<table>
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<th>INSTRUCTIONS TO THE CANDIDATES</th>
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<td><strong>Please read carefully</strong></td>
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### GENERAL

1. Any malpractice or attempt to commit malpractice in the examination hall will lead to disqualification of the candidate.

2. Candidates are not allowed to carry any textual material, printed or written bits of papers, Mathematical and Physical tables, electronic gadgets like calculators, cell phones, etc. into the examination hall.

3. Candidates shall possess the University Hall Ticket which should be produced on demand.

4. Candidates shall occupy the respective seats bearing their registration numbers.

5. Candidates shall sign the attendance sheet available with the invigilator.

6. **Candidates will not be permitted to leave the hall before the end of the examination.**

7. **Candidates are required to handover the ANSWER SHEET and QUESTION BOOKLET to the invigilator before leaving the hall.**

### QUESTION BOOKLET

8. **DO NOT OPEN THE SEALED QUESTION BOOKLET UNTIL THE INVIGILATOR ANNOUNCES TO DO SO.**

9. **Before opening the Question Booklet,** fill up the Registration Number, Name and Signature with ball pen in the spaces provided at the top of this page.

10. **Immediately after opening the booklet,** the candidate should examine whether it contains all the 120 questions in serial order and 20 pages as mentioned at the top of this page. In case of unprinted, torn or missing pages in the booklet, the matter should be immediately brought to the attention of the invigilator.

11. Rough work may be done on the space provided in this booklet.

*(Continued on the back of the question booklet)*
Rough work

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MATHEMATICS

1) Given the sets $A = \{1,2,3\}$, $B = \{3,4\}$, $C = \{4,5,6\}$ then $A \cup (B \cap C)$ is
   (a) $\{3\}$  
   (b) $\{1,2,4,5\}$  
   (c) $\{1,2,3,4\}$  
   (d) $\{1,2,3,4,5,6\}$

2) The number of non-empty subsets of the set $\{1,2,3,4\}$ is
   (a) 15  
   (b) 14  
   (c) 16  
   (d) 17

3) If $a, b \in \mathbb{R}$ and $a < b$, then
   (a) $\frac{1}{a} < \frac{1}{b}$  
   (b) $\frac{1}{a} > \frac{1}{b}$  
   (c) $a^2 > b^2$  
   (d) nothing can be said

4) If $Z = \bar{Z}$, then
   (a) $Z$ is purely real  
   (b) $Z$ is purely imaginary  
   (c) Real part of $Z =$ Complex part of $Z$  
   (d) none of the above

5) The line passing through $(0,1)$ and perpendicular to the line $x - 2y + 11 = 0$ is
   (a) $2x - y + 1 = 0$  
   (b) $2x - y + 3 = 0$  
   (c) $2x + y - 1 = 0$  
   (d) $2x + y - 2 = 0$

6) If $(x - a)^2 + (y - b)^2 = c^2$ represents a circle, them
   (a) $a = 0$  
   (b) $b = 0$  
   (c) $a = b = 0$  
   (d) $c \neq 0$

7) If the roots of $ax^2 + b = 0$ are real and distinct, then
   (a) $ab > 0$  
   (b) $a = 0$  
   (c) $ab < 0$  
   (d) $a > 0$, $b > 0$

8) If $a, b, c$ are in A.P, then $5^a, 5^b, 5^c$ are in
   (a) A.P  
   (b) G.P  
   (c) H.P  
   (d) none of the above

9) The product $(32) \left(\frac{1}{32}\right) (\frac{1}{32}) \left(\frac{1}{32}\right) \ldots \infty$ is equal to
   (a) 16  
   (b) 64  
   (c) 32  
   (d) 0

10) If $C(10,4) + C(10,5) = C(11, r)$ then $r$ equals
    (a) 5  
    (b) 4  
    (c) 3  
    (d) 6

11) If $\Delta = \begin{vmatrix} 5 & 15 & -25 \\ 7 & 21 & 30 \\ 8 & 24 & 42 \end{vmatrix}$, then
    (a) $\Delta = 0$  
    (b) $\Delta = 1$  
    (c) $\Delta = -1$  
    (d) $\Delta = 5
12) If $A = \begin{pmatrix} \frac{1}{3} & \frac{2}{3} \\ -\frac{3}{2} & -\frac{5}{2} \end{pmatrix}$, then $\text{Adj } A$ is
(a) $\begin{pmatrix} -\frac{5}{3} & -\frac{2}{3} \\ -\frac{3}{2} & -\frac{5}{2} \end{pmatrix}$  
(b) $\begin{pmatrix} \frac{3}{2} & -\frac{5}{2} \\ 1 & 2 \end{pmatrix}$  
(c) $\begin{pmatrix} -\frac{2}{3} & \frac{1}{3} \\ -\frac{5}{2} & \frac{3}{2} \end{pmatrix}$  
(d) $\begin{pmatrix} -\frac{5}{2} & \frac{3}{2} \end{pmatrix}$

