UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2017 – 2nd Year Examination – Semester 3

IT3305: Mathematics for Computing-II

PART I – Multiple Choice Question Paper

2nd June 2017

(ONE HOUR)

Important Instructions :

- The duration of the paper is **1(one) hour**.
- The medium of instruction and questions is English.
- The paper has **questions 24** and **5 pages**.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** 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) Find x, y, z, w if $\begin{bmatrix} x+y & 2z+w \\ x-y & z-w \end{bmatrix} = \begin{bmatrix} 3 & 5 \\ 1 & 4 \end{bmatrix}$.

(a) $x = 4,\ y = -1,\ z = 9,\ w = 5.$
(b) $x = 2,\ y = 1,\ z = 3,\ w = -1.$
(c) $x = 1,\ y = 2,\ z = -1,\ w = 3.$
(d) $x = 2,\ y = 1,\ z = 3,\ w = 1.$
(e) $x = 4,\ y = 1,\ z = 9,\ w = 5.$

2) If A is an $m \times n$ matrix where $m \neq n$, which of the following is(are) **not** true about A?

(a) A is a row matrix if m = 1.
(b) A is a column matrix if n = 1.
(c) A could be a diagonal matrix.
(d) A could be an orthogonal matrix.
(e) A could be an upper triangular matrix.

3) Let A, B and C be three matrices such that $A_{n\times p} = B_{m\times q} C_{l\times r}$. Which of the following **cannot** be true?

(a) $l, m, n, p, q, r \in N \text{ and } m \neq l.$
(b) $l, m, n, p, q, r \in N \text{ and } n \neq m\ .$
(c) $l, m, n, p, q, r \in N \text{ and } n = m, p = r, q = l.$
(d) $l, m, n, p, q, r \in N \text{ and } q \neq r.$
(e) $l, m, n, p, q, r \in N \text{ and } q \neq l.$

4) Let $A = \begin{pmatrix} 2 & 3 & 2 & -2 \\ 2 & 3 & 3 & 2 \\ 0 & 1 & 1 & -1 \\ 0 & 2 & 2 & 1 \end{pmatrix}$. Then |A| equals

(a) 0 (b) 128 (c) -128
(d) -6 (e) 6

5) Let $A = \begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 1 \\ \beta & 0 & \alpha \end{pmatrix}$. If adj $A = \begin{pmatrix} 2 & 0 & 1 \\ 1 & 3 & -1 \\ -1 & 0 & 1 \end{pmatrix}$, find α and β.

(a) $\alpha = 2$ and $\beta = 1$ (b) $\alpha = 1$ and $\beta = 1$ (c) $\alpha = -1$ and $\beta = 1$
(d) $\alpha = 2$ and $\beta = -1.$ (e) $\alpha = 1$ and $\beta = 0$

6) If A, B and (A+B) are invertible matrices of order *n*, then which of the following is(are) true?

(a) $(A(A+B))^{-1} = (A^2)^{-1} + A^{-1}B^{-1}$.
(b) $(A(A+B))^{-1} = (A^{-1})^2 + A^{-1}B^{-1}$.
(c) $(A(A+B))^{-1} = A^{-1}(A+B)^{-1}$.
(d) $(A(A+B))^{-1} = (A+B)^{-1}A^{-1}$.
(e) $(A(A+B))^{-1} = B^{-1}A^{-1} + A^{-1}$.

7) If A is an $m \times n$ matrix and B and C are both $n \times m$ matrices, then which of the following is(are) always true?

(a) $(\mathbf{A}(\mathbf{B}+\mathbf{C}))^{\mathbf{T}} = \mathbf{A}^{\mathbf{T}}(\mathbf{B}+\mathbf{C})^{\mathbf{T}}$.
(b) $(\mathbf{A}(\mathbf{B}+\mathbf{C}))^{\mathbf{T}} = (\mathbf{B}+\mathbf{C})^{\mathbf{T}}\mathbf{A}^{\mathbf{T}}$.
(c) $(\mathbf{A}(\mathbf{B}+\mathbf{C}))^{\mathbf{T}} = \mathbf{A}^{\mathbf{T}}(\mathbf{B}^{\mathbf{T}}+\mathbf{C}^{\mathbf{T}})$.
(d) $(\mathbf{A}(\mathbf{B}+\mathbf{C}))^{\mathbf{T}} = (\mathbf{C}^{\mathbf{T}}+\mathbf{B}^{\mathbf{T}})\mathbf{A}^{\mathbf{T}}$.
(e) $(\mathbf{A}(\mathbf{B}+\mathbf{C}))^{\mathbf{T}} = (\mathbf{B}^{\mathbf{T}}+\mathbf{C}^{\mathbf{T}})\mathbf{A}^{\mathbf{T}}$.

