M.C.A.

12P/203/23 8956

Set No. – I Question Booklet No. .....

(To be filled up by the candidate by ***blue/black ball-point pen***)

Roll No. | | | | | | | | |

Roll No.

(Write the digits in words) .....

Serial No. of Answer Sheet .....

Day and Date ....
(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only ***blue/black ball-point pen*** in the space above and on both sides of the Answer Sheet)

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall ***except the Admit Card without its envelope.***
3. A separate Answer Sheet is given. ***It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.***
4. Write your ***Roll Number and Serial Number of the Answer Sheet by pen*** in the space provided above.
5. ***On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.***
6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and Roll No. and OMR sheet No. on the Question Booklet.
7. Any changes in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfairmeans.
8. Each question in this Booklet is followed by four alternative answers. ***For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by pen as mentioned in the guidelines given on the first page of the Answer Sheet.***
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. ***Note that the answer once filled in ink cannot be changed.*** If you ***do not wish to attempt*** a question, leave all the circles in the corresponding row blank (such question will be awarded zero marks).
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit ***only the OMR Answer Sheet*** at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण-पृष्ठ पर दिये गये हैं।]

Total No. of Printed Pages : 26

No. of Questions : 150

Time : $2\frac{1}{2}$ Hours] *[Full Marks : 450*

Instructions :

(1) Attempt as many questions as you can. Each question carries **3 (three)** marks. ***One mark will be deducted for each incorrect answer. Zero*** mark will be awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.

1. Which of the following is the decimal representation of $\frac{22}{7}$?

(1) $3.\overline{142857}$ (2) $3.\overline{142867}$ (3) $3.\overline{14957}$ (4) $3.\overline{14967}$

2. Which of the following decimal number is in the form $\frac{p}{q}$?

(1) $\frac{60}{7}$ (2) $\frac{68}{9}$ (3) $\frac{63}{4}$ (4) $\frac{62}{5}$

3. If $\frac{\log x}{b-c}=\frac{\log y}{c-a}=\frac{\log z}{a-b}$, then $x^a y^b z^c$ equals :

(1) 0 (2) 1 (3) xyz (4) None of these

4. The factorization of the expression $36x^2-12x+1-25y^2$ is :

(1) $(5x-6y+1)(5x+6y+1)$ (2) $(6x-5y+1)(6x+5y+1)$

(3) $(5x-6y-1)(5x+6y-1)$ (4) $(6x-5y-1)(6x+5y-1)$

5. The solution of the following equation

$$\frac{x-1}{3}-\frac{4x+1}{4}=\frac{1}{12}$$

is :

(1) -1 (2) 1 (3) -2 (4) 2

6. If the sum of three consecutive odd natural numbers is 153, then the numbers are :

(1) 47, 49, 51 (2) 49, 51, 53 (3) 51, 53, 55 (4) 53, 55, 57

7. The value of complex number $\left(\frac{1+i}{\sqrt{2}}\right)^8+\left(\frac{1-i}{\sqrt{2}}\right)^8$ is :

(1) 2 (2) -2 (3) $\sqrt{2}$ (4) $\frac{1}{\sqrt{2}}$

8. The value of $7\log\frac{16}{15}+5\log\frac{25}{24}+3\log\frac{81}{80}$ is equal to :

(1) $\log 2$ (2) zero (3) unity (4) 0.2

9. The nth term of the series $2\frac{1}{2}+1\frac{7}{13}+1\frac{1}{9}+\frac{20}{23}+.....$ is :

(1) $\frac{20}{5n^2+3}$ (2) $20(5n+3)$ (3) $\frac{2}{5n-3}$ (4) $\frac{20}{5n+3}$

10. If the sum of first p terms of an A. P. is q and the sum of the first q terms is p, then the sum of the first $(p+q)$terms is :

(1) $p+q+1$ (2) $-(p+q+1)$ (3) $-(p+q)$ (4) $p+q$

11. If $x=1+a+a^2+a^3+.....\infty(a<1)$, $y=1+b+b^2+b^3+.....\infty(b<1)$, then the value of $1+ab+a^2b^2+a^3b^3+.....\infty$ is equal to :

(1) $\frac{xy}{x+y+1}$ (2) $\frac{xy}{x+y-1}$ (3) $\frac{x-y}{x+y+1}$ (4) $\frac{x-y}{x+y-1}$

12. The sum of 16 terms of the following series

$$\frac{1^3}{1}+\frac{1^3+2^3}{1+2}+\frac{1^3+2^3+3^3}{1+2+5}+.....16$$

terms is :

(1) 446 (2) 644 (3) 464 (4) 460

13. In the binomial expansion of $(a-b)^n$, $n \geq 5$, the sum of 5th and 6th terms is zero. Then $\frac{a}{b}$ equals :

(1) $\frac{n-5}{6}$ (2) $\frac{n-4}{5}$ (3) $\frac{5}{n-4}$ (4) $\frac{6}{n-5}$

14. If ${}^nC_{r-1}=36$, ${}^nC_r=84$ and ${}^nC_{r+1}=126$, then the value of r is equal to :

(1) 1 (2) 2 (3) 3 (4) 4

15. The expression $\frac{12}{3+\sqrt{5}+2\sqrt{2}}$ is equal to :

(1) $1-\sqrt{5}+\sqrt{2}+\sqrt{(10)}$ (2) $1-\sqrt{5}-\sqrt{2}+\sqrt{(10)}$

(3) $1+\sqrt{5}-\sqrt{2}+\sqrt{(10)}$ (4) $1+\sqrt{5}+\sqrt{2}-\sqrt{(10)}$

16. If ω is cube root of unity, then the value of determinant $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ is equal to :

(1) -1 (2) 1 (3) 0 (4) 2

17. If the matrices $A=\begin{bmatrix} 1 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} -2 & 3 \\ 1 & -5 \\ 4 & 1 \end{bmatrix}$, then AB is equal to :

