TOPIC – 01

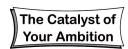**1.** In C language find the odd man out
(a) while – statement
(b) switch – statement
(c) for – statement
(d) do-while – statement

2. A group of students decided to go on picnic and planned to spend Rs. 6000/-. Four of them did not go on picnic. As a consequence each of the remaining had to contribute Rs. 400/- extra. The number of students who went on picnic are
(a) 6   (b) 10   (c) 8   (d) 4

3. The code of TIGER is VMMMB and the code of DOG is FSM. What is the code of FLY ?
(a) HPE   (b) GOD
(c) HOE   (d) GPE

4. If Laugh is to Joy then Cry is to _____.
(a) Panic   (b) Sorrow
(c) Sad   (d) Tragic

5. The complex numbers z_1, z_2 and origin form an equilateral triangle only if :
(a) $2z_1 + z_2^2 - z_1 z_2 = 0$
(b) $z_1^2 + z_2^2 - z_1 z_2 = 0$
(c) $z_1^2 + z_2^2 + 2z_1 z_2 = 0$
(d) $z_1^2 + 2z_2^2 - z_1 z_2 = 0$

6. X is 8 years older to Y and 5 years younger to Z. W and Y are twins. The average age of ward Z is $12\frac{1}{2}$ years. What is the age of W ?
(a) 16   (b) 19   (c) 6   (d) 9

7. In C language which of the following operators have highest precedence ?
(a) [ ]   (b) ? :   (c) =   (d) &

8. Let y(x) be a solution of the differential equation $(1 + e^x)y' + ye^x = 1$. If y(0) = 2, then y(–4) is equal to :
(a) $\frac{8e^4}{1+e^4}$ (b) 1   (c) 0   (d) $-\frac{2e^4}{1+e^4}$

9. The minimum value of the function $f(x) = 2|x-1| + |x-2|$ is
(a) 3   (b) 1   (c) 0   (d) 2

10. Let $P = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ and $Q = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ be two matrices. Then :
(a) P and Q have not common vector $(1, 0, 1)^T$.
(b) P and Q have common vector $(1, 0, 1)^T$ but corresponding eigenvalues for P and Q are different.
(c) P and Q have common vector $(1, 0, 1)^T$ and common eigenvalues 3.
(d) P and Q have common vector $(1, 0, 1)^T$ and common eigenvalues 1.

11. The locus of a point P which moves in R^3 such that 3PA = 2PB, where A(1, 3, 4) and B(1, –2, –1), is a sphere of radius :
(a) $7\sqrt{2}$ (b) $4\sqrt{7}$ (c) $6\sqrt{2}$ (d) $2\sqrt{6}$

12. The distance of a point on the surface $xyz^2 = 8$ nearest to the origin is :
(a) 4   (b) $2\sqrt{2}$ (c) 8   (d) $\sqrt{10}$

13. Which one of the following sequence is a convergent sequence :
(a) $< sin\frac{n\pi}{3} >$ (b) $< cos\frac{n\pi}{3} >$
(c) $< (-1)^n/n >$ (d) $< (-1)^n.n >$

14. Let R be a ring of 2x2 matrices over integers and $A = \left\{ \begin{bmatrix} a & b \\ 0 & 0 \end{bmatrix}; a, b \in z \right\}$ and $B = \left\{ \begin{bmatrix} a & 0 \\ b & 0 \end{bmatrix}; a, b \in z \right\}$. Then
(a) B is left ideal of R and A is right ideal of R.
(b) B is right ideal of R
(c) A is left ideal of R
(d) A and B both are left ideals of R.

15. Let $T: R^m \to R^n$ be a subjective (onto) linear transformations. If $T(v) = 0$ has a non-trivial solution in R^m, then which one of the following values is possible for the ordered pair (m, n) ?
(a) (1, 7)   (b) (7, 6)
(c) (7, 12)   (d) (7, 7)

16. Let $D = \{(x, y) | y \geq 0, 4 \leq x^2 + y^2 \leq 9\}$ then $\iint_D (x + 1)dA$, when expressed in polar coordinates, is equivalent to :
(a) $\int_0^\pi \int_2^3 (r^2 cos\theta + 1)drd\theta$
(b) $\int_0^\pi \int_4^9 (r^2 cos\theta + r)drd\theta$
(c) $\int_0^\pi \int_2^3 (r^2 cos\theta + r)drd\theta$
(d) $\int_0^{2\pi} \int_4^9 (r^2 cos\theta + r)drd\theta$

17. The number of homomorphism from the ring of integers z to an arbitrary ring R is :
(a) 2   (b) 0
(c) Infinite   (d) 1

