University of Colombo, Sri Lanka

University of Colombo School of Computing

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2023— 1^{st} Year Examination — Semester 1

EN1106 — Introductory 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 **6 pages**. Answer **all** questions.
- All questions are of the **MCQ** (Multiple Choice Questions) type.
- Each question will have **5 (five)** choices with **ONE OR MORE** correct answers.
- This paper consists of 100 marks and all the questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from -1 (All the incorrect choices are marked & no correct choices are marked) to +1 (All the correct choices are marked & no incorrect choices are marked). However, **the minimum mark per question would be zero**.
- 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) Which of the following statements regarding operations involving integers is/are false?

A - The square of any integer is a non-negative number.
B - Subtracting a negative integer from a positive integer result in a positive integer.
C - Multiplying an odd number of negative integers yields a negative product.
D - The absolute value of a product of two integers is always greater than the product of their absolute values.
E - Dividing a non-zero integer by zero results in an undefined value.

(a) A	(b) B	(c) C
(d) D	(e) E	

2) The following fraction is equal to,

$$\frac{3-2\sqrt{3}}{3+2\sqrt{3}}$$

(a) $(4\sqrt{3}+7)$	(b) $(7-4\sqrt{3})$	(c) $(7+4\sqrt{3})$
(d) $(4\sqrt{3}-7)$	(e) $(-4\sqrt{3}-7)$	

3) Give the **simplest form** of $\frac{9x^{-2}y^3}{(x^2y^{-1})^2} \times (x^2y)^{-1}$.

(a) $9\left\{\left(\frac{y}{x}\right)^2\right\}^2$	(b) $\left\{3\left(\frac{y}{x^2}\right)^2\right\}^2$	(c) $\left\{3\left(\frac{y}{x^4}\right)^2\right\}^2$
(d) $9\left(\frac{y}{x}\right)^4$	(e) $9\left(\frac{y}{x^2}\right)^2$	

4) Find x and y.

$$2x + 13y = 36$$
$$13x + 2y = 69$$

(a) y = 1	(b) x = 5	(c) x = 4
(d) y = 2	(e) x = 3	

5) Consider three consecutive odd numbers. If you add the first two and then subtract the third, then divide the result by 3, and finally multiply it by 8, you get 264. What is the smallest odd number among the three?

(a) 101	(b) 99	(c) 105
(d) 107	(e) 93	

6) The remainder when 3^{12} is divided by 13 is,

(a) 3	(b) 1	(c) 7
(d) 9	(e) 4	

7) If **x = 4** then the following expression is equal to,

$$\frac{x+1}{x+\dfrac{1}{1+\dfrac{1}{x+1}}}$$

(a) 29/30
(b) 29/24
(c) 30/29
(d) 25/24
(e) 24/25

8) If $9^{x+2y} = 243^{x-3y}$ then,

(a) $y = \frac{3}{19}x$	(b) $y = \frac{19}{3}x$	(c) $y = \frac{3}{15}x$
(d) $x = \frac{3}{19}y$	(e) $x = \frac{3}{15}y$	

9) List all the integer values that satisfy the inequality, $-5 < 2x + 1 \leq 3$.

(a) 0, 1, 2, 3	(b) – 1, 0, 1, 2	(c) 1, 0, −1, −2
(d) 0, −1, −2, −3	(e) Any integer value	

10) A rectangular container has a base that is 12 cm long and 8 cm wide. The container is filled with water to a height of 6 cm. If all the water is poured into a second container with a square base, it will rise to a height of 16 cm. What is the length of one edge of the square base of the second container?

(a) 6 cm	(b) 8 cm	(c) 9 cm
(d) 3 cm	(e) 5 cm	

11) Solve the inequality, $3x^2 - 5x - 1 < 4x^2 + 7x + 19$

(a) $x > -10$ or $x < -2$	(b) $x < -10$ or $x > -2$	(c) $x > 10$ or $x < 2$
(d) $x < -2$ or $x > -10$	(e) $x < 10$ or $x > 2$	

12) Simplify $\log_a a^2 - 4\log_a\left(\frac{1}{a}\right)$.

