (d) Meticulousness

18. Choose the most appropriate alternative from the options given below to complete the following sentence:

If the tired soldier wanted to lie down, he \_\_\_\_\_ the mattress out on the balcony.

- (a) should take  
 (b) shall take  
 (c) should have taken  
 (d) will have taken

19. One of the parts (A, B, C, D) in the sentence given below contains an ERROR. Which one of the following is INCORRECT?

I requested that he should be given the driving test today instead of tomorrow.

- (a) requested that  
 (b) should be given  
 (c) the driving test  
 (d) instead of tomorrow

20. One of the legacies of the Roman legions was discipline. IN the legions, military law prevailed and discipline was brutal. Discipline on the battlefield kept units obedient, intact and fighting, even when the odds and conditions were against them.

Which one of the following statements best sums up the meaning of the above passage?

- (a) Thorough regimentation was the main reason for the efficiency of the Roman legions even in adverse circumstances.  
 (b) The legions were treated inhumanly as if the men were animals.  
 (c) Discipline was the armies inheritance from their seniors.  
 (d) The harsh discipline to which the legions were subjected led to the odds and conditions being against them.

## GATE : 2013 (Civil Engineering)

21. Friendship, No matter how \_\_\_\_\_ it is, has its limitation

- (a) cordial      (b) intimate  
 (c) secret      (d) pleasant

22. The pair that best express a relationship similar to that expression in the pair:

**Medicine: Health**

- (a) Science : Experiment  
 (b) Wealth : Peace  
 (c) Education : Knowledge  
 (d) Money : Happiness

23. Which of the following option is closest in meaning to the word given below:

**"Primeval"**

- (a) Modern      (b) Historic  
 (c) Primitive      (d) Antique

## GATE : 2013 (ME + CS + PI + Engineering)

24. Complete the sentence :

Universalism is to particularism as diffuseness is to \_\_\_\_\_.

- (a) specificity      (b) neutrality  
 (c) generality      (d) adaptation

25. Were you a bird, you \_\_\_\_\_ in the sky.

- (a) would fly  
 (b) shall fly  
 (c) should fly  
 (d) shall have flown

26. Which one of the following options is the closest in meaning to the word given below?

**Nadir**

- (a) Highest      (b) Lowest  
 (c) Medium      (d) Integration

27. Choose the grammatically INCORRECT sentence:

- (a) He is of Asian origin.  
 (b) They belonged to Africa  
 (c) She is an European.  
 (d) They migrated from India to Australia.

28. After several defeats in wars, Robert Bruce went in exile and wanted to commit suicide. Just before committing suicide, he came across a spider attempting tirelessly to have its net. Time and again, the spider failed but did not deter it to refrain from making attempts. Such attempts by the spider made Bruce curious. Thus, Bruce started observing the near-impossible goal of the spider to have the net. Ultimately, the spider succeeded in having its net despite several failures. Such act of the spider encouraged Bruce not to commit suicide. And then, Bruce went back again and won many a battle, and the rest is history.

Which one of the following assertions is best supported by the above information?

- (a) Failure is the pillar of success  
 (b) Honesty is the best policy  
 (c) Life begins and ends with adventures  
 (d) No adversity justifies giving up hope

33. Statement: There were different streams of freedom movements in colonial India carried out by the moderates, liberals, radicals, socialists, and so on.

Which one of the following is the best inference from the above statement?

- (a) The emergence of nationalism in colonial India led to our Independence.  
 (b) Nationalism in India emerged in the context of colonialism.  
 (c) Nationalism in India is homogeneous.  
 (d) Nationalism in India is heterogeneous.

## GATE : 2014

### CE (Online Exam) Set: I

34. A student is required to demonstrate a high level of comprehension of the subject, especially in the social sciences.

The word closest in meaning to comprehension is

- (a) understanding      (b) meaning  
 (c) concentration      (d) stability

[2014 : 1 Mark, Set-I]

35. Choose the most appropriate word from the options given below to complete the following sentence.

One of his biggest \_\_\_\_\_ was his ability to forgive.

- (a) vice      (b) virtues  
 (c) choices      (d) strength

[2014 : 1 Mark, Set-I]

## GATE : 2014

### CE + IN + PI (Online Exam) Set: II

36. Choose the most appropriate word from the options given below to complete the following sentence.

A person suffering from Alzheimer's disease \_\_\_\_\_ short-term memory loss.