(1) $\begin{bmatrix} -3 & -1 \\ -9 & -3 \end{bmatrix}$ (2) $\begin{bmatrix} 3 & -1 \\ 9 & -3 \end{bmatrix}$ (3) $\begin{bmatrix} -3 & 1 \\ 9 & 3 \end{bmatrix}$ (4) $\begin{bmatrix} 3 & 1 \\ -9 & 3 \end{bmatrix}$

18. State which of the following statement is *correct* ?

(1) Every set has a proper subset

(2) Every subset of a finite set is finite

(3) Every subset of an infinite set is infinite

(4) The set $\{x : x + 8 = 8\}$ is the null set

19. Which of the following statement is true ?

(1) For any two sets A and B either $A \subseteq B$ or $B \subseteq A$

(2) $\{a\} \in \{a, b, c\}$

(3) $\{a, b, a, b, a, b, ...\}$ is an infinite set

(4) $\{a, b, c\} = \{c, a, b\}$

20. If U = {natural numbers}, A = {multiples of 3} and B = {multiples of 5}, then $A - B$ equals :

(1) $\overline{A} \cap B$ (2) $A \cap \overline{B}$ (3) $\overline{A} \cup \overline{B}$ (4) $\overline{A \cap B}$

21. Let P be a probability function on $S = (l_1, l_2, l_3, l_4)$ such that $P(l_2) = \frac{1}{3}, P(l_3) = \frac{1}{6}, P(l_4) = \frac{1}{9}$. Then $P(l_1)$ is :

(1) $\frac{7}{18}$ (2) $\frac{1}{3}$ (3) $\frac{1}{6}$ (4) $\frac{1}{2}$

22. Let H be a sub-group of a group G and $a, b \in H$. Let $a \sim b$ iff $a \equiv b \bmod H$, then which of the following is true ?

(1) '~' is a reflexive relation (2) '~' is a symmetric relation

(3) '~' is a transitive relation (4) All of these

23. The straight line passes through the point $P(2, \sqrt{3})$ and makes an angle of 60° with the x-axis. The length of the intercept on it between the point P and the line $x + \sqrt{3}\, y = 12$ is :

(1) 1.5 (2) 2.5 (3) 3.5 (4) 4.5

24. If m is the mid point of the side BC of the triangle ABC, then :

(1) $AB^2 + AC^2 = AM^2 + BM^2$ (2) $AB^2 + AC^2 = 2AM^2 + 2BM^2$

(3) $AM^2 + MB^2 = 2AC^2$ (4) $2AB^2 + 2AC^2 = AM^2 + MB^2$

25. The equation of the straight line passing through the point of intersection of $4x + 3y - 8 = 0$ and $x + y - 1 = 0$, and the point $(-2, 5)$ is :

(1) $9x + 7y - 17 = 0$ (2) $4x + 5y + 6 = 0$

(3) $3x - 2y + 19 = 0$ (4) $3x - 4y - 7 = 0$

26. The angle between the two straight line represented by the equation $6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$ is :

(1) $\tan^{-1}\frac{3}{5}$ (2) $\tan^{-1}\frac{5}{3}$ (3) $\tan^{-1}\frac{2}{11}$ (4) $\tan^{-1}\frac{11}{2}$

27. The equation of circle passing through (–1, 2) and concentric with $x^2 + y^2 - 2x - 4y - 4 = 0$ is :

(1) $x^2 + y^2 - 2x - 4y + 1 = 0$ (2) $x^2 + y^2 - 2x - 4y + 2 = 0$

(3) $x^2 + y^2 - 2x - 4y + 4 = 0$ (4) $x^2 + y^2 - 2x - 4y + 8 = 0$

28. The radius of the circle on which the four points of intersection of the lines $(2x - y + 1)(x - 2y + 3) = 0$ with the axes lie, is :

(1) 5 (2) $\frac{5}{\sqrt{2}}$ (3) $\frac{5}{2\sqrt{2}}$ (4) $\frac{5}{4\sqrt{2}}$

29. The focal distance of a point on the parabola $y^2 = 8x$ is 4. Its ordinates are :

(1) ± 1 (2) ± 2 (3) ± 3 (4) ± 4

30. The straight line $x \cos\alpha + y \sin\alpha = p$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if :

(1) $p^2 = a^2\cos^2\alpha - b^2\sin^2\alpha$

(2) $p^2 = a^2\cos^2\alpha + b^2\sin^2\alpha$

(3) $p^2 = a^2\sin^2\alpha - b^2\cos^2\alpha$

(4) $p^2 = a^2\sin^2\alpha + b^2\cos^2\alpha$

31. If the line $lx + my = n$ touches the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ if :

(1) $a^2l^2 - b^2m^2 = n^2$ (2) $al - bm = n$

(3) $a^2l^2 + b^2m^2 = n^2$ (4) $al + bm = n$

32. For the conic $\frac{l}{r} = 1 + e\cos\theta$, the sum of reciprocals of the segments of any focal chord is equal to :

(1) l (2) $2l$ (3) $\frac{1}{l}$ (4) $\frac{2}{l}$

33. $\underset{n\to\infty}{Lim}(1+x)^{1/x}$ is equal to :

(1) 0 (2) 1 (3) e (4) $\frac{1}{e}$

34. The function $f(x)$ defined by $\begin{matrix} f(x) = x\left[1 + \frac{1}{3}\sin\left(\log x^2\right)\right] & , & x \neq 0 \\ f(x) = 0 & , & x = 0 \end{matrix}$, then :

