UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2012 /2013 – 2nd Year Examination – Semester 3

IT3304: Mathematics for Computing-II

PART I – Multiple Choice Question Paper
01st March 2013
(ONE HOUR)

Important Instructions :

- The duration of the paper is **1(one) hour**.
- The medium of instruction and questions is English.
- The paper has 23 **questions** and **6 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.

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) Find 2*A* - 3*B* where $A = \begin{bmatrix} 1 & -2 & 3 \\ 4 & 5 & -6 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 0 & 2 \\ -7 & 1 & 8 \end{bmatrix}$

(a) $\begin{bmatrix} -11 & -4 & -12 \\ -13 & 13 & 12 \end{bmatrix}$.

(b) $\begin{bmatrix} 11 & 4 & 12 \\ 13 & -13 & -12 \end{bmatrix}$.

(c) $\begin{bmatrix} -7 & -4 & 0 \\ 29 & 7 & -36 \end{bmatrix}$.

(d) $\begin{bmatrix} 7 & 4 & 0 \\ -29 & -7 & 36 \end{bmatrix}$.

(e) $2A + (-3B)$

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

(a) 288 (b) -288 (c) -96
(d) 0 (e) 96

4) If A, B and (A+B) are 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) $(A(A+B))^T = (A+B)^T A^T$.
(d) $(A(A+B))^{-1} = (A+B)^{-1} A^{-1}$.
(e) $(A(A+B))^{-1} = B^{-1}A^{-1} + A^{-1}$.

5) Let $A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 2 \\ 9 & 0 & 3 \end{pmatrix}$. Find adj A.

(a) $\begin{pmatrix} 3 & 12 & 9 \\ 0 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} 3 & -24 & 9 \\ 0 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$ (c) $\begin{pmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{pmatrix}$

(d) $\begin{pmatrix} 3 & 0 & 0 \\ 12 & 3 & -2 \\ -9 & 0 & 1 \end{pmatrix}$ (e) $\begin{pmatrix} 3 & 0 & 0 \\ -24 & 3 & -2 \\ 9 & 0 & 1 \end{pmatrix}$

6) Let A = (a_{ij}) be a lower triangular matrix of order *n*. Which of the following is(are) true about A?

(a) $a_{ij} = 0$ whenever i < j, where i, j $\in$ {1, 2,….*n*}
(b) $a_{ij} = 0$ whenever i > j, where i, j $\in$ {1, 2,….*n*}.
(c) $a_{ij} = 0$ whenever i $\leq$ j, where i, j $\in$ {1, 2,….*n*}.
(d) $a_{ij} = 0$ whenever i $\geq$ j, where i, j $\in$ {1, 2,….*n*}.
(e) $a_{ij} \neq 0$ whenever i = j, where i, j $\in$ {1, 2,….*n*}.

7) For which of the following conditions will the points A, B and C with position vectors $\underline{a}$, $\underline{b}$ and $\underline{c}$ respectively be collinear?

(a) $\underline{c} - \underline{a} = 2(\underline{b} - \underline{a})$ (b) $|\underline{c} - \underline{a}| = 2|b - a|$ (c) $\underline{a} = 2(\underline{b} + \underline{c})$
(d) $2\underline{a} + \underline{b} = \underline{c}$ (e) $3\underline{a} - 2(\underline{b} + \underline{c}) = \underline{0}$

8) If $\underline{x} = a\underline{i} + b\underline{j}$, $\underline{y} = b\underline{j} + c\underline{k}$, and $\underline{z} = a\underline{i} + c\underline{k}$, for which of the following triads (a,b,c) is $\underline{x}$ perpendicular to $(\underline{z} - \underline{y})$?

