University of Colombo, Sri Lanka

University of Colombo School of Computing

BIT

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2024 — 1st Year Examination — Semester 1

IT1506 — Fundamentals of Mathematics

Multiple Choice Question Paper
(1 Hour)

Important Instructions

- The duration of the paper is **1 Hour**.

- The medium of instructions and questions is English.

- This paper has **20 questions** on **4 pages**. Answer **all** questions.

- All questions are of the **MCQ** (Multiple Choice Questions) type.

- Each question will have **5 (five)** choices with **ONLY ONE** correct answer.

- This paper consists of 100 marks and all the questions will carry equal marks.

- Answers should be marked on the **special answer sheet** provided.

- Note that questions appear on both sides of the paper. If a page or part of a page is not printed, please inform the supervisor/invigilator immediately.

- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**

- Any electronic device capable of storing and retrieving text, including electronic dictionaries, smartwatches, and mobile phones, is not allowed.

- Calculators are **not** allowed.

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1) The solution to the equation $27^{(x+2)} \times 3^{(5x-8)} = 9^{10}$ is

(a) 11/3	(b) 21	(c) 11/4
(d) 3/11	(e) 4/11	

2) What is the decimal representation of $\left(\frac{7}{16} + \frac{3}{32} + \frac{5}{32}\right)$?

(a) 0.6589	(b) 0. 6875	(c) 0.7556
(d) 0.5575	(e) 0.7570	

3) Convert $\frac{2}{5}$ into a percentage:

(a) 40%	(b) 1/500%	(c) 2/500%
(d) 9%	(e) 20%	

4) What is the Least Common Multiple (LCM) of 18, 24 and 30?

(a) 12	(b) 360	(c) 36
(d) 48	(e) 180	

5) Greatest Common Divisor (GCD) of two numbers is 8 and LCM is 144. What is the second number if the first number is 72?

(a) 24	(b) 2	(c) 16
(d) 48	(e) 6	

6) Simplified representation of $\frac{3x^2+5x-2}{x+1} + \frac{x^2+2x-3}{x-1}$ is

(a) $(4x^2 - 9x + 1)/(x + 1)$	(b) $(4x^2 + 4x + 1)/(x - 1)$
(c) $(4x^2 + 9x + 1)/(x + 1)$	(d) $(2x^2 + 9x + 1)/(x - 1)$
(e) $(2x^2 + 2x + 1)/(x + 1)$	

7) A sphere with a radius of 6 cm holds water. This water is poured into a cylindrical bowl with a radius of 9 cm and a height of 12 cm. What will be the height of the water in the bowl?

(a) 32/9 cm	(b) 360/9 cm	(c) 720/9 cm
(d) 9/32 cm	(e) 32 cm	

8) Factorize $x^3 + 6x^2 - 5x - 30$

(a) $(x - 6)(x^2 - 5)$	(b) $(2x + 2)(x - 3)$	(c) $(x + 3)(2x^2 + 2)$
(d) $(3x - 3)(2x - 2)$	(e) $(x + 6)(x^2 - 5)$	

09) What is the solution of $2x^2 - 4x - 6 = 0$?

(a) $x = 3, -1$	(b) $x = -3, 1$	(c) $x = -13, 13$
(d) $x = 13, -11$	(e) $x = -13, 11$	

10) Rearrange $P = 4(L + W/3)^{1/4}$

(a) $W = 3(\frac{P^4}{256} - L)$	(b) $W = 3(\frac{P^4}{27} + L)$	(c) $W = 9(\frac{P^4}{256} + L)$
(d) $W = 6(\frac{P^4}{256} + PL)$	(e) $W = 3(\frac{P^4}{256} + L)$	

11) The positive solution of the quadratic equation $x^2 - x - 3 = 0$ is

(a) $x = (1 - \sqrt{13})/2$	(b) $x = (2 + \sqrt{13})/13$	(c) $x = 13$
(d) $x = 13, -11$	(e) $x = (1 + \sqrt{13})/2$	

12) Amila purchased two items, X and Y, for Rs. 200 and Rs. 225 respectively. She sold item X for Rs. 350 and item Y for Rs. 275. What is the ratio of the profit made on item X to the profit made on item Y?