(1) $f(x)$ is continuous at $x = 0$

(2) $f(x)$ has discontinuity of first kind at $x = 0$

(3) $f(x)$ has discontinuity of second kind at $x = 0$

(4) $f(x)$ has removable discontinuity at $x = 0$

35. The derivative of $\sin^{-1}\frac{1-x^2}{1+x^2}$ w. r. t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is :

(1) -1 (2) 0 (3) $\frac{1}{x}$ (4) x

36. The equation of tangent at (2, 2) of the curve $xy^2 = 4(4 - x)$ is :

(1) $x - y = 4$ (2) $x + y = 4$ (3) $x - y = 2$ (4) $x + y = 2$

37. The condition that the curve $ax^2 + by^2 = 1$ and $a'x^2 + b'y^2 = 1$ should intersect orthogonally is that :

(1) $a + b = a' + b'$ (2) $a - b = a' - b'$

(3) $\frac{1}{a} + \frac{1}{b} = \frac{1}{a'} + \frac{1}{b'}$ (4) $\frac{1}{a} - \frac{1}{b} = \frac{1}{a'} - \frac{1}{b'}$

38. If x and y be two real variable, such that $x > 0$ and $xy = 1$, then the minimum value of $x + y$ is :

(1) 1 (2) -1 (3) 2 (4) -2

39. The value of $\int \frac{xe^x}{(x+1)^2} dx$ is :

(1) $\frac{1}{x+1}e^x$ (2) $(x-1)^2 e^x$ (3) $(x+1)e^x$ (4) e^x

40. The value of $\int \frac{x + \sin x}{1 + \cos x} dx$ is :

(1) $x \cot \frac{x}{2}$ (2) $x \tan \frac{x}{2}$ (3) $x \sin \frac{x}{2}$ (4) $x \cos \frac{x}{2}$

41. The value of $\int_0^{\pi/2} \log(\tan x)\, dx$ is equal to :

(1) 0 (2) $\frac{x}{4}$ (3) $\frac{x}{2}$ (4) π

42. If h is height and r_1, r_2 are the radii of the end of the frustum of a cone, then the volume of the frustum is :

(1) $\frac{\pi h}{3}\left(r_1^2 - 3r_1r_2 + r_2^2\right)$ (2) $\frac{\pi h}{3}\left(r_1^2 + 3r_1r_2 + r_2^2\right)$

(3) $\frac{\pi h}{3}\left(r_1^2 - r_1r_2 + r_2^2\right)$ (4) $\frac{\pi h}{3}\left(r_1^2 + r_1r_2 + r_2^2\right)$

43. If r is a radius and k is thickness of a frustum of a sphere, then its curved surface of frustum is :

(1) $\frac{1}{2}\pi rk$ (2) πrk (3) $2\pi rk$ (4) $4\pi rk$

44. The differential equation $y = px + f(p)$ is called of :

(1) Clairaut's form (2) Newtonian form

(3) Bernoulli's form (4) Euler's form

45. Which of the following differential equation is linear ?

(1) $(1+y)\frac{dy}{dx}+\cos x=0$ (2) $x+y\frac{dy}{dx}=0$

(3) $\frac{d^2y}{dx^2}+x^2\frac{dy}{dx}+(1+x)y=e^x$ (4) $(1+y)\frac{d^2y}{dx^2}+xy=e^x+x$

46. Which of the following differential equations can be reduced to homogeneous form ?

(1) $y\left(e^x+x^2y\right)dx-e^xdy=0$

(2) $x^3\frac{dy}{dx}-x^2y+y^4\cos x=0$

(3) $(4x + 6y + 5)dx = (2x + 3y + 4)\,dy$

(4) $\left(1+y^2\right)dx+(x-\sin y)\,dy=0$

47. The system of vectors are :

(1) Never closed under addition and multiplication

(2) Closed under addition and in a restricted sense in multiplication

(3) Closed under addition and multiplication

(4) Closed under addition only

48. The area of the triangle having vertices (1, 3, 2), (2, –1, 1) and (–1, 2, 3) is :

(1) $\frac{1}{2}\sqrt{107}$ (2) $\frac{1}{2}\sqrt{155}$ (3) $\frac{1}{2}\sqrt{165}$ (4) $\frac{1}{2}\sqrt{187}$

49. The point of intersection of the line $\vec{r}=\vec{a}+\vec{b}+t\vec{c}$ and the plane $\vec{r}=\vec{a}-\vec{b}+t_1\left(\vec{a}+\vec{b}-\vec{c}\right)+t_2\left(\vec{a}-\vec{b}+\vec{c}\right)$ is :

(1) $2\vec{a}-3\vec{b}+4\vec{c}$ (2) $2\vec{a}-3\vec{b}-4\vec{c}$ (3) $2\vec{a}+3\vec{b}+4\vec{c}$ (4) $2\vec{a}+3\vec{b}-4\vec{c}$

50. The angle between two non-zero vectors $\vec{a}$ and $\vec{b}$ is given by :

(1) $\sin^{-1}\frac{\vec{a}.\vec{b}}{|\vec{a}\,\vec{b}|}$ (2) $\cos^{-1}\frac{\vec{a}.\vec{b}}{|\vec{a}.\vec{b}|}$ (3) $\sin^{-1}\frac{\vec{a}.\vec{b}}{|\vec{a}|\,|\vec{b}|}$ (4) $\cos^{-1}\frac{\vec{a}.\vec{b}}{|\vec{a}|\,|\vec{b}|}$

51. If $\vec{a}, \vec{b}, \vec{c}$ be three non-coplanar vectors, then the cross product is :

(1) distributive over scalar product of vectors

(2) not distributive over scalar product of vectors

(3) distributive over addition of vectors

(4) not distributive over addition of vectors

52. Which of the following is correct ?

(1) $(\vec{a}\times\vec{b})=(\vec{a}.\vec{b})^2+\overrightarrow{a^2}\,\vec{b}$ (2) $(\vec{a}\times\vec{b})^2=(\vec{a}.\vec{b})^2-\overrightarrow{a^2}\,\overrightarrow{b^2}$