13) The mean of a set of numbers is $\bar{x}$. If each number is increased by $\lambda$, the mean of the new set is
(a) $\bar{x}$  
(b) $\bar{x} + \lambda$  
(c) $\lambda \bar{x}$  
(d) none of these

14) If the mode of a data set is 18 and the mean is 24, then the median is
(a) 18  
(b) 24  
(c) 22  
(d) 21

15) Two fair dice are tossed. The probability that both show an even number is
(a) $\frac{1}{4}$  
(b) $\frac{1}{3}$  
(c) $\frac{1}{6}$  
(d) $\frac{5}{36}$

16) The probability that a non-leap year should have 53 Mondays is
(a) $\frac{53}{365}$  
(b) $\frac{52}{365}$  
(c) $\frac{6}{7}$  
(d) $\frac{1}{7}$

17) The mean of a Poisson distribution is $\lambda$, then its standard deviation is
(a) $\lambda$  
(b) $\lambda^2$  
(c) $\sqrt{\lambda}$  
(d) $\frac{1}{\lambda}$

18) A coin is tossed 4 times. The probability that at least one head turns up is
(a) $\frac{1}{16}$  
(b) $\frac{2}{16}$  
(c) $\frac{14}{16}$  
(d) $\frac{15}{16}$

19) If $f(x) = x^3 \sin x$, then $f(x)$ is
(a) an even function  
(b) an odd function  
(c) power function  
(d) none of these

20) The range of $f(x) = \frac{x-3}{3-x}$, $x \neq 3$ is
(a) 1  
(b) -1  
(c) $\{1\}$  
(d) $\{-1\}$

21) $\lim_{x \to 0} \frac{a^x - b^x}{x}$ is
(a) $\log ab$  
(b) $\log \frac{a}{b}$  
(c) $\frac{\log a}{\log b}$  
(d) $\frac{\log b}{\log a}$
22) Let the function \( f \) be defined by \( f(x) = x \sin \frac{1}{x} \), when \( x \neq 0 \),
\[ = 0 \], when \( x = 0 \)

Then at \( x = 0 \), \( f \) is

(a) Continuous    (b) not continuous   (c) not defined
(d) all of the above are correct

23) The derivative of \( f(x) = |x| \) at \( x = 0 \) is

(a) 1    (b) 0   (c) -1    (d) does not exist

24) If \( y = \log(\sin x) \), then \( \frac{d^2y}{dx^2} \) equals:

(a) \(-\csc^2 x\)    (b) \(\sec^2 x\)   (c) \(-\csc x \cot x\)    (d) \(\sec x \tan x\)

25) \( \int e^{\tan^{-1}x} \frac{1}{1+x^2} \, dx \) is equal to

(a) \( e^{\tan^{-1}x} + c \)    (b) \( \frac{1}{2} e^{\tan^{-1}x} + c \)   (c) \( x^{\tan^{-1}x} + c \)    (d) \( \log(1 + x^2) + c \)

60) Solution of the differential equation \( \frac{dy}{dx} = e^{2x-y} + x^3 e^{-y} \) is

(a) \( e^x = \frac{e^{2y}}{2} + \frac{x^3}{3} + c \)    (b) \( e^y = \frac{e^{2x}}{2} + \frac{x^4}{4} + c \)   (c) \( e^{2x} = \frac{e^{2y}}{2} + \frac{x^4}{4} + c \)    (d) \( e^y = \frac{e^{2x}}{2} - \frac{x^4}{4} + c \)
I. Complete the following sentences by choosing the right options.

61) In Asian countries, stiff tariffs and other import barriers, plus undervalued currencies _______.
   (a) make imported goods prohibitively expensive
   (b) do not encourage smuggling
   (c) make the economy non-competitive
   (d) give rise to sharp economic inequalities.

