Faculty of Science
Math & Computer Science Dept.
Level-3
Attempt All Questions

First Term Exam, 2011-2012
Subject: Selected Topics[SWE]
Time Allowed: 3 Hours
Total Marks: 60 Marks

Question 1: Fill in the space in the following statements: [10 Marks]

A. During the problem analysis phase, the system may be partitioned with respect to....., or ....., or ..... in order to have different views of the system.

B. Specification languages used in SRS documents are either....., which is suitable for ....., or....., which is more suitable for.....; which requires more precise and verifiable specifications.

C. Several approaches can be used for Requirement Analysis including:
a. ..... b. .....
c. ..... d. .....

D. Many types of architectural views have been proposed but most of these views belong to one of these three types
a. ..... b. ..... c. .....

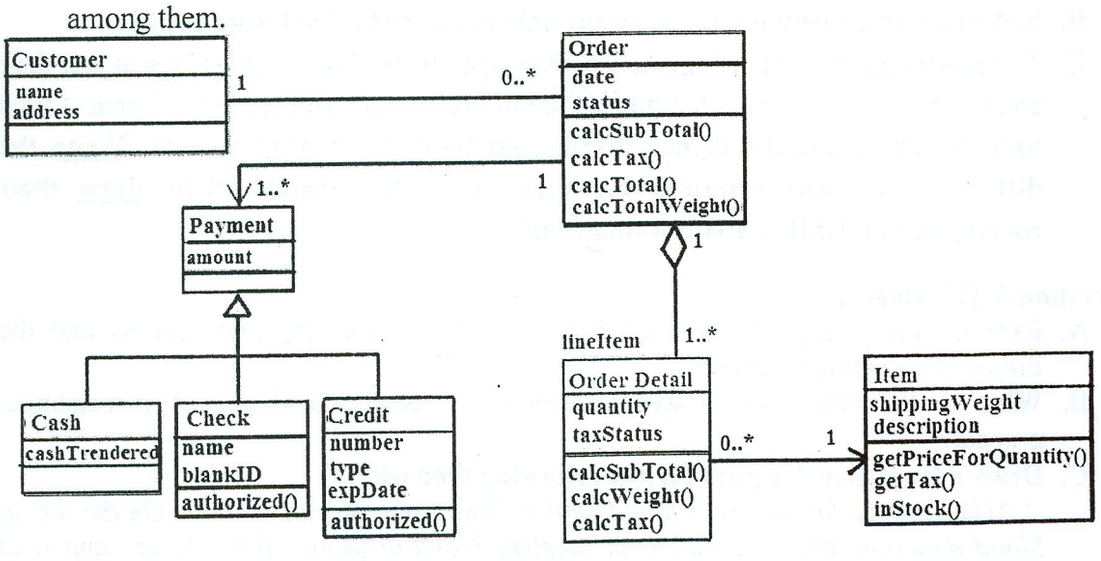
E. The Project Management include phases:
a. ..... b. ..... c. .....

F. A three-tier structure is commonly used in many applications and Web systems. The main three parts of this structure are:
a. ..... b. ..... c. .....

Question 2: [14 Marks]

A. State the definition of the following terms:
A. Process Model **B.** Software Reliability **C.** Formal Methods/Languages
D. SRS **E.** Software Architecture **F.** Termination Analysis
G. Productivity **H.** System Requirement

B. The following class diagram represents a simple *Order management system.* State the basic elements of this system and describe their attributes, operations and the relations among them.



Question 3:[14 Marks]

A. Draw a diagram that shows the inputs and outputs of the different phases of the Waterfall Software development process model. Then explain the advantages and disadvantages of this model.

B. State the main features of the XP process model; then draw diagrams to show both the XP model as a whole, and a single iteration in it.

please turn the page

C. Different software systems have different Component and Connector (C&C) structure. The client-server style is one of the common architectural styles for the C&C view. Mention the basic components and connector types used in this architectural style and show an example of its use.

Question 4: [14 Marks]

A. A project uses the time-boxing process model with three stages in each time box, but with unequal length. Suppose the requirement specification stage takes 2 weeks with a team of 2 people, the build stage takes 3 weeks with a team of 4 people, and deployment takes 1 week with a team of 2 people. **Design the process for this project that maximizes resource utilization. Assume that each resource can do any task.** (Hint: Exploit the fact that the sum of durations of the first and the third stage is equal to the duration of the second stage.). **What effect is the project monitoring activity likely to have on the development process?**

B. *"A university offers degrees to students. The university consists of faculties each of which consists of one or more departments. Each degree is administered by a single department. Each student is studying towards a single degree. Each degree requires one to 40 courses. A student enrols in 3-6 courses (per term). A course can be either graduate or undergraduate, but not both. Likewise, students are graduates or undergraduates but not both".* **Draw a class diagram which represents the generic objects and relationships described above. Make sure to specify multiplicities for all associations shown in your diagrams**

Answer only one of the question [Question 5, Question 6]

Question 5: [12 Marks]

A. Suppose changes are to be made to a software system that is in operation. Why will changes to such a system cost a lot more than just making changes to the source code files?