(3) $(\vec{a}\times\vec{b})^2+(\vec{a}.\vec{b})^2=\overrightarrow{a^2}\,\overrightarrow{b^2}$ (4) $(\vec{a}\times\vec{b})^2+(\vec{a}.\vec{b})^2+\overrightarrow{a^2}\,\overrightarrow{b^2}=0$

53. The volume of the parallelopiped whose edges are represented by $2\hat{i}-3\hat{j}+4\hat{k}$, $\hat{i}+2\hat{j}-\hat{k}$ and $3\hat{i}-\hat{j}+2\hat{k}$ is :

(1) 10 (2) 7 (3) 6 (4) 5

54. If $\vec{a}, \vec{b}, \vec{c}$ are vectors from the origin to the point A, B, C, then $(\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a})$:

(1) perpendicular to the plane ABC (2) parallel to the plane ABC

(3) lies in the plane ABC (4) is null vector

55. What is the value of $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})+(\vec{a}\times\vec{c})\times(\vec{d}\times\vec{b})+(\vec{a}\times\vec{d})\times(\vec{b}\times\vec{c})$?

(1) $2[\vec{a}\,\vec{d}\,\vec{c}]\,\vec{b}$ (2) $2[\vec{b}\,\vec{d}\,\vec{c}]\,\vec{a}$ (3) $2[\vec{a}\,\vec{c}\,\vec{d}]\,\vec{b}$ (4) $2[\vec{b}\,\vec{c}\,\vec{d}]\,\vec{a}$

56. The point of intersection of the lines $\vec{r}\times\vec{a}=\vec{b}\times\vec{a}$ and $\vec{r}\times\vec{b}=\vec{a}\times\vec{b}$ is :

(1) $\vec{a}$ (2) $\vec{b}$ (3) $\vec{a}+\vec{b}$ (4) $\vec{a}-\vec{b}$

57. If cosec A + cot $A = \frac{5}{2}$, then tan A is :

(1) $\frac{4}{9}$ (2) $\frac{3}{5}$ (3) $\frac{15}{16}$ (4) $\frac{20}{21}$

58. The value(s) of $\cos\frac{\pi}{7}\cos\frac{4\pi}{7}\cos\frac{5\pi}{7}$ is (are) :

(1) $-\frac{1}{8}$ (2) $-\frac{1}{4}$ (3) $\frac{1}{8}$ (4) $\frac{1}{4}$

59. If $A+B+C=\pi$ and $x=\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$, then :

(1) $x\geq\frac{1}{8}$ (2) $x\leq\frac{1}{8}$ (3) $x\geq\frac{1}{2}$ (4) $x\leq\frac{1}{2}$

60. The maximum value of $\frac{\log_e x}{x}$ is :

(1) 1 (2) $\frac{2}{e}$ (3) e (4) $\frac{1}{e}$

61. If $\sin x+\sin^2 x=1$, then the value of $\cos^{12}x+3\cos^{10}x+3\cos^8 x+\cos^6 x$ is equal to :

(1) –1 (2) 1 (3) – 2 (4) 2

62. If $y=\sec^{-1}\left(\frac{x+1}{x-1}\right)+\sin^{-1}\left(\frac{x-1}{x+1}\right)$, then $\frac{dy}{dx}$ is :

(1) 1 (2) 0 (3) $\frac{x-1}{x+1}$ (4) $\frac{x+1}{x-1}$

63. If the angle of elevation of a cloud at a height h above the level of water in a lake is α and the angle of depression of its image in the lake is β, then the height of the cloud above the surface of the lake is not correct :

(1) $\frac{h(\tan\beta+\tan\alpha)}{\tan\beta-\tan\alpha}$ (2) $\frac{h\sin(\alpha+\beta)}{\sin(\beta-\alpha)}$

(3) $\frac{h(\cot\alpha+\cot\beta)}{\cot\alpha-\cot\beta}$ (4) $\frac{h\cos(\alpha+\beta)}{\sin(\beta-\alpha)}$

64. If the angles of elevation of the top and bottom of a flag staff fixed at the top of a tower at a point distant a from the foot of a tower are α and β, then height of the flag staff is :

(1) $a(\sin\alpha-\sin\beta)$ (2) $a(\cos\alpha-\cos\beta)$

(3) $a(\cot\alpha-\cot\beta)$ (4) $a(\tan\alpha-\tan\beta)$

65. The solution of the equation

$$3\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+2\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{\pi}{3}$$

is :

(1) $x=\sqrt{3}$ (2) $x=\frac{1}{\sqrt{3}}$ (3) $x=1$ (4) $x=0$

66. If $\sin^{-1}x+\cos^{-1}\left(\frac{1}{2}\right)=\frac{\pi}{2}$, then x is :

(1) 0 (2) $\frac{2}{\sqrt{3}}$ (3) $\frac{1}{\sqrt{5}}$ (4) $\frac{\sqrt{3}}{2}$

67. The value of $\cos^{-1}\sqrt{\frac{2}{3}}-\cos^{-1}\frac{\sqrt{6}+1}{2\sqrt{3}}$ is equal to :

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) $\frac{\pi}{6}$

68. The probability that A, B, C can solve problem is $\frac{1}{3},\frac{1}{3},\frac{1}{3}$ respectively they attempt independently, then the probability that the problem will solved is :

(1) $\frac{1}{9}$ (2) $\frac{2}{9}$ (3) $\frac{4}{9}$ (4) $\frac{2}{3}$

69. In a single throw with two dice, the chances of throwing eight is :

(1) $\frac{7}{36}$ (2) $\frac{1}{18}$ (3) $\frac{1}{9}$ (4) $\frac{5}{36}$

70. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel, is :

(1) $\frac{3}{11}$ (2) $\frac{4}{11}$ (3) $\frac{2}{11}$ (4) 0

71. In a box containing 100 bulbs, 10 are defective. What is the probability that out of a sample of 5 bulbs, none is defective ?