- (a) experienced      (b) has experienced  
 (c) is experiencing      (d) experiences

[2014 : 1 Mark, Set-II]

37. Choose the most appropriate word from the options given below to complete the following sentence.

\_\_\_\_\_ is the key to their happiness; they are satisfied with what they have.

- (a) Contentment (b) Ambition
  - (c) Perseverance (d) Hunger
- [2014 : 1 Mark, Set-II]

38. Which of the following options is the closest in meaning to the sentence below?

"As a woman, I have no country."

- (a) Women have no country.
  - (b) Women are not citizens of any country.
  - (c) Women's solidarity knows no national boundaries.
  - (d) Women of all countries have equal legal rights.
- [2014 : 1 Mark, Set-II]

39. Moving into a world of big data will require us to change our thinking about the merits of exactitude. To apply the conventional mindset of measurement to the digital, connected world of the twenty-first century is to miss a crucial point. As mentioned earlier, the obsession with exactness is an artefact of the information-deprived analog era. When data was sparse, every data point was critical, and thus great care was taken to avoid letting any point bias the analysis. From "BIG DATA" Viktor Mayer-Schonberger and Kenneth Cukier

The main point of the paragraph is:

- (a) The twenty-first century is a digital world
  - (b) Big data is obsessed with exactness
  - (c) Exactitude is not critical in dealing with big data
  - (d) Sparse data leads to a bias in the analysis
- [2014 : 2 Marks, Set-II]

## GATE : 2014

### ME + EC (Online Exam) Set: I-IV

40. Choose the most appropriate phrase from the options given below to complete the following sentence. The aircraft \_\_\_\_\_ take off as soon as its flight plan was filed.

- (a) is allowed to
- (b) will be allowed to
- (c) was allowed to
- (d) has been allowed to

[2014 : 1 Mark, Set-I]

41. Choose the most appropriate word from the options given below to complete the following sentence.

Many ancient cultures attributed disease to supernatural causes. However, modern science has largely helped \_\_\_\_\_ such notions.

- (a) impel (b) dispel
- (c) propel (d) repel

[2014 : 1 Mark, Set-I]

42. Choose the most appropriate word from the options given below to complete the following sentence.

Communication and interpersonal skills are \_\_\_\_\_ important in their own ways.

- (a) each (b) both
- (c) all (d) either

[2014 : 1 Mark, Set-II]

43. Which of the options given below best completes the following sentence?

She will feel much better if she \_\_\_\_\_.

- (a) will get some rest
- (b) gets some rest
- (c) will be getting some rest
- (d) is getting some rest

[2014 : 1 Mark, Set-II]

44. Choose the most appropriate pair of words from the options given below to complete the following sentence.

She could not \_\_\_\_\_ the thought of \_\_\_\_\_ the election to her bitter rival.

- (a) bear, loosing (b) bare, loosing
- (c) bear, losing (d) bare, losing

[2014 : 1 Mark, Set-II]

45. The value of one U.S. dollar is 65 Indian Rupees today, compared to 60 last year. The Indian Rupee has \_\_\_\_\_.

- (a) depressed (b) depreciated
- (c) appreciated (d) stabilized

[2014 : 1 Mark, Set-III]

46. 'Advice' is \_\_\_\_\_.

- (a) a verb
- (b) a noun
- (c) an adjective
- (d) both a verb and a noun

[2014 : 1 Mark, Set-III]

47. Which of the following options is the closest in meaning to the word underlined in the sentence below?

In a democracy, everybody has the freedom to disagree with the government.

- (a) dissent (b) descent
- (c) decent (d) decadent

[2014 : 1 Mark, Set-IV]

48. After the discussion, Tom said to me, 'Please revert!'. He expects me to \_\_\_\_\_.

- (a) retract (b) get back to him
- (c) move in reverse (d) retreat

[2014 : 1 Mark, Set-IV]

49. While receiving the award, the scientist said, "I feel vindicated". Which of the following is closest in meaning to the word 'vindicated'?

