Minor Test# ITF

Date :- 21/10/2023   **Duration :- 60 min.**   **Max. Marks :- 20**

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you open the question booklet.

1.   The question paper is divided into Four sections:

    Section A: MCQ Question   **4 marks**

    Section B: Very Short Question   **8 marks**

    Section C: Short/Long/Tricky Question **8 marks**

2.   There are 15 questions in this test.

    Q. (1-4) each question carries 1 mark.

    Q. (5-8) each question carries 2 marks.

    Q. (9-10) each carry 4 marks.

3.   All questions are compulsory.

4.   Answers are to be given on a separate answer sheet.

5.   If you do not know the answer to any question, do not waste time on it and pass on

    to the next one. Time permitting, you can come back to the questions, which you

    have left in the first in- stance and attempt them.

PLEASE TURN OVER THE PAGE AND START YOUR WORK.

Section –A

(Multiple Choice Questions)   Each question carries 1 mark

Q.1   The value of $\cot^{-1}\left(\cot\dfrac{5\pi}{4}\right)$ is

(a) $\dfrac{\pi}{4}$ (b) $\dfrac{-\pi}{4}$ (c) $\dfrac{3\pi}{4}$ (d) none of these

Q.2 $\dfrac{\pi}{3} - \sin^{-1}\left(\dfrac{-1}{2}\right) = ?$

(a) 0 (b) $\dfrac{2\pi}{3}$ (c) $\dfrac{\pi}{2}$ (d) π

Q3. $\tan\dfrac{1}{2}\left(\cos^{-1}\dfrac{\sqrt{5}}{3}\right) = ?$

(a) $\dfrac{(3-\sqrt{5})}{2}$ (b) $\dfrac{(3+\sqrt{5})}{2}$ (c) $\dfrac{(5-\sqrt{3})}{2}$ (d) $\dfrac{(5+\sqrt{3})}{2}$

Q.4   The principal value of $\sec^{-1}\left(\dfrac{-2}{\sqrt{3}}\right)$ is

(a) $\dfrac{\pi}{6}$ (b) $\dfrac{-\pi}{6}$ (c) $\dfrac{5\pi}{6}$ (d) $\dfrac{7\pi}{6}$

Section –B

[This section comprises of very short answer type questions (VSA) of 2 marks each]

Q.5   *Prove that* $\tan^{-1}\left(\dfrac{\cos x}{1+\sin x}\right) = \left(\dfrac{\pi}{4} - \dfrac{x}{2}\right)$

Q.6   *Prove that* $\tan^{-1}\dfrac{3}{4} + \tan^{-1}\dfrac{3}{5} - \tan^{-1}\dfrac{8}{19} = \dfrac{\pi}{4}$

Q.7   Prove that:

(i) $\cos^{-1}(1-2x^2) = 2\sin^{-1}x$

Q.8   *Evaluate* $\cos\left(\sin^{-1}\dfrac{3}{5} + \sin^{-1}\dfrac{5}{13}\right)$

Section – C

[This section comprises of short answer type questions (SA) of 4 marks each]

Q. 9   *Prove that* $\tan^{-1}\dfrac{1}{3} + \tan^{-1}\dfrac{1}{5} + \tan^{-1}\dfrac{1}{7} + \tan^{-1}\dfrac{1}{8} = \dfrac{\pi}{4}.$

OR

Solve $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x).$

Q.10   *Solve* $\tan^{-1} 2x + \tan^{-1} 3x = \dfrac{\pi}{4}$

OR

Solve $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\dfrac{8}{31}$

Note : Write down the domain and range of each of the following functions and draw its graph:

1. $\sin^{-1}$ 2. $\cos^{-1}x$ 3. $\tan^{-1}x$ **[Bonus Marks]**