18. Let U_1 and U_2 be subspaces of R^4 over the field R be defined by $U_1 = \{(x, y, z, w) | y + z + w = 0\}$ and $U_2 = \{(x, y, z, w) | x + y = 0, z = 2w\}$. Then dim ($U_1 \cap U_2$) is :
(a) 2   (b) 3
(c) 4   (d) 1

19. Let $< S_n >$ be a sequence defined by $S_1 = 1, S_{n+1} = \frac{3+2S_n}{2+S_n}, n \geq 1$. Then $< S_n >$ is :
(a) Convergent sequence and converges to $\frac{3}{2}$
(b) Oscillate sequence.
(c) Convergent sequence and converges to $\sqrt{3}$
(d) Divergent sequence.

20. If $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ is an eigenvector of the matrix $A = \begin{pmatrix} 4 & 1 & 2 \\ p & 2 & 1 \\ 14 & -4 & 10 \end{pmatrix}$, then p is equal to :
    (a) 17   (b) 31
    (c) 19   (d) 16

21. Which one of the set of vectors is linearly independent ?
    (a) (1, 2, 3, 4), (0, 1, –1, 2), (1, 5, 1, 8), (3, 7, 8, 14)
    (b) (1, –1, 2, 0), (3, 0, 0, 1), (2, 1, –1, 0), (1, –1, 2, 0)
    (c) (1, 1, 2), (–3, 1, 0), (1, –1, 1), (1, 2, –3)
    (d) (1, 0, 0), (1, 1, 1), (1, 2, 3)

22. the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{pmatrix}$ is
    (a) An involuntary   (b) Nilpotent
    (c) An idempotent   (d) Skew-symmetric

23. If m and n are the orders of permutations $\sigma = (4,5)(2,3,7)$ and $\tau = (1,4)(3,7,5,8)$, respectively, in the group S_B, then the ordered pair (m,n) is equal to :
    (a) (3, 4)   (b) (6, 4)
    (c) (6, 2)   (d) (4, 6)

24. On a certain day, a scientist had 1 kg of a radioactive substance X at 12:00 noon. The substance follows an exponential decay. If only 64 gm of the substance remained after 6 hour, then the amount (in gm) of substance X at 4:00 pm on the same day is :
    (a) 80   (b) 120
    (c) 160   (d) 200

25. The volume of the solid obtained by rotating the region bounded by the lines x = 0, x = 2, and y = 0, and the curve $y = 1 + \frac{x^3}{4}$, about the y-axis is :
    (a) 12π (b) 4π
    (c) 8π (d) 6π

26. Using 2's complement number system perform the indicated operation :
    00100011
    00100110
    The result of the operation is :
    (a) 00000011   (b) 01001001
    (c) 11111101   (d) 01001010

27. The volume lying inside the cylinder $x^2 + y^2 = 25$ and between the planes z = 2 and x + z = 8 is :
    The result of the operation is :
    (a) 50π (b) 75π
    (c) 150π (d) 175π

28. The radius of convergence of the series $\frac{1}{2}x + \frac{1.3}{2.5}x^2 + \frac{1.3.5}{2.5.8}x^3 + \cdots$ is :
    (a) 0   (b) $\frac{5}{2}$
    (c) $\frac{3}{2}$ (d) 1

29. Consider two improper integrals $I_1 = \int_0^2 \frac{dx}{(2-x)^{1/2}}$ and $I_2 = \int_0^2 \frac{dx}{(4-x^2)^{3/2}}$. Then :
    (a) Both I_1 and I_2 are divergent.
    (b) Both I_1 and I_2 are convergent.
    (c) I_1 is divergent and I_2 is convergent
    (d) I_1 is convergent and I_2 is divergent.

30. Let a be a 3 x 3 matrix with trace 10. If $(1, 2, 1)^T$ and $(1, 1, 0)^T$ are eigenvectors with same eigenvalue 7 of A, then the determinant of A is :
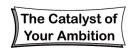   (a) –196   (b) 196   (c) 98   (d) –49

31. The coefficient of $(x - 8)^2$ in the Taylor's series expansion of the function $f(x) = x^{1/3}$ about x = 8 is
    (a) $-\frac{1}{288}$ (b) $\frac{1}{96}$ (c) $-\frac{1}{144}$ (d) $-\frac{1}{32}$

32. Let f be differentiable on an interval I and f' be bounded on I. Then :
    (a) f is continuous but not uniformly continuous.
    (b) f is not continuous
    (c) f is uniformly continuous on I.
    (d) Neither f is continuous on I nor f is uniformly continuous on I