(a) 4	(b) 6	(c) 8
(d) 2	(e) 10	

13) Three numbers X, Y, Z in that order, are in geometric progression with common ratio r. Given further that X, 3Y, Z in that order, are in arithmetic progression, determine the possible value/s of r. ($X \neq 0$)

(a) $3 + 2\sqrt{2}$	(b) $-3 + 2\sqrt{2}$	(c) $3 - 2\sqrt{2}$
(d) $-3 - 2\sqrt{2}$	(e) None	

14) What are the roots of the equation?

$$x^3 - 4x^2 - 9x + 36 = 0$$

(a) −4, −3, 3	(b) −3, 0, 3	(c) 4, 3, 1
(d) 4, 3, −3	(e) 4, 3, 2	

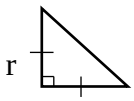
15) A 22 cm^3 block metal is made into a wire of diameter 2 mm. How long will be the wire?

(a) 7 m	(b) 8 m	(c) 9 m
(d) 10.50 m	(e) 11.50 m	

16) X started a company on July 1, 2023 investing Rs. 400,000.00. Y joined the company on November 1, 2023, with an investment of Rs. 1,300,000.00. At the end of the year 2023, they made a profit of Rs. 400,000.00. What is the profit of X and Y at the end of the year 2023? (***Assumption:*** You should consider the amount of investment and the duration of investment for the calculation of weighted investment)

(a) X– Rs. 202,000.00 Y– Rs. 198,000.00	(b) X– Rs. 194,000.00 Y – Rs. 206,000.00	(c) X– Rs. 190,000.00 Y – Rs. 210,000.00
(d) X– Rs. 206,000.00 Y – Rs. 194,000.00	(e) X– Rs. 192,000.00 Y – Rs. 208,000.00	

17) **An isosceles right-angled triangle** is cut out from a circle which has a radius, r of 10 cm. The triangle is cut out with the right angle on the center of the circle and two equal sides' legs along the circle's radius. What is the area of the leftover shapes?



Isosceles right-angled triangle

(a) $50(2\pi - 1)$ cm^2	(b) $50(1 - \pi)$ cm^2	(c) $50(\pi - 1)$ cm^2
(d) $50(2\pi + 1)$ cm^2	(e) $50(1 - 2\pi)$ cm^2	

18) A circle with a radius of 6 cm is enlarged by 120%. What will be the percentage increase in the area of the new circle compared to the original circle?

(a) 382%	(b) 384%	(c) 386%
(d) 388%	(e) 358%	

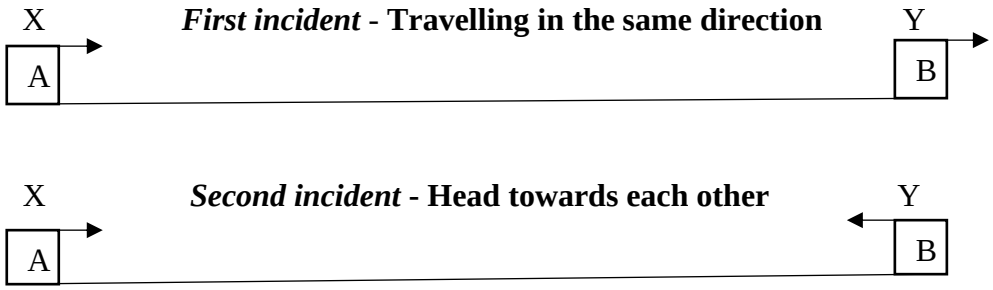
19) Salaries of Kamal and Nimal are in the ratio 2:3. If the salary of each is increased by Rs.4000.00, the new ratio becomes 7:10. What is Nimal's new salary?

(a) Rs. 40,000.00	(b) Rs. 50,000.00	(c) Rs. 60,000.00
(d) Rs. 70,000.00	(e) Rs. 80,000.00	

20) On a highway, places X and Y are situated 100 km apart. In the ***first incident***, Car A departs from X and Car B from Y at the same time, they meet after 5 hours travelling in the **same direction**. However, in the ***second incident,*** **they head towards each other** by departing from X and Y at the same time, they meet after only 1 hour. What are the speeds of Car A and Car B?

(**Note** – There is no any acceleration / deceleration in speed of both cars A and B in both incidents.)

$$Speed = \frac{Distance}{Time}$$



(a) A – 60 km/h , B – 40 km/h
(b) A – 40 km/h , B – 60 km/h
(c) A – 80 km/h , B – 60 km/h
(d) A – 60 km/h , B – 80 km/h
(e) A – 60.5 km/h, B – 40.5 km/h

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