(1) 10^{-5} (2) $\left(\frac{1}{2}\right)^5$ (3) $\left(\frac{9}{10}\right)^5$ (4) $\frac{9}{10}$

72. The average of n numbers $x_1, x_2, x_3, ..., x_n$ is M. If x_1 is replaced by x', then the new average is :

(1) $M - x_1 + x'$ (2) $\frac{M - x_1 + x'}{n}$

(3) $\frac{(n-1)M - x_1 + x'}{n}$ (4) $\frac{nM - x_1 + x'}{n}$

73. If the sizes in the frequency distribution are given in an ascending order of magnitude, then the median is calculated by :

(1) $M_d = l + \left(\frac{\frac{N}{2} + C}{f}\right) \times i$ (2) $M_d = l + \left(\frac{\frac{N}{2} - C}{f}\right) \times i$

(3) $M_d = l - \left(\frac{\frac{N}{2} + C}{f}\right) \times i$ (4) $M_d = l - \left(\frac{\frac{N}{2} - C}{f}\right) \times i$

74. For a frequency distribution standard deviation is computed by using the formula :

(1) $\sigma = \frac{\sum f(x - \bar{x})}{\sum f}$ (2) $\sigma = \frac{\sqrt{\sum f(x - \bar{x})^2}}{\sum f}$

(3) $\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$ (4) $\sigma = \sqrt{\frac{\sum f(x - \bar{x})}{\sum f}}$

75. The variance of Binomial distribution is :

(1) np (2) $1 - np$ (3) npq (4) $\pm\sqrt{n - pq}$

76. In case of Poisson distribution :

(1) mean > variance (2) mean < variance

(3) mean = variance (4) mean and variance are not related

77. For a normal curve the greatest ordinate is :

(1) $\frac{1}{\sigma\sqrt{2\pi}}$ (2) $\frac{1}{\sqrt{2\pi\sigma}}$ (3) $\sigma\sqrt{2\pi}$ (4) $2\pi\sigma$

78. In the method of least square of curve fitting, if n are constants, then the normal equations are :

(1) n^2 (2) n (3) $n-1$ (4) $n+1$

79. The value of the correlation coefficient between two variables lies between :

(1) 0 and ∞ (2) $-\infty$ and ∞ (3) 0 and 1 (4) -1 and 1

80. Fit a straight line regression of Y on X from the following table :

X	:	0	1	2	3	4	5	6
Y	:	2	1	3	2	4	3	5

(1) $Y = 0.35 + 1.578\,X$ (2) $Y = 1.578 + 0.35\,X$

(3) $Y = 1.357 + 0.5\,X$ (4) $Y = 0.5 + 1.357\,X$

81. In the Linear Programming Problem :

Maximize $z = 4x + y$

Subject to :

$$3x + 5y \leq 15$$

$$5x + y \leq 15$$

$$-x + y \leq 2$$

$$4x + 5y \leq 20$$

$$x, y \geq 0,$$

has :

(1) no solution (2) one solution

(3) infinite solution (4) finite solution

82. The resultant of P and Q is R. If Q is doubled, R is also doubled. If Q is reversed, R is again doubled. Then $P^2 : Q^2 : R^2$ is given by :

(1) 1 : 1 : 1 (2) 2 : 2 : 3 (3) 2 : 3 : 2 (4) 3 : 2 : $\sqrt{2}$

83. If three forces acting at a point are represented in magnitude and direction by three sides of a triangle, taken in order, they are in equilibrium. This condition is :

(1) only necessary and not sufficient

(2) only sufficient but not necessary

(3) both necessary as well as sufficient

(4) neither necessary nor sufficient

84. Two forces given in magnitude at each through a fixed point, and are inclined at a constant angle θ. If θ varies, then the locus of A is :

(1) a straight line (2) a circle (3) a parabola (4) an ellipse

85. $ABCD$ ..... is a polygon of n sides, and forces act at a point parallel and proportional to AB, $2BC$, $3CD$, etc. If O be the centroid of all the points B, C, D,..... including A, then their resultant is parallel and proportional to :

(1) $(n-2)OA$ (2) $(n+1)OA$ (3) nOA (4) $(n-1)OA$

86. If six forces, of relative magnitudes 1, 2, 3, 4, 5 and 6 act along the sides of a regular hexagon, taken in order, then the single equivalent force is of relative magnitude :

(1) 1 (2) 3 (3) 5 (4) 6

87. The moments of a system of coplanar forces (not in equilibrium) about three collinear points A, B, C in the plane are G_1, G_2, G_3. Then :

(1) $G_1 . AB + G_2 . BC + G_3 . CA = 0$ (2) $G_1 . BC + G_2 . CA + G_3 . AB = 0$

(3) $G_1 . CA + G_2 . AB + G_3 . BC = 0$ (4) $G_1 . G_2 + CA . AB + G_3 . BC = 0$

88. Let P, Q, R be the sum of the components of various forces acting at a point, in three mutually perpendicular directions. Then the forces are in equilibrium if :

(1) $P = Q = R$ (2) $P + Q = Q + R = R + P = 0$

(3) $P = Q = R = 0$ (4) $P + Q + R = 0$

89. A uniform rod of weight W rests with its ends in contact with two smooth planes, inclined at angles α and β respectively to the horizon, and intersecting in a horizontal line. The inclination θ of the rod to the vertical is given by :

(1) $2\tan\theta = \tan\beta - \tan\alpha$ (2) $2\tan\theta = \tan\alpha - \tan\beta$

(3) $2\cot\theta = \cot\beta - \cot\alpha$ (4) $2\cot\theta = \cot\alpha - \cot\beta$