(a) 1:3	(b) 6:1	(c) 3:1
(d) 3	(e) 1:6	

13) The roots of the quadratic equation $(a - b)x^2 + bx + c = 0$ are equal. Which of the following equation is true?

(a) $b^2 = 2(a - b)c$	(b) $b^2 = 4(a - b)c$	(c) $2b = a - c$
(d) $b^2 = 4(b - a)c$	(e) $2a = b - 2c$	

14) What is the domain of $f(x) = \sqrt{x^2 - 4}$?

(a) $x \geq 2 \cup x \leq -2$	(b) $x \leq 2 \cup x \leq -2$	(c) $x = 4$
(d) $x < 4$	(e) $x > 2 \cup x < -2$	

15) Which of the following equations represents an exponential function?

|		
(a) $y = \sin(e)$	(b) $y = 2^x$	(c) $y = \cos(x)$
(d) $y = \tan(x)$	(e) $y = e^2$	

16) Using the BODMAS rule, determine the result of $4 + 3 \times (9 - 1) \div 4$?

(a) 10	(b) 7	(c) 9
(d) 14	(e) 16	

17) $40656 = 21a^x b^y$ where a and b, are primes and $a < b$. If x and y are positive integers, then x and y, are respectively given by:

(a) 2,11	(b) 0,4	(c) 4, 2
(d) 11, 2	(e) 2, 4	

Consider following diagram and answer Question 18 and 19. The diagram shows the triangle XYZ, with $XY = 8\ cm$, $XZ = 11cm$ and angle $Y\hat{X}Z = \pi/3$ radians. The arc YT which lies on XZ is an arc of a circle with center X and radius 8cm. The region, shown shaded in the diagram, is bounded by lines YZ and ZT and arc YT.
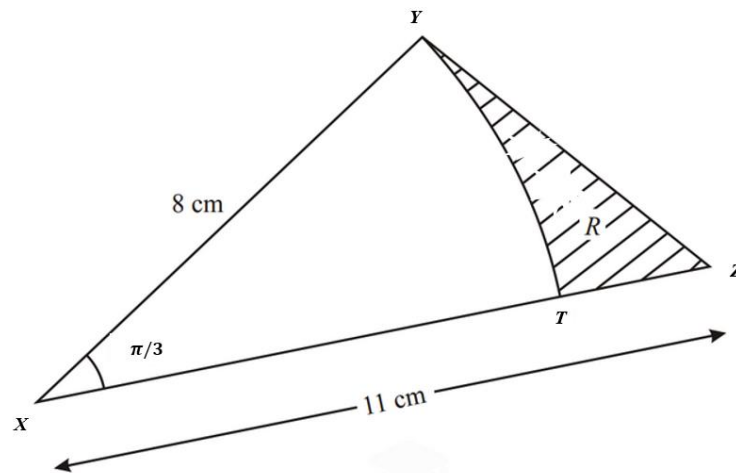
18) What is the length of the arc YT?

(a) 77/22 cm	(b) 88/21 cm	(c) 88/22 cm
(d) 176/21cm	(e) 77/21 cm	

19) What is the length of YZ?

(a) 34 cm	(b) $(88/21) + 3 + 48$ cm	(c) $(88/22) + 3 + 97$ cm
(d) $\sqrt{97}$ cm	(e) $(77/21) + 3 + \sqrt{48}$ cm	

20) If $\tan x = t$ then $(\cos^2 x)(\sin^2 x)$ is equal to

(a) $t^2/(t^2 + 1)^2$	(b) t^2	(c) $(t^2 - 1)^2/2t^2$
(d) $(t^2 - 1)^2/t^2$	(e) $(t^2 + 1)^2/t^2$	

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