



Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree
in
**Information Technology (Computer Systems
and Networking)**

Orientation Programme (2010)

Mathematical Skills (001)

Duration: 2 Hours

Monday, 28th December 2009
(Time 1.00 p.m. – 3.00 p.m.)

Instruction to Candidates:

- ◆ This paper has 40 questions. Answer All Questions.
- ◆ Total Marks 100.
- ◆ This paper contains 9 pages.
- ◆ Calculators are **NOT** allowed.

1. Solve for x , $2^x = \frac{1}{32}$

- a) $x = 5$
- b) $x = -3$
- c) $x = -5$

- d) $x = 16$
- e) None of the above

2. Find the value for x , $\frac{4^x}{4^{2x+1}} = \frac{1}{256}$

- a) $x = 2$
- b) $x = -2$
- c) $x = -3$
- d) $x = 3$
- e) None of the above

3. If $\log_a b = c$ then find $\log_{\frac{1}{a}} b$.

- a) $\frac{1}{c}$
- b) $-c$
- c) c

- d) $-\frac{1}{c}$
- e) None of the above.

4. Simplify $\frac{4^{n+4} - 8(4^{n+1})}{7(4^{n+2})}$

- a) 4
- b) 2
- c) 1

- d) -2
- e) None of the above.

5. Evaluate $\log_{10} 0.01$

- a) -2
- b) $\frac{1}{2}$
- c) 21

- d) 0.1
- e) None of the above

6. If $x = 1 + e^y$, what is y ?

- a) $y = 1 + e^x$
- b) $y = x^e + 1$
- c) $y = \ln(x - 1)$

- d) $y = \log_e x - 1$
- e) None of the above

13. Let the universal set be the set R for all real numbers and let $A = \{x \in R \mid -1 \leq x < 4\}$ and $B = \{x \in R \mid 2 \leq x < 7\}$. Find $A \cup B$.

- a) $A \cup B = \{0, 1, 2, 3, 4, 5, 6\}$
- b) $A \cup B = \{-1, 0, 1, 2, 3, 4, 5, 6\}$
- c) $A \cup B = \{x \in R \mid -1 \leq x < 7\}$
- d) $A \cup B = \{x \in R \mid -1 \leq x \leq 7\}$
- e) None of the above

14. Solve the inequality $\frac{x}{2} + \frac{x}{3} \geq \frac{15}{6}$.

- a) $x \leq 3$
- b) $x \geq 3$
- c) $x > 3$
- d) $x < 2$
- e) None of the above

15. $Q = \frac{\gamma}{P^\beta}$ in log form is:

- a) $\log Q = \log \gamma - P \log \beta$
- b) $Q = \gamma - \beta \log P$
- c) $\log Q = \log \gamma + \beta \log P$
- d) $\log Q = \log \gamma - \beta \log P$
- e) None of the above

16. Given $u = 3$ and $v = -1$, $4u^2 - 8v^2$

- a) 28
- b) 4
- c) 44
- d) 24
- e) None of the above

17. Evaluate $\frac{1}{\log_{10} \left(\frac{1}{\log_{10} \sqrt[10]{10}} \right)}$

- a) 10
- b) 1
- c) -1
- d) -10
- e) None of the above

18. Find x , $49 \times 7^x = 343^{2x-5}$

a) $x = \frac{1}{5}$

b) $x = \frac{5}{17}$

c) $x = 1$

d) $x = \frac{17}{5}$

e) None of the above

19. Solve $\log_3(5x+7) = 2$

a) $x = \frac{1}{5}$

b) $x = \frac{2}{5}$

c) $x = -\frac{2}{5}$

d) $x = \frac{5}{2}$

e) None of the above

20. Solve the value for x , $\log_{10} x = \log_5 2 + \log_5 x$.

a) $x = -1$

b) $x = 1$

c) $x = 0.1$

d) $x = -0.1$

e) None of the above

21. Simplify, $x = \frac{\sqrt{2}-1}{\sqrt{2}+1}$

a) $x = \sqrt{2} + 2$

b) $x = 3 + 2\sqrt{2}$

c) $x = 1 - 2\sqrt{2}$

d) $x = -2\sqrt{2} + 3$

e) None of the above

22. Find the solutions for x , $\sqrt{x+1} + \sqrt{x-4} = 5$

a) $x = -4$

b) $x = 9$

c) $x = 8$

d) $x = 5$

e) None of the above

23. Select the **incorrect** answer out of the simplifications for the expression

$$\frac{a}{2} + \frac{7a}{4} + \frac{3a}{12}$$

a) $\frac{30a}{12}$

b) $2.5a$

c) $\frac{15a}{6}$

d) $\frac{3a}{12}$

e) $\frac{5a}{2}$

24. Select the **correct** answer out of the simplifications for the expression

$$\frac{10}{x+4} - \frac{7}{x-5}$$

a) $\frac{3(x-26)}{(x+4)(x-5)}$

b) $\frac{3x-26}{(x+4)+(x-5)}$

c) $\frac{3x-26}{(x+4)(x-5)}$

d) $\frac{3x-78}{(x+4)+(x-5)}$

e) None of the above

25. What combination of rational expressions gives the result $\frac{(x-2)(x-1)}{(x+3)(x-3)}$?

a) $\frac{x}{x+3} + \frac{2}{x-9}$

b) $\frac{x}{x+3} + \frac{2}{x^2-9}$

c) $\frac{x}{x+3} + \frac{2}{x-3}$

d) $\frac{x}{x+3} + \frac{2x}{x^2+9}$

e) None of the above

26. Simplify the following $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}} + \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}}$