90. Weights W, ω, W, are attached to points B, C, D respectively of a light string AE where B, C, D divide the string into 4 equal lengths. If the string hangs in the form of 4 consecutive sides of a regular octagon with the ends A and E attached to points on the same level, then :

(1) $W = 2\omega$ (2) $W = (\sqrt{2}+1)\omega$ (3) $W = (\sqrt{3}+1)\omega$ (4) $W = 4\omega$

91. The displacement has :

(1) only magnitude (2) only direction

(3) both magnitude and direction (4) constant negative quantity

92. If a particle moves along $x = a(2t + \sin 2t)$, $y = a(1 - \cos 2t)$,then acceleration is :

(1) constant (2) variable (3) unknown (4) known

93. If a particle moves on a cycloid, then the motion is :

(1) linear (2) simple harmonic

(3) simple (4) parabolic

94. If a particle moves along a plane curve, then its velocity along the normal at every point is :

(1) zero (2) unity (3) finite (4) infinite

95. A mass of 10 kg falls from rest, and is then brought to rest by penetrating 1 m into some sand; the average thrust of the send on it is (taking $g = 10\ m/s^2$) :

(1) 800 N (2) 900 N (3) 1000 N (4) 1100 N

96. The singular solution of the differential equation $y = xp + a\sqrt{1+p^2}\left(p = \frac{dy}{dx}\right)$ is a :

(1) parabola (2) hyperbola (3) circle (4) straight line

97. The simple harmonic motion is the motion of a particle which moves in a straight line so that the acceleration is always directed towards a fixed point on the line and varies as the :

(1) distance from the fixed point

(2) square of the distance from the fixed point

(3) reciprocal of the distance from the fixed point

(4) reciprocal of the square of the distance from the fixed point

98. If at any instant the velocity of projectile be u and its direction of motion α to the horizon, then it will be moving at right angles to this direction after time :

(1) $\frac{u}{g}\sin\alpha$ (2) $\frac{u}{g}\cos\alpha$ (3) $\frac{u}{g}\operatorname{cosec}\alpha$ (4) $\frac{u}{g}\sec\alpha$

99. A shot is fixed at an angle α to the horizontal up an inclined plane of inclination β. It will strike the plane horizontally if :

(1) $\tan\alpha = \tan\beta$ (2) $2\tan\alpha = \tan\beta$ (3) $\tan\alpha = 2\tan\beta$ (4) $4\tan\alpha = \tan\beta$

100. If α, β be two directions of projection to hit a given point (h, k), then :

(1) $\cos(\alpha+\beta) = -\frac{h}{k}$ (2) $\sin(\alpha+\beta) = -\frac{h}{k}$

(3) $\cot(\alpha+\beta) = -\frac{h}{k}$ (4) $\tan(\alpha+\beta) = -\frac{h}{k}$

Directions : (Question Nos. 101 - 105) : Vijay starts from his home with his wife at 9.30 a. m. on his scooter. He goes 1 km east, drop his wife at her office, turns left, goes another km then turns right, and after a km reaches the bank where he spends five minutes. Then he turn towards north and reaches hospital which is one km from the bank.

After taking to a doctor friend for five minutes he turns towards west and reaches his office, which is 2 km from the hospital at 9.58 a. m.

Now answer the following questions :

101. How far is Vijay's office from his home as the crow flies ?

(1) 3 km (2) 4 km (3) 2 km (4) 5 km

102. How far is the hospital from his wife's office ?

(1) 3 km (2) 4 km

(3) $4\frac{1}{2}$ km (4) 1 km

103. How much time would Vijay had taken in reaching his office by the same route if he had not stopped at the bank and hospital ?

(1) 20 minutes (2) 23 minutes

(3) 18 minutes (4) 13 minutes

104. What is the average speed ?

(1) 18 km per hour (2) 25 km per hour

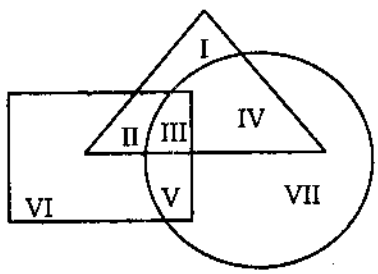
(3) 30 km per hour (4) 20 km per hour

105. At what time did Vijay reach the bank ?

(1) 9.42 a.m. (2) 9.39 a.m.

(3) 9.45 a.m. (4) 9.36 a.m.

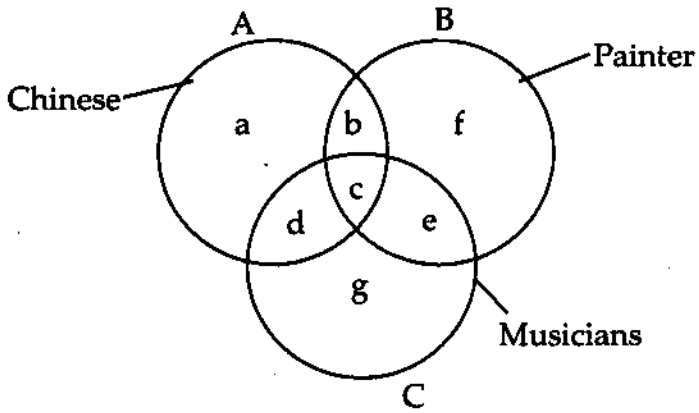
106. The triangle, square and circle shown below respectively represent the urban, hard working and educated people. Which one of the areas marked I-VII is represented by the urban educated people who are not hard working ?



(1) II (2) I (3) IV (4) III

P.T.O.