33. Let $f(x) = \begin{matrix} xe^{-x^2}, & |x| \leq 1, \\ e^{-1}, & |x| > 1, \end{matrix}$ Then
    (a) $f'(1) = 0$
    (b) $f'(-1) = 0$
    (c) f is not differentiable at x = 1 and x = –1
    (d) $f'(0) = 0$

34. Let $S = \{(x,y)|0 \leq x \leq 1, 0 \leq y \leq 1\}$. Then the value of $\oint_s (xy\hat{i} + yz\hat{j} + xz\hat{k})\, d\vec{r}$ is equal to
    (a) $-\frac{1}{2}$ (b) $\frac{1}{3}$
    (c) $-\frac{1}{3}$ (d) $\frac{1}{2}$

35. The power series $\sum_{n=2}^{\infty} \frac{(x-4)^4}{n \ln^2 n}$ is
    (a) convergent in(3, 5)   (b) divergent when x = 3
    (c)divergent in (3, 5)   (d) convergent in (0, 1)

36. If $x = u + \frac{v}{2}$ and $y = \frac{v}{2}$ and D is the region bounded by $x^2 - 2xy + 5y^2 = 1$, then the value of $\iint_D 2dA$, is
    (a) 2π (b) 2   (c) 1   (d) π

37. Let R be the ring of real-valued continuous functions on closed interval [0, 1]. If $M = \left\{f \in R \middle| f\left(\frac{1}{\sqrt{2}}\right) = 0\right\}$, then M is a :
    (a) neither maximal nor prime ideal
    (b) both maximal and prime ideal
    (c) maximal ideal but not a prime ideal
    (d) prime ideal but not a maximal ideal

38. The expression a > 6 || a < 7 & & a ! = 10 is evaluated as :
    (a) a > 6 || a < 7 & & (a ! = 10)
    (b) a > 6 || (a < 7 & & a ! = 10)
    (c) a > 6 || a < 7) & & a ! = 10
    (d) (a > 6 || a < 7 & & a ! = 10)

39. Find the ODD man out :
4 – 16 – 256,
5 – 25 – 625,
7 – 49 – 343,
8 – 64 – 4096.
(a) 5 – 25 – 625   (b) 8 – 64 – 4096
(c) 7 – 49 – 343   (d) 4 – 16 – 256

40. The next term in the series : 4, 14, 45, 139, ? is :
(a) 517   (b) 522
(c) 422   (d) 417

TOPIC – 02

Direction (Q.N. 1- 5): Read the following passage carefully and give the right answer :

Like so much else in the world's largest democracy, household finance in India is unique. There is, for example, a strong tendency to keep wealth in physical assets – gold and property. Levels of pension wealth are worrying low, as is take-up of all types of insurance, even in areas which are prone to natural disasters. When emergency expenditures are necessary, for example, for health reasons, there are high levels of reliance on unsecured debt from non-institutional sources. Why are these issues important?

For one, we are sitting on a demo graphic time-bomb. The number of Indians over the age of 60 has hit an all-time high, with the most recent figures showing that this demographic comprises 8.6 percent of the population, with a climbing age dependency ratio (currently at 14.2 percent). We can expect this elderly cohort to grow rapidly in coming years. Indians have traditionally shunned pension plans in favor of traditional arrangements in which the younger generation takes care of their elders. But these traditional structures are under increasing pressure, putting families in a potentially vulnerable position.

For another, the lack of widespread insurance can see the victims of tragic or unfortunate circumstances forced into unregulated emergency borrowing, often from non-institutional sources, at potentially punitive rates. The steps in the recent budget towards universal health insurance are a welcome step (if implemented appropriately), consistent with the recommendations of our committee, but there is much more to be done here. A third issue is that we have a tendency to invest heavily in physical assets such as gold and property. Steps to encourage the financialisation of savings are therefore critical. Viewed in this light, the introduction of the long-term capital gains tax is a step backwards, especially given how responsive Indians are to tax incentives.

1. Mark the statement that is NOT true:

(a) Indians, as a rule, like to invest heavily in physical assets such as gold and property
(b) In case of emergency, people like to depend on unsecured debt from noninstitutional sources.
(c) Only in areas prone to natural disasters do people take up all types of insurance.
(d) The numbers of elderly people is growing rapidly.

2 'Indians have traditionally shunned pension plans in favor of traditional arrangements.' What does 'traditional arrangements' mean?

(a) Trusting your children to take care of you in your old age.
(b) Cash at home
(c) All types of insurance.
(d) Loans from non-institutional sources.

3. Why does the author say 'the introduction of the long-term capital gains tax is a step backwards'

(a) People in India are averse to paying taxes.
(b) All of these
(c) Government instruments of investment will become less attractive for people.
(d) It could make people put more faith in traditional avenues of investment.