- (a) punished (b) substantiated
- (c) appreciated (d) chastened

[2014 : 1 Mark, Set-IV]

## GATE : 2014

### EE + CS (Online Exam) Set: I-III

50. Which of the following options is the closest in meaning to the phrase underlined in the sentence below?

It is fascinating to see life forms cope with varied environment conditions.

- (a) adopt to (b) adapt to
- (c) adept in (d) accept with

[2014 : 1 Mark, Set-I]

51. Choose the most appropriate word from the options given below to complete the following sentence.

He could not understand the judges awarding her the first prize, because he thought that her performance was quite \_\_\_\_\_.

- (a) superb (b) medium
- (c) mediocre (d) exhilarating

[2014 : 1 Mark, Set-I]

52. In a press meet on the recent scam, the minister said, "The buck stops here". What did the minister convey by the statement?

- (a) He wants all the money
- (b) He will return the money
- (c) He will assume final responsibility
- (d) He will resist all enquiries

[2014 : 1 Mark, Set-I]

53. The Palghat Gap (or Palakkad Gap), a region about 30 km wide in the southern part of the Western Ghats in India, is lower than the hilly terrain to its north and south. The exact reasons for the formation of this gap are not clear. It result in the neighbouring regions of Tamil Nadu getting more rainfall from the South West monsoon and the neighbouring regions of Kerala having higher summer temperatures. What can be inferred from this passage?

- (a) The Palghat gap is caused by high temperatures in southern Tamil Nadu and Kerala.
- (b) The regions in Tamil Nadu and Kerala that are near the Palghat Gap are low lying.
- (c) The low terrain of the Palghat Gap has a significant impact on weather patterns in neighbouring parts of Tamil Nadu and Kerala.
- (d) Higher summer temperatures result in higher rainfall near the Palghat Gap area.

[2014 : 2 Marks, Set-I]

54. Choose the most appropriate phrase from the options given below to complete the following sentence.

India is a post colonial country because

- (a) it was a former British colony
- (b) Indian Information Technology processional have colonized the world
- (c) India does not follow any colonial practices
- (d) India has helped other countries gain freedom

[2014 : 1 Mark, Set-II]

55. Who \_\_\_\_\_ was coming to see us this evening?

- (a) you said
- (b) did you say
- (c) did you say that
- (d) had you said

[2014 : 1 Mark, Set-II]

**56. Match the columns:**

- |                        |                    |
|------------------------|--------------------|
| Column-1               | Column-2           |
| 1. eradicate           | P. misrepresent    |
| 2. distort             | Q. soak completely |
| 3. saturate            | R. use             |
| 4. utilize             | S. destroy utterly |
| (a) 1-S, 2-P, 3-Q, 4-R |                    |
| (b) 1-P, 2-Q, 3-R, 4-S |                    |
| (c) 1-Q, 2-R, 3-S, 4-P |                    |
| (d) 1-S, 2-P, 3-R, 4-Q |                    |
- [2014 : 1 Mark, Set-II]

57. The old city of Koenigsberg, which had a German majority population before World War 2, is now called Kaliningrad. After the events of the war, Kaliningrad is now a Russian territory and has a predominantly Russian population. It is bordered by the Baltic Sea on the north and the countries of Poland to the South and West and Lithuania to the East respectively. Which of the statements below can be inferred from this passage.

- (a) Kaliningrad was historically Russian in its ethnic make up
  - (b) Kaliningrad is a part of Russia despite it not being contiguous with the rest of Russia
  - (c) Koenigsberg was renamed Kaliningrad, as that was its original Russian name
  - (d) Poland and Lithuania are on the route from Kaliningrad to the rest of Russia
- [2014 : 2 Marks, Set-II]

58. The number of people diagnosed with dengue fever (contracted from the bite of a mosquito) in North India is twice the number diagnosed last year. Municipal authorities have concluded that measures to control the mosquito population have failed in this region. Which one of the following statements, if true, does not contradict this conclusion?

- (a) A high proportion of the affected population has returned from neighbouring countries where dengue is prevalent.
  - (b) More cases of dengue are now reported because of an increase in the Municipal Office's administrative efficiency.
  - (c) Many more cases of dengue are being diagnosed this year since the introduction of a new effective diagnostic test.
  - (d) The number of people with malarial fever (also contracted from mosquito bites) has increased this year.
- [2014 : 2 Marks, Set-II]

59. While trying to collect an envelope  
 I  
 from under the table, Mr. X fell down and  
 II  
 III  
 and was losing consciousness.  
 IV

Which one of the above underlined parts of the sentence is NOT appropriate?