Directions : (Question Nos. 107 - 110) : In the figure given below, there are three intersecting circles each representing certain section of people. Different regions are marked a-g. Read the statements in each of the following questions and choose the letter of the region which correctly represents the statement :



107. Chinese who are painters but not musicians :

(1) b (2) c (3) d (4) g

108. Painters who are neither Chinese nor musicians :

(1) b (2) c (3) f (4) g

109. Chinese who are musicians but not painters :

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

110. Chinese who are painters as well as musicians :

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

Directions : (Question Nos. 111 - 115) : A and B are good at hockey and Volley ball. C and A are good at Hockey and Baseball. D and B are good at Cricket and Volley ball. D and E are good as Football and Baseball. Study the above given information and answer the following questions :

111. Who of the following is good at all the four games ?

(1) E (2) D (3) C (4) B

112. Who is good at Cricket, Baseball and Volley ball ?

(1) E (2) D (3) C (4) B

113. Who is good at Baseball, Volley ball and Hockey ?
(1) E (2) D (3) C (4) B

114. Who is good at Cricket, Hockey and Volley ball ?
(1) E (2) D (3) C (4) B

115. Who is good of the largest number of games ?
(1) E (2) D (3) C (4) B

116. A man drove his car straight towards east for 5 km. Then he turn right and drove for 3 km and then he turned to his south and drove for 3 km. How far was he from the starting point ?
(1) 6 km (2) 5 km (3) 7 km (4) 8 km

117. In a row at a bus stop A is 7th from the left and B is 9th from the right. They both interchange their positions. A becomes 11th from the left. How many people are there in the row ?
(1) 18 (2) 19 (3) 20 (4) 21

118. Out of five friends A is shorter than B but taller than E. C is tallest and D is little shorter than A. Which one is the shortest ?
(1) A (2) E (3) C (4) D

119. A is brother of B and C; D is C's mother. D is B's sister and E is B's sister. How is C related to E ?
(1) Niece (2) Cousin (3) Aunt (4) Mother

120. A's mother is sister of B and has a daughter C. How is A related to B ?
(1) Niece (2) Uncle (3) Daughter (4) Father

121. *A, B, C, D* are standing at the corners of a square field. They walk along the sides of the square in the clockwise direction. They stop after covering four sides which one of the following statement is true ?
(1) C is North - East of B (2) D is East - West of A
(3) A is West of B (4) B is East - South of D

122. Many people send Christmas cards to their friends because :
(1) They are pretty
(2) It is a cheaper to send them, through post
(3) It is the custom to send good wises to friends at Christmas time in that way
(4) It provides the work for postman

123. Glass is used for window's because :

(1) Glass is cheap

(2) You can see through glass

(3) A broken window is easily replaced

(4) Glass is easily cut to the right size

124. Motorists must have driving mirrors in their cars so that :

(1) Their lady passengers can use them

(2) They can see the traffic behind them

(3) Other motorists can see them

(4) Their head lamps will not dazzle oncoming traffic

125. People should drink more milk because :

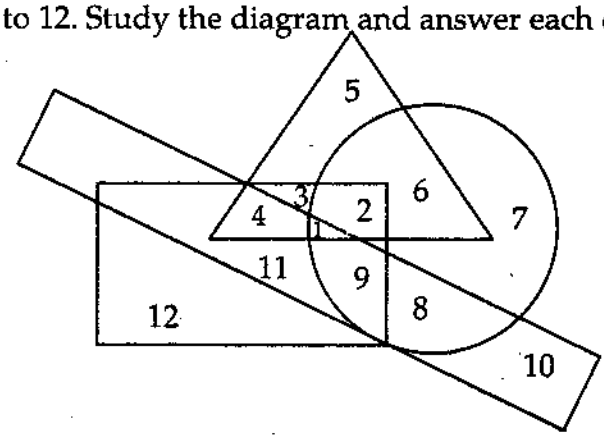
(1) It would help the farmers

(2) It does not keep fit for a long time

(3) It is sold in many schools

(4) It is a good food

Directions : (Question Nos. 126 - 130) : The questions (126 to 130) are based on the following diagram in which circle stands for the educated, the square for hard working, the triangle for urban and the rectangle for honest, the diagram are numbered from 1 to 12. Study the diagram and answer each question :



126. Non-urban people who are honest and hard working but not educated are indicated by :

(1) 11 (2) 10 (3) 9 (4) 3

127. Non-urban educated hard working and honest people are indicated by :

(1) 7 (2) 8 (3) 9 (4) 10

128. Urban hard working who are neither educated nor honest are indicated by :

(1) 2 (2) 3 (3) 4 (4) 5

129. Uneducated, urban, hard working and honest people are indicated by :

(1) 2 (2) 3 (3) 4 (4) 5

130. Hard working and non-urban people who are neither educated nor honest are indicated by :

(1) 7 (2) 8 (3) 10 (4) 12

131. Which of the following diseases usually spreads through air ?

(1) Plague (2) Tuberculosis (3) Typhoid (4) Cholera

132. The southernmost point of Indian territory is in which of the following States/Union Territories ?

(1) Tamil Nadu (2) Lakshadweep

(3) Kerala (4) Andaman and Nicobar Islands

133. Which of the following has been found useful in keeping the level of cholesterol down ?

(1) serpentina (2) tulsi (3) turmeric (4) garlic

134. A place which has 2 as the first digit in its PIN Code must be situated in which of the following states ?

(1) Uttar Pradesh (2) Maharashtra

(3) Gujarat (4) Andhra Pradesh

135. In which of the following countries did the decimal system of numbers originate ?

(1) England (2) France (3) India (4) Greece

Directions : (Question Nos. 136 - 138) : In the following questions you have passages, with questions following poassages. Read passage carefully and choose the best answer to each question and mark it in the Answer Sheet :

But alas, in 1964, when I was nine, my young life shattered into pieces once again. My mother passed away after an illness of just 15 days. She had been the anchor of my life. And how I missed her. But little children are resilient. My maternal grandmother was staying with us and my mother's widowed younger sister came to help out with us. So well did my aunt fit into our household that in two years my father had married her : she become our mother and her only daughter become our sister.