8) A recurrence relation is given by $U_0 = 1, \quad U_1 = 2, \quad U_{n+1} = U_n^2 - U_{n-1}^2$. Then U_4 is equal to

(a) 4 (b) 16 (c) 5
(d) 25 (e) 20

9) The sum $\sum_{r=n}^{2n}(r+1)$ is equal to

(a) $\frac{1}{2}(3n^2 - 5n + 2)$ (b) $\frac{1}{2}(3n^2 + 5n + 1)$ (c) $\frac{1}{2}(3n^2 - 5n - 1)$
(d) $\frac{1}{2}(3n^2 + 5n - 1)$ (e) $\frac{1}{2}(3n^2 + 5n + 2)$

10) If 34 + 30 + 26 + 22 + …… adds up to 112, then the number of terms is /are

(a) 4 (b) 8 (c) 16
(d) 7 (e) 14

11) If an investment of Rs. I earns interest at $100r\%$ per month for the first 6 months and $50r\%$ per month for the next six months, then the amount at the end of the year, if interest is compounded monthly is,

(a) $I(1+r)^6\left(1+\frac{r}{2}\right)^6$ (b) $I\left(1+\frac{r}{100}\right)^6\left(1+\frac{r}{200}\right)^6$ (c) $I(1+100r)^6(1+50r)^6$
(d) $I\left(1+\frac{r}{100}\right)^6\left(1+\frac{r}{50}\right)^6$ (e) $I\left(1+\frac{r}{100}+\frac{r}{50}\right)^6$

12) The area enclosed by the x-axis and the curve $y = 2 - |x-3|$ is

(a) 8 (b) 3 (c) 6
(d) 5 (e) 4

13) $\int_0^{ln2} \frac{1}{1+e^{-x}} dx$ is equal to

(a) $e^{3/2}$	(b) $e^{2/3}$	(c) 1
(d) $\ln(\frac{3}{2})$	(e) $\ln(\frac{4}{3})$	

14) The value of the nth derivative of $f(x) = (e^{mx})^2$ is

(a) $2m^n f(x)$	(b) $(2m)^n f(x)$	(c) $2m^n e^x$
(d) $2^n m^n e^{2mx}$	(e) $(2m)^n e^x$	

15) The position vector of points A and B are $\underline{a} = -i + j + k$ and $\underline{b} = 2i - j - 3k$ respectively. If ABC is an isosceles triangle, then which of the following is a/are possible position vector(s) of C?

(a) $\frac{i}{2} - k$	(b) $i + k$	(c) $i - k$
(d) $i - \frac{k}{2}$	(e) $i - j - k$	

16) If $f(x) = x^2 e^{-nx},\ n \in \mathbb{N}$ the values of x for which $f'(x) = 0$ and $f''(x) < 0$ is/are

(a) 0 and $\frac{2}{n}$	(b) $\frac{2}{n^2}$	(c) 0
(d) $\frac{2}{n}$	(e) $\frac{4}{n}$ and 0	

17) The shortest distance between the fixed position $i + j$ and a variable position $i - 2tj + k$, where *t* is time, is equal to

(a) 1	(b) 9	(c)) 10
(d) 0	(e) $\sqrt{10}$	

18) $\underline{a}$ and $\underline{b}$ are two vectors where $|\underline{a}| = 5$. If $\underline{b}$ is perpendicular to $\underline{a} + \underline{b}$ and $|\underline{b}| = 3$, then $|\underline{a} + \underline{b}|$ is equal to

(a) 3	(b) 5	(c) 7
(d) 12	(e) 4	

19) Consider the following random variables.

A. Serial Number of a laptop computer
B. Percentage of RAM use when a computer programme is running
C. Time taken to download a 4MB size MP3 song

Type of the random variables are

(a) A is a numerical variable.
(b) B is a numerical variable.
(c) C is a numerical variable.
(d) A is categorical variable.
(e) C is categorical variable.

20) Consider the following random variables.

A. RAM capacity stated in the specification of laptop computers
B. Number of virus attacks in a particular computer system in a week
C. Current usage of hard disk of laptop computers

Types of the random variables are

(a) A is a discrete variable.	(b) B is a discrete variable.	(c) C is a continuous variable.
(d) B is a continuous variable.	(e) C is a discrete variable.	

21) The variance and the mean of a number of successes which is distributed as binomial are 9 and 18 respectively. The number of trials and probability of success of this distribution are, respectively

(a) 23, 0.83
(b) 23, 0.17
(c) 36, 0.25
(d) 36, 0.5
(e) 114,0.17

22) If the standard deviation of a Poisson distribution is 9 then its mean is

(a) 3
(b) 4.5
(c) 9
(d) 18
(e) 81

23) Suppose that 1% of virus attacks to the computer system of a certain bank were very harmful. During the last eight months on average ten harmful virus attacks per week were observed. A random variable X is defined as "number of harmful virus attacks per week". Then, the distribution of X is

(a) Binomial with parameters n = 7 and p =0.01
(b) Binomial with parameters n = 10 and p =0.01
(c) Binomial with parameters n = 8 and p =0.01
(d) Poisson with parameter $\lambda = 10$
(e) Poisson with parameter $\lambda = 1$

24) The resistance for a certain type of resistors is known to be normally distributed with mean 6 ohms and standard deviation 2 ohms. The probability that the resistance is less than 8 ohms is 0.8413. The probability that the resistance less than 4 ohms is

(a) 0.1587	(b) 0.3085	(c) 0.3173	(d) 0.6827	(e) 0.8413

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