- (a) I
  - (b) II
  - (c) III
  - (d) IV
- [2014 : 1 Mark, Set-III]

60. If she \_\_\_\_\_ how to calibrate the instrument, she \_\_\_\_\_ done the experiment.
- (a) knows, will have
  - (b) knew, had
  - (c) had known, could have
  - (d) should have known, would have
- [2014 : 1 Mark, Set-III]

61. Choose the word that is opposite in meaning to the word "coherent".
- (a) sticky
  - (b) well-connected
  - (c) rambling
  - (d) friendly
- [2014 : 1 Mark, Set-III]

62. By the beginning of the 20<sup>th</sup> century, several hypotheses were being proposed, suggesting a paradigm shift in our understanding of the universe. However, the clinching evidence was provided by experimental measurements of the position of a star which was directly behind our sun.

- Which of the following inference(s) may be drawn from the above passage?
- (i) Our understanding of the universe changes based on the positions of stars
  - (ii) Paradigm shifts usually occur at the beginning of centuries
  - (iii) Stars are important objects in the universe
  - (iv) Experimental evidence was important in confirming this paradigm shift
- (a) (i), (ii) and (iv)
  - (b) (iii) only
  - (c) (i) and (iv)
  - (d) (iv) only
- [2014 : 2 Marks, Set-III]

**GATE : 2015**  
**EE + EC (Online Exam)**

63. Choose the appropriate word/phrase, out of the four options given below, to complete the following sentence:

Frogs \_\_\_\_\_

- (a) croak
- (b) roar
- (c) hiss
- (d) patter

64. Choose the word most similar meaning to the given word:

Educe \_\_\_\_\_

- (a) Exert
- (b) Educate
- (c) Extract
- (d) Extend

65. Choose the most appropriate word from the options given below to complete the following sentence.

The principal presented the chief guest with a \_\_\_\_\_, as token of appreciation.

- (a) momento
- (b) memento
- (c) momentum
- (d) moment

66. The following question presents a sentence, part of which is underlined. Beneath the sentence you find four ways of phrasing the underlined part. Following the requirements of the standard written English, select the answer that produces the most effective sentence.

Tuberculosis, together with its effects, ranks one of the leading causes of death in India.

- (a) ranks as one of the leading causes of death
- (b) rank as one of the leading causes of death
- (c) has the rank of one of the leading causes of death
- (d) are one of the leading causes of death

67. Read the following paragraph and choose the correct statement.

Climate change has reduced human security and threatened human well being. An ignored reality of human progress is that human security largely depends upon environmental security. But on the contrary, human progress seems contradictory to environmental security. To keep up both at the required level is a

challenge to be addressed by one and all. One of the ways to curb the climate change may be suitable scientific innovations, while the other may be the Gandhian perspective on small scale progress with focus on sustainability.

- (a) Human progress and security are positively associated with environmental security.
- (b) Human progress is contradictory to environmental security.
- (c) Human security is contradictory to environmental security.
- (d) Human progress depends upon environmental security.

68. We \_\_\_\_\_ our friend's birthday and we \_\_\_\_\_ how to make it up to him

- (a) completely forgot --- don't just know
- (b) forgot completely --- don't just know
- (c) completely forgot --- just don't know
- (d) forgot completely --- just don't know

69. A generic term that includes various items of clothing such as a skirt, a pair of trousers and a shirt is

- (a) fabric
- (b) textile
- (c) fibre
- (d) apparel

70. Choose the statement where underlined word is used correctly.

- (a) The industrialist had a personnel jet.
- (b) I write my experience in my personnel diary.
- (c) All personnel are being given the day off.
- (d) Being religious is a personnel aspect.

71. Out of the following four sentences, select the most suitable sentence with respect to grammar and usage.

- (a) Since the report lacked needed information, it was of no use to them.
- (b) The report was useless to them because there were no needed information in it.
- (c) Since the report did not contain the needed information, it was not real useful to them.
- (d) Since the report lacked needed information, it would not have been useful to them.