a) $\frac{2(a-b)}{(a+b)}$

b) $\frac{2a+b}{(a-b)}$

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

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

e) $\frac{(a+b)}{(a-b)}$

27. Solve the inequality: $\frac{1}{(2x-5)} < 0$.

a) $x \geq 0$

b) $x \leq \frac{5}{2}$

c) $x > \frac{5}{2}$

d) $x < \frac{5}{2}$

e) None of the above

28. Simplify, $x = \frac{\sqrt{2}-1}{\sqrt{2}+1}$

a) $x = \sqrt{2} + 2$

b) $x = 3 + 2\sqrt{2}$

c) $x = 1 - 2\sqrt{2}$

d) $x = -2\sqrt{2} + 3$

e) None of the above

29. Simplify the following $\left\{\frac{a}{b} + \frac{c}{d}\right\} \left\{\frac{p}{q} \div \frac{r}{s}\right\}$

a) $\frac{ps(ab+dc)}{rqab}$

b) $\frac{ab(ps+bc)}{rqab}$

c) $\frac{ac(ar+sc)}{rqab}$

d) $\frac{pr(ad+bc)}{sqab}$

e) $\frac{ps(ad+bc)}{rqdb}$

30. $\frac{2}{7} + \frac{a}{b} - \frac{b}{a}$ is not equal to

a) $\frac{7(a+b)^2 - 12ab - 14b^2}{7ab}$

b) $\frac{-7(a+b)^2 + 12ab + 14a^2}{-7ab}$

c) $\frac{7(a^2 - b^2) + 2ab}{7ab}$

d) $\frac{-7(b^2 - a^2) + 2ab}{7ab}$

e) $\frac{7(a+b)^2 - 12ab}{7ab}$

31 Find the equation of a circle whose center is at (1, -1) and radius 2.

a) $x^2 + y^2 = 4x + 4y + 2$

b) $x^2 + y^2 = 2x + 2y - 2$

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

d) $x^2 + y^2 = 2x - 2y + 2$

e) None of the above

32 Find a rational number.

- a) e
- b) $\sqrt{2}$
- c) π

- d) 0.123123123...
- e) None of the above.

33 The point (2,2) lies on a circle whose center is at (-1,-2). Find the standard form of the equation for this circle

- a) $(x-1)^2 + (y-2)^2 = 5$
- b) $(x-1)^2 + (y-2)^2 = 25$
- c) $(x+1)^2 + (y+2)^2 = 25$
- d) $(x-1)^2 + (y-2)^2 = 5$
- e) None of the above.

34 Find the value for x where $x = (\log_b a)(\log_a b) + \log_b b$

- a) $x = 0$
- b) $x = 2$
- c) $x = 1$
- d) $x = -1$
- e) None of the above.

35 Find the distance between the two points (5, -6) and (-1, 2),

- a) 100
- b) 10
- c) $\sqrt{32}$
- d) $\sqrt{28}$
- e) None of the above

36 Find the slope of the line passes through the pair of points (-5,9) , (-1,11) ,

- a) $-\frac{1}{2}$
- b) $\frac{1}{2}$
- c) 2
- d) -2
- e) None of the above

37 Find the equation of the line with a slope of $\frac{1}{4}$ and passes through the point

$\left(\frac{1}{2}, 1\right)$

- a) $y = \frac{x}{4} - \frac{9}{2}$
- b) $y = x + \frac{7}{2}$
- c) $y = 4x + \frac{7}{2}$

d) $y = \frac{x}{4} + \frac{7}{8}$

- e) None of the above

38 Find an equation on the line that passes through the point (3,5) and perpendicular to the line $y - \frac{3}{5}x = \frac{5}{3}$,

a) $y = -\frac{5}{3}x$

d) $y = -\frac{5}{3}x + 10$

b) $y = \frac{5}{3}x + 10$

e) None of the above

c) $y = -\frac{3}{5}x + 10$

39 Find the distance between $25/3$ and $13/5$

a) $86/15$

d) $12/5$

b) $-86/15$

e) None of the above

c) $12/15$

40 The point (-1,2) lies on a circle whose center is at (3,-4). Find the standard form of the equation of this circle.

a) $(x - 3) + (y + 4) = 12$

b) $(x + 1)^2 + (y - 2)^2 = 60$

c) $(x^2 - 3) + (y^2 - 4) = 12$

d) $(x - 3)^2 + (y + 4)^2 = 60$

e) None of the above