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

9) If $x_n + x_{n+2} = 10$, n $\in$ N and $x_1 = 3$, then x_{11} is equal to

(a) 3 (b) 7 (c) -3
(d) -7 (e) 4

10) The sum $\sum_{n=1}^{10} \frac{1}{n(n+2)}$ is equal to

(a) $175/132$	(b) $175/396$	(c) $275/132$
(d) $275/396$	(e) $175/264$	

11) If the tenth term and the sum of the first ten terms of an Arithmetic Progression are 10 and 55 respectively, then the sum of the first hundred terms is

(a) 5,000	(b) 4,950	(c) 5,250
(d) 5,150	(e) 5,050	

12) The fifteenth term of the sequence 2, 5, 10, 17, 26, ….. is

(a) 186	(b) 106	(c) 226
(d) 176	(e) 126	

13) The area in the first quadrant, bounded by the curve $y = 1 - |x - 1|$ and the x-axis is

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

14) If $\int_{-k}^{1-k} x\sqrt{k+x}\ dx = 1$, then the value of k is

(a) 0.1	(b) 0.9	(c) 0.8
(d) -0.9	(e) -0.8	

15) The value of $\lim_{n\to\infty} \int_{n}^{n+1} \frac{1}{x} dx$ is equal to

(a) 1	(b) 2	(c) 0
(d) $\frac{1}{2}$	(e) ∞	

16) If $f(x) = \sin x + \cos x$, then $\frac{d^{17} f}{dx^{17}}$ is equal to

(a) $\sin x + \cos x$ (b) $\sin x - \cos x$ (c) $-\sin x + \cos x$

(d) $-\sin x - \cos x$ (e) $\sqrt{2}\sin(\frac{\pi}{4} - x)$

17) The derivative of $f(x) = x^{ax^2+bx+c}$ is equal to

(a) $x^{ax^2+bx+c}\left[(2ax+b)\ln x + \frac{ax^2+bx+c}{x}\right]$

(b) $x^{ax^2+bx+c}\left[(2ax+b)\ln x - \frac{ax^2+bx+c}{x}\right]$

(c) $x^{ax^2+bx+c}\left[(2ax+b)\ln x\right]$

(d) $x^{ax^2+bx+c}(2ax+b)$

(e) $(ax^2+bx+c)x^{ax^2+bx+c-1}$

18) For positive a and r, the function $f(x) = axe^{-rx}$ has a maximum value at

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

(d) $\frac{1}{r}$ (e) ar

19) The probability density function of a discrete random variable X is given by

$P[X = x] = a\left(\frac{1}{2}\right)^x$.

Then the value of a is

(a) $\frac{4}{3}$ (b) $\frac{3}{4}$ (c) $\frac{6}{3}$ (d) $\frac{2}{6}$ (e) $\frac{6}{2}$

20) The probability density for the random variable X is as shown in the following table.

x	2	3	4	otherwise
P[$X = x$]	0.4	0.3	0.3	0

The expected value of X is

(a) 0.0 (b) 1.0 (c) 2.9
(d) 3.5 (e) 9.0

21) If the probability that it will rain on any given day in February is 0.3, then what is the probability that in a given week in February, it will not rain on exactly two days? Assume that it is raining on a day is independent from that of the other days.

(a) ${}^7C_2(0.7)^5(0.3)^2$ (b) ${}^7C_2(0.7)^2(0.3)^5$ (c) ${}^7C_1(0.7)^1(0.3)^6+{}^7C_1(0.7)^1(0.3)^6$
(d) ${}^7C_1(0.7)^6(0.3)^1+{}^7C_1(0.7)^6(0.3)^1$ (e) $2\times{}^7C_1(0.7)^2(0.3)^5$

22) If the standard deviation of a random variable X which follows a Poisson distribution is 9, then what is the mean of that random variable X?

(a) 3 (b) 6 (c) 9
(d) 18 (e) 81

23) It is found that on average, three viruses infect a personal computer in a working day. What is the probability that in two working days four viruses will infect the personal computer?

(a) $\frac{e^{-4}4^6}{6!}$
(b) $\left(\frac{e^{-3}3^4}{4!}\right)^2$
(c) $\frac{e^{-6}6^4}{4!}$
(d) $\frac{e^{-3}3^4}{4!}$
(e) $2\times\frac{e^{-3}3^4}{4!}$

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