62) In order to raise the company’s profit, the employees _______.
   (a) demanded two additional increments
   (b) decided to raise the price of raw material
   (c) offered to work overtime without any compensation
   (d) requested the management to implement new welfare schemes

63) Two of the representatives abstained _______ voting on the issue.
   (a) of
   (b) from
   (c) out
   (d) against

64) Jane could not hear me as the aeroplane flying _______ her head was making too much of noise.
   (a) over
   (b) upon
   (c) on
   (d) above

II. Choose the option that is nearest in meaning to the given words.

65) Incitement
   (a) noise
   (b) calm
   (c) deterrent
   (d) stir up

66) Dissolute
   (a) immoral
   (b) honest
   (c) repulsive
   (d) distant
III. Choose the option that is **opposite in meaning** to the given words.

67) En masse
   (a) in group
   (b) democratically
   (c) individually
   (d) mass

68) Impeccable
   (a) reasonable
   (b) faulty
   (c) repulsive
   (d) practical

IV. Choose the option that contains **an error** in the given sentences.

69) The idea that shook / the whole world was / published in one / of the unknown journal.

   (a) 
   (b) 
   (c) 
   (d)

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80) The production of different kinds / of artificial materials / are essential to the

   (a) 
   (b) 
   (c) 
   (d) conservation of/ our natural resources.
81) Directions: (Qs 31 –32): Study the following letter-number sequence and answer the questions given below:
A G L 2 0 K W C 3 R M N P D 4
H S T Y J E 6 Q U N F B K V 8
If every alternate position starting from right hand side replaces digit of a clock with 1 replaced by 8, which digit will replace ‘7’ of the clock?
(a) H  
(b) Q  
(c) U  
(d) T

82) If the first half is written in the reverse order, which number/letter will be third to the right of 21st letter/number from your right?
(a) P  
(b) U  
(c) L  
(d) W

83) Fill in the missing number.
1, 5, 11, 19, 29, ?
(a) 47  
(b) 41  
(c) 39  
(d) 55

84) Simplify
\[
\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}
\]
(b) 8/5  
(c) 5/8  
(d) 9/6  
(e) 3/2

85) A square garden has fourteen posts along each side at equal interval. Find how many posts are there in all four sides?
(a) 56  
(b) 44  
(c) 52
86) In a certain code BREAKDOWN is written as BFSCJMVNC. How is ORGANISED written in that code?
   (a) PSHBMCDRK
   (b) BHSPOCDRH
   (c) BHSPNHRDC
   (d) BHSPMCDRH

87) A positive number when decreased by 4 is equal to 21 times the reciprocal of the number. The number is:
   (a) 7
   (b) 70
   (c) 6
   (d) 3

88) Find the missing number from the given responses

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<tr>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>81</td>
<td>176</td>
<td>?</td>
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   (a) 25
   (b) 177
   (c) 82
   (d) 455

89) Sohan started from point X and travelled forward 8 km up to point Y, then turned towards right and travelled 5 km up to point Z, then turned right and travelled 7 km up to point A and then turned towards right and travelled 5 km up to B. What is the distance between points B and X?
   (a) 2
   (b) 3
   (c) 1
   (d) 5

120) Select the suitable choice for the missing number.

   $68 : 130 :: ? : 350$
   (a) 240.
   (b) 222
   (c) 216
   (d) 210
Rough work

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OMR ANSWER SHEET

12. Use the OMR answer sheet carefully; no spare sheet will be given.

13. Do not fold or make any stray mark on the OMR sheet.

14. Use HB pencil / Ball point pen (Blue / Black ) for shading the bubbles and Ball pen for writing.

15. In the OMR answer sheet, make the following entries.
   a. Write the Registration number, Question Booklet Number and Question Booklet Version Code.
   b. Fill the ovals corresponding to the Registration Number, Question Booklet Number and Question Booklet Version Code.
   c. Write your signature and name.

16. Rough work should not be done on the answer sheet.

ANSWRING AND EVALUATION

17. For each question, four answers are suggested of which only one is correct / most appropriate. Mark the correct / most appropriate answer by darkening the corresponding bubble using HB pencil / Ball point pen (Blue / Black).

18. In case the candidate wishes to change the choice already shaded using HB pencil, he/she may erase the marking completely and thereafter shade the alternative bubble.

19. If more than one bubble is darkened against a question, it will be treated as an incorrect answer.

20. For each correct answer, three marks will be awarded.

21. For each incorrect answer, one mark will be deducted from the total score.

22. If any smudge is left on the OMR sheet, evaluation will become imperfect.