## GATE : 2015

### ME + CE (Online Exam)

72. What is the adverb for the given word below?

Misogynous

- (a) Misogynousness
- (b) Misogyny
- (c) Misogynously
- (d) Misogynous

73. Choose the appropriate word/phrase, out of the four options given below, to complete the following sentence:

Dhoni, as well as the other team members of Indian team, \_\_\_\_\_ present on the occasion.

- (a) were
- (b) was
- (c) has
- (d) have

74. Choose the word most similar in meaning to the given word:

Awkward

- (a) Inept
- (b) Graceful
- (c) Suitable
- (d) Dreadful

75. In the following sentence certain parts are underlined and marked P, Q and R. One of the parts may contain certain error or may not be acceptable in standard written communication. Select the part containing an error. Choose D as your answer if there is no error.

The student corrected all the errors that  
P

the instructor marked on the answer book  
Q R

- (a) P
- (b) Q
- (c) R
- (d) No Error

76. Select the pair that best expresses a relationship similar to that expressed in the pair

Children: Pediatrician

- (a) Adult: Orthopaedist
- (b) Females: Gynaecologist
- (c) Kidney: Nephrologist
- (d) Skin: Dermatologist

77. Extreme focus on syllabus and studying for tests has become such a dominant concern of Indian students that they close their minds to anything \_\_\_\_\_ to the requirements of the exam.

- (a) related
- (b) extraneous
- (c) outside
- (d) useful

78. The Tamil version of \_\_\_\_\_ John Abraham-starrer *Madras Cafe* \_\_\_\_\_ cleared by the Censor Board with no cuts last week, but the film's distributors \_\_\_\_\_ no takers among the exhibitors for a release in Tamil Nadu \_\_\_\_\_ this Friday.

- (a) Mr., was, found, on
- (b) a, was, found, at
- (c) the, was, found, on
- (d) a, being, find at

79. Alexander turned his attention towards India, since he had conquered Persia.

Which one of the statements below is logically valid and can be inferred from the above sentence?

- (a) Alexander would not have turned his attention towards India had he not conquered Persia.
- (b) Alexander was not ready to rest on his laurels, and wanted to march to India.
- (c) Alexander was completely in control of his army and could command it to move towards India.
- (d) Since Alexander's kingdom extended to Indian borders after the conquest of Persia, he was keen to move further.

## GATE : 2015

### CS + IN (Online Exam)

80. Didn't you buy \_\_\_\_\_ when you went shopping?

- (a) any paper
- (b) much paper
- (c) no paper
- (d) a few paper

81. Which of the following options is the closest in meaning to the sentence below?

She enjoyed herself immensely at the party.

- (a) She had a terrible time at the party
- (b) She had a horrible time at the party
- (c) She had a terrific time at the party
- (d) She had a terrifying time at the party

82. Which one of the following combinations is incorrect?

- (a) Acquiescence - Submission
- (b) Wheedle - Roundabout
- (c) Flippancy - Lightness
- (d) Profligate - Extravagant

83. Select the alternative meaning of the underlined part of the sentence.

The chain snatchers took to their heels when the police party arrived.

- (a) took shelter in a thick jungle
- (b) open indiscriminate fire
- (c) took to flight
- (d) unconditionally surrendered

84. Choose the appropriate word/phrase, out of the four options given below, to complete the following sentence:

Apparent lifelessness \_\_\_\_\_ dormant life.

- (a) harbours
- (b) leads to
- (c) supports
- (d) affects

85. Choose the statement where underlined word is used correctly:

- (a) When the teacher eludes to different authors, he is being elusive.
- (b) When the thief keeps eluding the police, he is being elusive.
- (c) Matters are difficult to understand, identify or remember are allusive.
- (d) Mirages can be allusive, but a better way to express them is illusory.

86. Fill in the blank with the correct idiom/phrase. That boy from the two was a \_\_\_\_\_ in the sleepy village.

- (a) dog out of herd
- (b) sheep from the heap
- (c) fish out of water
- (d) bird from the flock

87. Select the appropriate option in place of underlined part of the sentence:

Increased productivity necessary reflects greater efforts made by the employees.

