

**University of Asia Pacific**  
**Department of Basic Sciences & Humanities**  
**Mid Examination, Fall-2017**  
**Program: B. Sc. Engineering (Computer Science)**  
**2<sup>nd</sup> Year /1<sup>st</sup> Semester**

Course Title: Probability & Statistics  
Time: 1.00 Hour

Course Code: MTH 203

Credit: 3.00  
Full Marks: 60

There are **Four** questions. Answer any **Three**. All questions are of equal values, indicated in the right margin.

1. (a) Define Probability. Two unbiased dices are thrown simultaneously. Find the probability that the sum of the faces is divisible by 3. 12  
(b) Students  $A$  and  $B$  can individually solve 75% and 50% problems respectively of a book. What is the probability that either  $A$  or  $B$  can solve any randomly selected problem of that book? 8
2. (a) State and prove Bayes' Theorem. 10  
(b) In a class of 60 students, 15 are girls. Office record indicates that 80% of the girl students and 75% of the boy students got GPA 5. One student is randomly chosen and found to have GPA 5. Find the probability that the chosen student is a girl. 10
3. (a) Suppose the current measurements in a strip of wire are assumed to follow a normal distribution with a mean of 10 milliamperes and a variance of 4 (milliamperes)<sup>2</sup>. What is the probability that a measurement will exceed 13 milliamperes? What is the probability that a current measurement is between 9 and 11 milliamperes? 10  
(b) Ten percent of the tools produced in a certain manufacturing process turn out to be defective. Find the probability that in a sample of 10 tools chosen at random exactly 2 will be defective by using (a) the binomial distribution and (b) the Poisson approximation to the binomial distribution. 10
4. (a) Find the marginal densities of  $X$  and  $Y$  from the following density function: 10  
$$f(x, y) = \begin{cases} (6 - x - y)/8, & 0 < x < 2, 2 < y < 4 \\ 0, & \text{otherwise} \end{cases}$$
  
Also compute  $P(X+Y < 3)$ .

(b) Given the following joint distributions of the discrete random variables  $X$  and  $Y$ :

10

$X$			
$Y$	0	1	2
0	$3/28$	$9/28$	$3/28$
1	$6/28$	$6/28$	0
2	$1/28$	0	0

Find  $f(X|1)$  and  $P(X=0|Y=1)$ .

**University of Asia Pacific**  
**Department of Computer Science & Engineering**  
**Mid-Semester Examination, Fall-2017**  
**Program: B. Sc. Engineering (2<sup>nd</sup> Year / 1<sup>st</sup> Semester)**

Course Title: Electrical & Electronic Engineering II    Course Code: EEE 221

Credit: 4.00

Time: 1.00 Hour

Full Marks: 60

[There are **Four** Questions. Answer any **Three**. Figures in the right margin indicate marks.]

- ✓ (a) Briefly explain the open circuit and load characteristics of a DC Generator. [10]
- ✓ (b) A shunt generator delivers a load current of 50A at 500 V and has armature and shunt field resistance of  $0.05 \Omega$  and  $250 \Omega$  respectively. Calculate the generated voltage and the armature current. [10]
2. (a) What are the losses involved in a DC machine? How can these losses be minimized? [10]
- (b) What is back e.m.f.? Is there any relation between back e.m.f. and armature current? Why is a starter circuit required for a DC Motor? [10]
- 3 ✓ (a) Define transformer. Why is laminated core used in a transformer? What are the major fields of using transformer? [10]
- (b) What do you mean by the transformation ratio? What is the relation between voltage ratio and transformation ratio in a transformer? [10]
- Calculate the voltage output of the secondary winding of a transformer if the primary voltage is 35 volts, the secondary winding has 4500 turns, and the primary winding has 355 turns.
- 4 ✓ (a) Classify stepper motor. Explain different types of stepping mode in brief. [10]
- (b) Note down the advantages of stepper motor. Discuss in brief how a unipolar stepper motor can be controlled. [10]



University of Asia Pacific  
Department of Basic Sciences & Humanities  
Mid Semester Examination, Fall-2017  
Program: B.Sc. Engineering (Computer Science & Engineering)  
2nd Year /1st Semester

Course Title: Math III: Multivariable Calculus      Course Code: MTH 201

Course credit: 3.00

Time: 1 hr

Full Marks: 60

Answer any **three** of the following questions. Your handwriting should be legible. All questions are of equal value. Figures in the right margin indicate marks.

1. (a) Find parametric equations of the tangent line to the circular helix  $x = \cos t$ ,  $y = \sin t$ ,  $z = t$  at the point where  $t = \pi$ . 10  
(b) Find the arc length of the graph of  $\mathbf{r}(t) = e^t \mathbf{i} + e^{-t} \mathbf{j} + \sqrt{2} t \mathbf{k}$ ,  $0 \leq t \leq 1$ . 10
2. (a) A particle moves along a curve in 3-space so that its position vector at time  $t$  is  $\mathbf{r} = (4 \cos \pi t) \mathbf{i} + (4 \sin \pi t) \mathbf{j} + t \mathbf{k}$ . Find the distance traveled and the displacement of the particle during the time interval  $0 \leq t \leq 5$ . 10  
(b) Find the curvature of the ellipse  $\mathbf{r}(t) = (2 \cos t) \mathbf{i} + (3 \sin t) \mathbf{j}$ ,  $0 \leq t \leq 2\pi$  at the endpoints of the major and minor axes. 10
3. (a) Show that the function  $z = \ln(x^2 + y^2) + 2 \tan^{-1}(y/x)$  satisfies Laplace's equation  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$ . 12  
(b) Evaluate  $\lim_{(x,y) \rightarrow (0,0)} \frac{xy}{x^2 + y^2}$  along the lines (i)  $x = 0$ , and (ii)  $y = -x$ . Does the limit exist? 8
4. (a) Find the unit tangent vector  $\mathbf{T}(t)$  and the unit normal vector  $\mathbf{N}(t)$  of the helix  $\mathbf{r}(t) = (a \cos t) \mathbf{i} + (a \sin t) \mathbf{j} + (ct) \mathbf{k}$  where  $a > 0$ . 10  
(b) Locate all relative extrema and saddle points of  $f(x, y) = 4xy - x^4 - y^4$ . 10