136. The writer's life got 'shattered into pieces' when :

(1) his father married again (2) he lost his mother

(3) he fell seriously ill (4) a sister was born to him

137. The writer's response to his father marrying again is that of :

(1) indifference (2) disdain (3) approval (4) disapproval

138. The tone of the passage is :

(1) gloomy (2) humorous (3) ironical (4) lyrical

Directions : (Question No. 139 & 140) : On prepositions may be taken as a drill in the use of prepositions. Select the most appropriate preposition carefully and then put your cross against the right answer :

139. Do not look down ..... the poor.

(1) do (2) upon (3) at (4) in

140. He was heart broken ..... her indifference ..... him.

(1) at, to (2) by, for (3) by, to (4) at, on

141. A Central Processing Unit (CPU) consist of :

(1) input, output unit

(2) memory unit

(3) arithmetic and logical unit, central unit

(4) keyboard, printer

142. Main memory unit of computer :

(1) performs arithmetic

(2) stores a small amount of data and instructions

(3) stores bulk of data and instructions

(4) supervises the working of all the units

143. The base of the binary number system is :

(1) 2 (2) 16 (3) 8 (4) 10

144. The basic arithmetic operation performed by a Computer is :

(1) addition (2) multiplication (3) subtraction (4) division

145. Which is true of conditional compilation ?

(1) It is taken care of by the compiler

(2) It is setting the compiler option conditionally

(3) It is compiling a program based on a condition

(4) It is operation taken by the compiler

146. The minimum number of temporary variables needed to swap the contents of two variables is :

(1) 1 (2) 2 (3) 3 (4) 0

147. If the integer needs two bytes of storage, then maximum value of an unsigned interger is :

(1) $2^{16}-1$ (2) $2^{15}-1$ (3) 2^{16} (4) 2^{15}

148. If y is of integer type then the expressions

$$3 * (y - 8)/9 \text{ and } (y - 8)/9 * 3$$

yield the same value if :

(1) y is an even number (2) y is an odd number

(3) $y - 8$ is an integral multiple of 9 (4) $y - 8$ is an integral multiple of 3

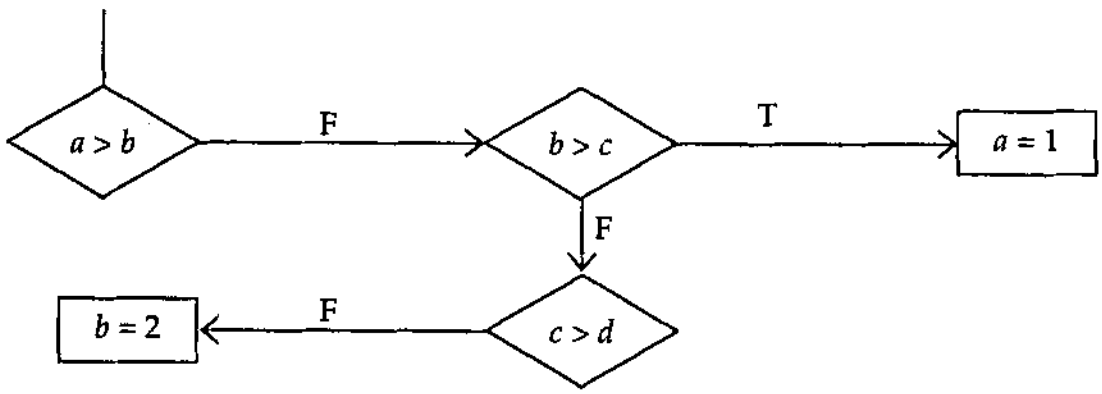
149. The following program fragment

```
if (a = 0)
printf ("a is zero") ;
else
printf ("a is not zero") ;
```

results in the printing of

(1) *a* is zero (2) *a* is not zero (3) nothing (4) garbage

150. Consider the following flow chart :



Which of the following is ***not*** equivalent to the above flow chart ?

(1)
```
if (a > b)
  if (b > c)
  a = 1;
  else if (c > d)
  b = 2;
```

(2)
```
if (a < = b)
  if (b > c)
  a = 1;
  else if (c < = d)
  b = 2;
```

(3)
```
if (a > b)
  ;
  else if (b > c)
  a = 1;
  else if (c<= d)
  b = 2;
```

(4)
```
if (a > b)
  ;
  else if (b > c)
  a = 1;
  else if (c > d)
  ;
  else b = 2;
```

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण-पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल ***नीली/काली बाल-प्वाइंट पेन*** से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख ले कि प्रश्नपत्र में सभी पृष्ठ मौजूद है और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।
2. परीक्षा भवन में ***लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,*** लिखा या सादा कोई भी खुला कागज साथ में न लायें।
3. उत्तर-पत्र अलग से दिया गया है। ***इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा। केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।***
4. अपना ***अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन से*** निर्धारित स्थान पर लिखें।
5. ***उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।***
6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्न-पुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्न-पुस्तिका पर अनुक्रमांक संख्या और ओ० एम० आर० पत्र संख्या की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।
7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।
8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। ***प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिये आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।***
9. प्रत्येक प्रश्न के उत्तर के लिये केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।
10. ***ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है।*** यदि आप किसी प्रश्न का ***उत्तर नहीं देना चाहते हैं,*** तो सम्बन्धित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।
11. रफ कार्य के लिये इस पुस्तिका के मुखपृष्ठ के अंदर वाला पृष्ठ तथा अंतिम खाली पृष्ठ का प्रयोग करें।
12. परीक्षा के उपरान्त ***केवल ओ० एम० आर० उत्तर-पत्र*** ही परीक्षा भवन में जमा करें।
13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।
14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की भागी होगा/होगी।