- (a) Increase in productivity necessary
- (b) Increase productivity is necessary
- (c) Increase in productivity necessarily
- (d) No improvement required

## GATE : 2016

### EC + ME (Online Exam) Set: I

88. Which of the following is CORRECT with respect to grammar and usage? Mount Everest is \_\_\_\_\_.

- (a) the highest peak in the world
- (b) highest peak in the world
- (c) one of highest peak in the world
- (d) one of the highest peak in the world

89. The policeman asked the victim of a theft, "What did you \_\_\_\_\_?"

- (a) loose
- (b) lose
- (c) loss
- (d) louse

90. Despite the new medicine's \_\_\_\_\_ in treating diabetes, it is not \_\_\_\_\_ widely.

- (a) effectiveness - prescribed
- (b) availability - used
- (c) prescription - available
- (d) acceptance - proscribed

91. In a world filled with uncertainty, he was glad to have many good friends. He has always assisted them in times of need and was confident that they would reciprocate. However, the events of the last week proved him wrong.

Which of the following inference(s) is/are logically valid and can be inferred from the above passage?

- I. His friends were always asking him to help them.
  - II. He felt that when in need of help, his friends would let him down.
  - III. He was sure that his friends would help him when in need.
  - IV. His friends did not help him last week.
- (a) I and II
  - (b) III and IV
  - (c) III only
  - (d) IV only

**GATE : 2016****EC + ME (Online Exam) Set: II**

92. Based on the given statements, select the appropriate option with respect to grammar and usage. Statements

- I. The height of Mr. X is 6 feet.
- II. The height of Mr. Y is 5 feet.
- (a) Mr. X is longer than Mr. Y.
- (b) Mr. X is more elongated than Mr. Y
- (c) Mr. X is taller than Mr. Y
- (d) Mr. X is lengthier than Mr. Y

93. The students \_\_\_\_\_ the teacher on teachers' day for twenty years of dedicated teaching.

- (a) facilitated (b) felicitated
- (c) fantasized (d) facilititated

94. After India's cricket world cup victory in 1985, shrotria who was playing both tennis and cricket till then, decided to concentrate only on cricket. And the rest is history.

What does the underlined phrase mean in this context?

- (a) history will rest in peace
- (b) rest is recorded in history books
- (c) rest is well known
- (d) rest is archaic

95. Social science disciplines were in existence in an amorphous form until the colonial period when they were institutionalized. In varying degrees, they were intended to further the colonial interest. In the time of globalization and the economic rise of postcolonial countries like India, conventional ways of knowledge production have become obsolete. Which of the following can be logically inferred from the above statements?

- I. Social science disciplines have become obsolete.
- II. Social science disciplines had a pre-colonial origin.
- III. Social science disciplines always promote colonialism.
- IV. Social science must maintain disciplinary boundaries.

- (a) II only (b) I and III only
- (c) II and IV only (d) III and IV only

**GATE : 2016****IN + EC (Online Exam) Set: I-III**

96. An apple costs ₹ 10. An onion costs ₹ 8. Select the most suitable sentence with respect to grammar and usage.

- (a) The price of an apple is greater than an onion.
- (b) The price of an apple is more than onion.
- (c) The price of an apple is greater than of an onion.
- (d) Apples are more costlier than onions.

97. The Buddha said, "Holding on to anger is like grasping a hot coal with the intent of throwing it at someone else; you are the one who gets burnt."

Select the word below which is closest in meaning to the word underlined above.

- (a) burning (b) igniting
- (c) clutching (d) flinging

98. The overwhelming number of people infected with rabies in India has been flagged by the World Health Organization as a source of concern. It is estimated that inoculating 70% of pets and stray dogs against rabies can lead to a significant reduction in the number of people infected with rabies.

Which of the following can be logically inferred from the above sentences?

- (a) The number of people in India infected with rabies is high.
- (b) The number of people in other parts of the world who are infected with rabies is low
- (c) Rabies can be eradicated in India by vaccinating 70% of stray dogs
- (d) Stray dogs are the main source of rabies worldwide

**GATE : 2016****CE + CS (Online Exam) Set: I**

99. Out of the following four sentences, select the most suitable sentence with respect to grammar and usage.

- (a) I will not leave the place until the minister does not meet me.
- (b) I will not leave the place until the minister doesn't meet me.
- (c) I will not leave the place until the minister meet me.
- (d) I will not leave the place until the minister meets me.