Department of Computer Science & Engineering  
University of Asia Pacific (UAP)

Mid Semester Examination  
Course Code: CSE205  
Full Marks: 60

Fall 2017  
Course Title: Data Structure

2<sup>nd</sup> Year 1st Semester  
Credits: 3  
Duration: 1 Hour

**Instructions:**

1. There are **Four (4)** Questions. Answer any **Three (3)**. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a) Define 'data structure'. What are the main operations in the data structure? 5  
 b) Suppose you have a large sorted data set in an array. Write an efficient algorithm to find a location of a particular data items from it and explain why you think it as an efficient technique. 10  
 c) What are the issues you should consider to use a particular data structure for your data? 5
2. a) What are the advantages of linked lists over arrays? 5  
 b) Describe briefly the following data structures with necessary figures: 5  
     i. Circular Linked List.  
     ii. Doubly Linked List.  
 c) What is Application Memory? Describe different types of Application Memory. 2+3+5  
     Describe the differences of the following code segments in terms of application memory usage.

```
struct Node* GetNewNode(int x) {  
  
    struct Node* newNode;  
    newNode->data = x;  
    newNode->prev = NULL;  
    newNode->next=NULL;  
    return &newNode;  
}
```

```
struct Node* GetNewNode(int x) {  
  
    struct Node* newNode = (struct Node*)  
    malloc (sizeof (struct Node));  
    newNode->data = x;  
    newNode->prev = NULL;  
    newNode->next=NULL;  
    return newNode;  
}
```

3. a) Write the algorithm/Code of POP and PUSH operations of a stack using Linked List. 10  
 b) Evaluate the following Postfix expression using the Algorithm: 10  
     36 7 4 - / 2 1 5 + \* +

4. a) What are the differences between Queue and Deque. 5  
 b) Consider the following circular QUEUE of size N=7 where Front = 2 and Rear = 5 10

0	1	2	3	4	5	6
		London	Berlin	Rome	Paris	

Describe the QUEUE, including the value of Front and Rear, as the following operations take place:

- a) ATHENS is added, b) Two cities are deleted c) MADRID and NEWYORK are added  
 d) Three cities are deleted.
- c) Briefly describe the implementation of a priority queue using two 2D arrays with example. 5

# University of Asia Pacific

## Department of Computer Science & Engineering

### Mid-Semester Examination Fall-2017

#### Program: B. Sc Engineering (2<sup>nd</sup> Year/ 1<sup>st</sup> Semester)

Course Title: Object Oriented Programming 1:Java

Course No. CSE 203

Credit: 3.00

Time: 1.00 Hours.

Full Mark: 60

There are **Four** Questions. Answer any **Three**. All questions are of equal value/Figures in the right margin indicate marks.

1. I. Define A class called **circle**. It contains: 20
  - a) An instance variable: **radius** (double).
  - b) One constructor -which takes a double type parameter and initialize the variable **radius**.
  - c) One public method: **getArea()**, which returns the area of the object ( $A=\pi r^2$ ).II. Define A class called **cylinder** which extends class **circle**. It contains:
  - d) An instance variable: **height** (double).
  - e) One constructor -which takes two double type parameters and initialize the variables **radius** and **height**. (You can use **super**)
  - f) One public method: **getVolume()**, which returns the volume of the object ( $A=\pi r^2 h$ ). (You can use the method **getArea()** to get  $\pi r^2$ )
2. a. How does a simple java program run? 5
- b. What are the differences between method overloading and method overriding? Explain with appropriate example. 5
- c. Show the execution steps of the following statement using operator precedence. Let, 10 $P=2, Q=3, I=7, S=2, T=5$  [Assume all integers]  
 $P = P|Q+R^{\wedge}S\&T*P-6$
3. a. Write down short notes on following topics: 16
  - ✓ I. Finalize method
  - ✓ II. Garbage Collector
  - ✓ III. Dynamic Initialization
  - ✓ IV. JVM
- b. Write down the uses of '**Super**' with appropriate examples. 4
4. a. Write down the three uses of the keyword '**final**' with appropriate examples. 6
- b. What are the differences between an **Abstract class** and an **Interface**? 4

- ✓ 2. Find out the error of the following code segment. If there is any error, correct them. 6  
Code Segment:

```
class A{
    private int j;
    final int a=100;
    byte b=40;
    short c;
    A()
    {
        j=i+j;
        b=b+2
    }
    class B{
        int i;
        int A[10];
        B()
        {
            i=i+j;
            c= i+4;
            a++;
        }
    }
}
```

- d. What is narrow conversion? Give an example

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