UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2017 –1st Year Examination – Semester 1

EN1201: Introductory Mathematics
Multiple Choice Question Paper
28th May 2017
(TWO HOUR)

<u>**Important Instructions :**</u>

- The duration of the paper is **2(two) hours**.

- The medium of instruction and questions is English.

- The paper has **40 questions** and **7 pages**.

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

- All questions should be answered.

- Each question will have 5 (five) choices with <u>**one or more**</u> correct answers.

- All 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 0 (*All the incorrect choices are marked & no correct choices are marked*) to +1 (*All the correct choices are marked & no incorrect choices are marked*).

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

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

- Calculators are not allowed.

- 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.**

1) If $x + y = 5$ and $xy = -3$, then $x^2 + y^2$ is equal to

(a) 16	(b) 24	(c) 30	(d) 31	(e) 34

2) If $\sqrt{2} + \sqrt{5} = k(\sqrt{2} - 1)$, then k is equal to

(a) $(\sqrt{2} + \sqrt{5})(\sqrt{2} + \sqrt{1})$
(b) $\sqrt{3} + \sqrt{5} + \sqrt{10} + \sqrt{15}$
(c) $\sqrt{2} + \sqrt{5} + \sqrt{8} + \sqrt{10}$
(d) $\sqrt{2} + \sqrt{4} + \sqrt{5} + \sqrt{10}$
(e) $\sqrt{2} + \sqrt{3} + \sqrt{5} + \sqrt{10}$

3) The length and breadth of a rectangle are 12 cm and 8 cm respectively to the nearest cm. Then a lower bound of the area for the rectangle is

(a) 96	(b) 87.5	(c) 86.25	(d) 106.5	(e) 97.75

4) How many perfect squares are there between 109 and 199 ?

(a) 4	(b) 3	(c) 5	(d) 7	(e) 6

5) $\dfrac{(-1)^2 + (-1)^3}{(-1)^4 + (-1)^6}$ is equal to

(a) 1	(b) 0	(c) -1	(d) 2	(e) -2

6) The Greatest Common Divisor of $2^3 \times 3^2 \times 5$ and $3^3 \times 2^2 \times 7$ is

(a) 210	(b) 108	(c) 36	(d) 72	(e) 35

7) The sum 2+4+6+8+….+100 is equal to

(a) 50×51	(b) 50×52	(c) 2450	(d) 49×50	(e) 2550

8) If $x + y = 4$ for positive integers x and y, then the smallest possible value of $\dfrac{1}{x} + \dfrac{1}{y}$ is

(a) 1	(b) 1/2	(c) 2	(d) 1/4	(e) 1/3

9) If the area of a square is $36cm^2$, then the length in centimeters of a side of an equilateral triangle which has the same perimeter as that of the square is

(a) 8   (b) 12   (c) 6   (d) 9   (e) 18

10) $1+3+5+7+9+\ldots\ldots+999$ is equal to

(a) 350000   (b) 250000   (c) 200000   (d) 225000   (e) 275000

11) If $x = 100$ then $x + x^{-1} + x^{-2}$ is equal to

(a) 100.1010   (b) 100.1001   (c) 100.0011   (d) 100.0101   (e) 100.0011

12) If $x - \dfrac{1}{x} = 10$, then $x^2 + \dfrac{1}{x^2}$ is equal to

(a) 99   (b) 100   (c) 101

(d) 102   (e) 98

13) $\dfrac{x^2}{(x-1)(x+1)}$ is equal to

(a) $1 + \dfrac{1}{2(x-1)} - \dfrac{1}{2(x+1)}$

(b) $1 - \dfrac{1}{2(x-1)} - \dfrac{1}{2(x+1)}$

(c) $1 + \dfrac{1}{2(x-1)} + \dfrac{1}{2(x+1)}$

(d) $\dfrac{1}{2(x-1)} + \dfrac{1}{2(x+1)}$

(e) $\dfrac{1}{2(x-1)} - \dfrac{1}{2(x+1)}$

14) $1+8999 \times 9001$ is equal to

(a) 81,009,000   (b) 81,000,000   (c) 80,109,000
(d) 80,100,000   (e) 81,000,900

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15) Which of the following is/are an equation of lines perpendicular to the line $y = 4x - 7$?

(a) $y + 4x = 7$ (b) $y = -\frac{1}{4}x + 2$ (c) $4y + x = 7$ (d) $x - 4y = -1$ (e) $x + y = 4$

16) If $(x - 3)(x - 5) > 0$ then the possible values of x are

(a) $x > 5$ (b) $x < 3$ (c) $x > 3$
(d) $3 < x < 5$ (e) $3 \le x \le 5$

17) The solution to $\left| \frac{3x}{1-x} \right| = 4$ is/are

(a) -4 (b) $-\frac{4}{7}$ (c) $\frac{2}{7}$ (d) 4 (e) $\frac{4}{7}$

18) If $A = \{x : 3 < x \le 7\}$ and $B = \{x : -1 \le x < 5\}$, then $A \cap B'$ is equal to

(a) $\{x : 5 < x < 7\}$
(b) $\{x : 5 \le x \le 7\}$
(c) $\{x : 5 < x \le 7\}$
(d) $\{x : 3 < x < 5\}$
(e) $\{x : 3 \le x \le 7\}$

19) The area of the region bounded by $|x| + |y| = 5$ is

(a) 100 square units   (b) 50 square units   (c) 25 square units

(d) 10 square units   (e) 20 square units

20) The volume of a triangular prism of length 10 cm and an equilateral triangle of side length 8 cm as cross-section is equal to