100. A rewording of something written or spoken is a \_\_\_\_\_.

- (a) paraphrase (b) paradox
- (c) paradigm (d) paraffin

101. Archimedes said, "Give me a lever long enough and a fulcrum on which to place it, and I will move the world." The sentence above is an example of a \_\_\_\_\_ statement.

- (a) figurative (b) collateral
- (c) literal (d) figurine

102. Indian currency notes show the denomination indicated in at least seventeen languages. If this is not an indication of the nation's diversity, nothing else is. Which of the following can be logically inferred from the above sentences?

- (a) India is a country of exactly seventeen languages.
- (b) Linguistic pluralism is the only indicator of a nation's diversity.
- (c) Indian currency notes have sufficient space for all the Indian languages.
- (d) Linguistic pluralism is strong evidence of India's diversity.

**GATE : 2016****EE + CS (Online Exam) Set: I-II**

103. The man who is now Municipal Commissioner worked as \_\_\_\_\_.

- (a) the security guard at a university
- (b) a security guard at the university
- (c) a security guard at university
- (d) the security guard at the university

104. Nobody knows how the Indian cricket team is going to cope with the difficult and seamer-friendly wickets in Australia. Choose the option which is closest in meaning to the underlined phrase in the above sentence.

- (a) put up with (b) put in with
- (c) put down to (d) put up against

105. Find the odd one in the following group of words.

- mock, deride, praise, jeer
- (a) mock (b) deride
- (c) praise (d) jeer

106. Computers were invented for performing only high-end useful computations. However, it is no understatement that they have taken over our world today. The internet, for example, is ubiquitous. Many believe that the internet itself is an unintended consequence of the original invention. With the advent of mobile computing on our phones, a whole new dimension is now enabled. One is left wondering if all these developments are good or, more importantly, required.

Which of the statement(s) below is/are logically valid and can be inferred from the above paragraph?

- (i) The author believes that computers are not good for us.
- (ii) Mobile computers and the internet are both intended inventions
- (a) (i) only (b) (ii) only
- (c) both (i) and (ii) (d) neither (i) nor (ii)

## GATE : 2016

### CE (Online Exam) Set: II

107. If I were you, I \_\_\_\_\_ that laptop. It's much too expensive.  
 (a) won't buy      (b) shan't buy  
 (c) wouldn't buy    (d) would by

108. He turned at deaf ear to my request.  
 What does the underlined phrasal verb mean?  
 (a) ignored      (b) appreciated  
 (c) twisted      (d) returned

109. Choose the most appropriate set of words from the options given below to complete the following sentence.  
 \_\_\_\_\_ is a will, \_\_\_\_\_ is a way.  
 (a) wear, there, their  
 (b) were, their, there  
 (c) where, there, there  
 (d) were, their, their

110. Today we consider, Ashoka as a great ruler because of the copious evidence he left behind in the form of stone carved edicts. Historians tend to correlate greatness of a king at his time with the availability of evidence today.

- Which of the following can be logically inferred from the above sentences?  
 (a) Emperors who do not leave significant sculpted evidence are completely forgotten.  
 (b) Ashoka produced stone carved edicts to ensure that later historians will respect him.  
 (c) Statues of kings are a reminder of their greatness.  
 (d) A king's greatness, as we know him today, is interpreted by historians.

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## GATE : 2016

### EE (Online Exam) Set: II

111. The chairman requested the aggrieved shareholders to \_\_\_\_ him.  
 (a) bare with      (b) bore with  
 (c) bear with      (d) bare

112. Identify the correct spelling out of the given options:  
 (a) Managable      (b) Manageable  
 (c) Mangaeble      (d) Managible

113. A poll of students appearing for masters in engineering indicated that 60 % of the students believed that mechanical engineering is a profession unsuitable for women. A research study on women with masters or higher degrees in mechanical engineering found that 99 % of such women were successful in their professions.

- Which of the following can be logically inferred from the above paragraph?  
 (a) Many students have misconceptions regarding various engineering disciplines.  
 (b) Men with advanced degrees in mechanical engineering believe women are well suited to be mechanical engineers.  
 (c) Mechanical engineering is a profession well suited for women with masters or higher degrees in mechanical engineering.  
 (d) The number of women pursuing higher degrees in mechanical engineering is small.



Adv.

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