4. An apt title for the passage could be :

(a) Traditional ways of saving in India.
(b) Management of household finances in India
(c) Problems of old people.
(d) The demographic time-bomb.

5. How is household finance in India unique ?

(a) Prone to disasters, Indians like to keep ready cash with them.
(b) Unlike others, Indians keep wealth in physical assets – gold and property.
(c) They do not trust any type of insurance.
(d) They believe in traditional ways of savings.

TOPIC – 03

Direction (Q.N. 1- 5): Read the following passage carefully and give the right answer :

It may rain once a decade or less in South America's Atacama Desert, but tiny bacteria and microorganisms survive there, hinting at the possibility of similar life on Mars, researchers said Monday.

The desert, which spans parts of Chile and Peru, is the driest no n-polar desert on Earth and may contain the environment most like that of the Red Planet, said the report in the 'Proceedings of the National Academy of Sciences'.

Lead researchers Dirk Schulze-Makuch, a professor and planetary scientist at the Technic al University of Berlin, and colleagues took a trip to the desert in 2015 to learn more about what kind of life might exist there. Then, unexpectedly, it rained. Scientists detected an explosion of biological activity in the soil, and scooped up samples. Genomic analyses helped identify the several apparently indigenous species of microbial life – most bacteria – that had somehow adapted to live in the harsh environment by lying dormant for years, the reanimating and reproducing once it rained.

"In the past, researchers have found dying organisms near the surface and remnants of DNA, but this is really the first time that anyone has been able to identify a persistent form of live living in the soil of the Atacama Desert," Schulze-Makuch said. "We believe these microbial communities can lie dormant for thousands of years in conditions very similar to what you would find on a planet like Mars a come back to life when it rains."

Scientist returned to the Atacam a in 2016 and 2017 and discovered that the same microbial communities in the soil were gradually reverting to their dormant state. Since Mars has oceans and lakes billions of years ago, researchers say early life forms may have thrived there, too.

1. The central idea of the passage can be summed up in the statement:

(a) Study of microbial life on Atacama Desert and on the Mars.
(b) Looking for life on the Mars millions of years ago.
(c) Microbial life in Atacama holds clue to possible life on the Mars.
(d) Research on life on the Mars.

2. What conclusion did the research team arrive at on the basis of their findings?

(a) Indigenous species of microbial life had somehow adapted to live in the harsh environment of the Atacama Desert by lying dormant for years
(b) The findings proved that early life form like that in the Atacama Desert thrived on the Mars, too.
(c) The Atacama Desert and the Mars had similar environments and life forms.
(d) If microorganisms could survive in the dry Atacama Desert, perhaps similar life could survive on the Mars, too.

3. What basic similarity did the research team find between the Atacama Desert and the Mars surface

(a) Both had very dry deserts.
(b) All of these
(c) Environment that once existed on Mars was imilar to that in Atacama Desert today.
(d) Microbial life could thrive for thousands of years in identical conditions in Atacama Desert and on Mars.

4. Mark the statement that is NOT true :

(a) Bacteria had somehow adapted to live in the harsh environment in Atacama by lying dormant for years.
(b) Tiny microorganisms that survive in Atacama Desert hint at the possibility of similar life on Mars
(c) This research team was the first to identify a persistent form of life living in the soil of the Atacama Desert.
(d) Research on Atacama microbes has proved that similar life forms exist on the Mars

5. Why did the scientists choose South America's Atacama Desert for research ?

(a) It contained bacteria that could survive the longest without water on Earth.
(b) It is a region where it rains once a decade or less.
(c) It is the driest non-polar desert on Earth.
(d) They surmised that its environment was most like that of the Red Planet.

ANSWER KEY (DU MCA 2018)

TOPIC - 1

1. (b)	2. (a)	3. (a)	4. (b)	5. (b)	6. ()	7. (a)	8. (c)	9. (b)	10. (b)
11. (c)	12. (b)	13. (c)	14. (a)	15. (b)	16. (c)	17. (d)	18. (d)	19. (c)	20. (a)
21. (d)	22. (b)	23. (b)	24. (c)	25. (d)	26. (c)	27. (c)	28. (c)	29. (d)	30. (a)
31. (c)	32. (c)	33. (c)	34. (a)	35. (a)	36. (d)	37. (b)	38. (a)	39. (c)	40. (c)

TOPIC – 2

1. (c)	2. (a)	3. (b)	4. (b)	5. (b)

TOPIC – 3

1. (c)	2. (d)	3. (d)	4. (d)	5. (d)