(a) 160 cm^3 (b) $240\sqrt{3}$ cm^3 (c) 320 cm^3
(d) $160\sqrt{3}$ cm^3 (e) $320\sqrt{3}$ cm^3

21) If the area of Sri Lanka is 4.2×10^4 square kilometers and that of Russia is 5.6×10^6 square kilometers, then the ratio of the area of Sri Lanka to that of Russia is

(a) $3 : 400$ (b) $3 : 500$ (c) $3 : 40$
(d) $14 : 425$ (e) $14 : 465$

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22) The least positive integer k such that $96k$ is a perfect square is

(a) 3   (b) 9   (c) 12   (d) 6   (e) 18

23) If three angles of a quadrilateral are 88°, 90° and 92° degrees to the nearest degree, then the largest possible value of the fourth angle is

(a) 92.5° (b) 91.5° (c) 90.5° (d) 89.5° (e) 93.5°

24) The volume of a hollow cubic vessel is $125{,}000$ cm^3 . Then the volume of the largest cylinder that can be placed inside the vessel is

(a) $31{,}000\pi$ cm^3 (b) $62{,}500\pi$ cm^3 (c) $62{,}000\pi$ cm^3

(d) $31{,}250\pi$ cm^3 (e) $125{,}000\pi$ cm^3

25) The volume of a solid hemisphere A is 125 times that of another hemisphere B. If the base radius of B is 10 cm, then the base radius of A is

(a) 25 cm   (b) 50 cm   (c) 35 cm   (d) 125 cm   (e) 62.5 cm

26) If $\tan x = \dfrac{5}{12}$ and x is an acute angle, then $1/\sin x$ is equal to

(a) 12/5   (b) 5/12   (c) 5/13   (d) 13/5   (e) 13/12

27) If $x_n^2 = -31 + (-2)^n$, then x_8 could be

(a) $\sqrt{97}$ (b) $-\sqrt{97}$ (c) -15   (d) 15   (e) not a real number

28) A, B and C share an amount of money in the ratio 9:5:4 . If A and B together get Rs. 5,600 then C's share is equal to

(a) Rs. 2,000   (b) Rs. 800   (c) Rs. 1,600   (d) Rs. 3,200   (e) Rs. 2,400

29) A car travels at 40 kmph for 3 hours on Monday. It made the same journey on Tuesday by travelling the first half of the distance at 30 kmph and the other half at 20kmph. Then the time taken on Tuesday is

(a) 5 hours (b) 4 hours (c) 3 hours more than on Monday
(d) 6 hours (e) 2 hours more than on Monday

30) The number of integers that satisfy the inequality $|2x - 5| < 10$ is

(a) 8 (b) 14 (c) 11 (d) 10 (e) 12

31) Which of the following is/are true?
I. $\sin 45^\circ = \sin 135^\circ$
II. $\cos 65^\circ = \sin 25^\circ$
III. $\tan 45^\circ = \cos 60^\circ$

(a) I,II and III (b) I and II (c) I and III (d) II and III (e) I only

32) If $\theta = 60^\theta$, then which of the following has the smallest value

(a) $\sin \theta$ (b) $\cos \theta$ (c) $\tan \theta$ (d) $\sec \theta$ (e) $\operatorname{cosec} \theta$

33) A man invests Rs.100,000 at the beginning of a year in an account that yields 10% interest per annum compounded semi-annually. The account balance at the beginning of the fourth year is,

(a) $100{,}000(1.05)^6$ (b) $100{,}000(1.05)^7$ (c) $100{,}000(1.05)^8$ (d) $100{,}000(1.10)^3$ (e) $100{,}000(1.10)^6$

34) If a trader marks his price with 20% profit on cost price and sells with a discount of 10% on marked price, then the effective profit percentage is,

(a)10 % (b) 11 % (c) 12 % (d) 8 % (e) 9 %

35) The income tax table for employees is 0% for the first Rs. 500,000 of the annual income, 5% for the next Rs. 500,000 and 10% for the rest of the income. Then the annual tax for a person with a monthly income of Rs. 150,000 is

(a) Rs. 125,000 (b) Rs. 65,000 (c) Rs. 130,000 (d) Rs. 100,000 (e) Rs.105,000

36) A solid cylindrical metal block of radius r and height $2r$ is melted and solid spheres of radius $\frac{3r}{8}$ are made. The maximum number of spheres that can be made is,

(a) 56   (b) 42   (c) 28   (d) 29   (e) 14

37) The sum of n terms of a series is $S_n = \frac{5a - 3n^2}{2}$. Then the 4th term of this series is

(a) $\frac{21}{2}$ (b) $-\frac{21}{2}$ (c) $-\frac{11}{2}$ (d) $\frac{11}{2}$ (e) $\frac{3}{2}$

38) Amal gave $\frac{1}{4}$ of the sweets he had to his brother and $\frac{3}{7}$ of the remaining sweets to his sister. Which of the following number of sweets will allow this distribution?

(a) 32   (b) 56   (c) 48   (d) 24   (e) 28

39) A circular pond of radius r is surrounded by a circular path, where the area of the path is equal to the area of the pond. Then the width of the path is

(a) $\left(\sqrt{3} - 1\right)r$ (b) $\left(1 - \frac{1}{\sqrt{2}}\right)r$ (c) $\left(\sqrt{2} - 1\right)r$ (d) $\left(1 + \frac{1}{\sqrt{2}}\right)r$ (e) $\left(\sqrt{2} + 1\right)r$

40) If $x = \dfrac{1}{p - \frac{p^2}{p+1}}$ and $x \neq 1$, then p is equal to

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

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