B. State the relation between the software architecture and the software design.

C. The processing on an auction site involves operations done by (a) sellers to sell their goods, (b) buyers to make bidding on the offered goods, and (c) the software system itself which selects the highest bidder and finish the buying process. **Write the different Use-Cases required for such an auction system; then, draw their corresponding UML Use-Case diagrams.**

Question 6. [12 Marks]

A. Explain (using diagram) the relation between the Development process and the Project Management process.

B. What is the difference between development process and project management process?

C. Draw a Sequence diagram for the following scenario:

"The College Street Cross blood Donor Centre operates as follows: On the day of blood donation, the Donation Unit receives blood donations from donors and send them to the Testing Unit which tests each blood donation for blood type and potential viral agents. The Testing Unit then sends the blood donation along with test result to the Processing Office which fills a form for each tested blood unit where the tests are OK, and send the blood units and forms to the Distribution Office. If tests indicate that a blood unit may be contaminated with a viral agent, the Processing Office destroys that unit".

الفرقة الثالثة - رياضيات وحاسب - نظم قواعد البيانات (٣٤٤)

Mansoura University Faculty of Science Dept. of Mathematics Database Systems		3rd year Time: 3 Hours Date: 29/12/2011 Maximum 60 Marks

Answer the following questions:

Question #1 (25 Marks)

a) State the advantages of database system?

b) Clarify the difference between database systems and file systems?

c) Define the following

1. Candidate key	2. Foreign key	3. Record	4. View
5. Index	6. Cardinality	7. Meta data	8. Plan

d) Draw the block diagram of:

1. Typical database system	2. Internal components of a typical RDBMS
3. ANSI/SPARC database model	4. Hierarchical database model
5. Database state diagram	6. Distributed database system

Question #2 (15 Marks)

a) State the characteristics of database systems?

b) What is the relation between databases and computer based information system?

c) State the components that constitute a typical relational database?

d) What is difference between tuple calculus and domain calculus?

e) State the different types of relations and give example for each one?

f) What is meant by concurrency? Explain how to solve this problem?

Question #3 (20 Marks)

a) Give an example for hybrid table fragmentation?

b) For the following two relations:

Relation (M)

Staff_No	Staff_Name	Address	Birth Date	Salary	Branch_No
2324	Ahmed	Mansoura	17/11/1987	1600	B001
4547	Nagwa	Tanta	22/02/1989	1550	B003
6549	Tamer	Cairo	12/12/1987	2750	B003
7653	Yaser	Sudan	10/08/1986	1700	B002
8975	Hamed	Cairo	04/10/1981	2400	B004

Relation (T)

Staff_No	Staff_Name	Address	Birth Date	Salary	Branch_No
3546	Fayez	Alexandria	24/05/1988	2800	B001
6549	Tamer	Cairo	12/12/1987	2750	B003
7292	Mohamed	Sinai	03/04/1989	2900	B003
8975	Hamed	Cairo	04/10/1981	2400	B004
9990	Sameh	Port Said	11/11/1988	2850	B002

1. Solve the following query:

$\sigma_{\text{Salary>2600 AND Address='Cairo'}} \Pi_{\text{Staff\_No, Staff\_Name, Address, Branch\_No}}(T)$

2. Determine **union, intersection, Cartesian product, and the differences (T-M), (M-T)**?

3. Perform horizontal fragmentation for relation **(T)** and vertical fragmentation for relation **(M)**?

4. Assume that relation **(T)** is stored on site **SITEE** and relation **(M)** is stored on site **SITEL**, write SQL code to join these two relations?

احصاء وبلوماتيك

الستون الثالث - الإحصاء وعلوم الحاسب - برمجة هيكلية (٣٤١)

MANSOURA UNIVERSITY
FACULTY OF SCIENCES
SUBJECT NAME: STRUCTURED PROGRAMMING
EXAMINER(S): DR.MAHMOUD ABD ELLATIF

Final Exam
SEMESTER: FIRST
DATE: 16/1/2012 DURATION : 2 HOURS
EXAM CONSISTS OF 5 QUESTIONS / 2 PAGE

QN 1: State whether each of the following is *true* or *false*. If *false*, explain why.(10 Marks)

Please : write your answer in table like that

No	Answer (T/F)	Why
1		
2		

1) C# considers the variables **number** and **NuMbEr** to be identical.
2) The compiler uses **class** statements to identify namespaces referenced in a C# program.
3) Placing a semicolon after the condition in an **if** structure is a syntax error.
4) Structured programs are clear, easy to debug and modify and more likely than unstructured programs to be bug-free in the first place.
5) The expression **(x <= y && y > 4)** is true if **x** is less than or equal to **y** or **y** is greater than 4.
6) Infinite loops are caused when the loop-termination condition is always true.
7) When a method recursively calls itself, it is known as the base case.
8) Any problem that can be solved recursively also can be solved iteratively.
9) An array can store many different types of values at the same time.
10) A **const** variable must be declared and initialized in the same statement, or a syntax error will occur.

QN2: Fill in the blanks in each of the following statements: .(15 Marks)

Please : write your answer in table like that

No	Missing word
1	
2	

1) The process of placing the elements of an array in order is called .... the array.
2) Lists and tables of values can be stored in ....
3) The keyword ....is used in a method header to indicate that a method does not return a value.
4) A variable known only within the method in which it is defined is called a ..... .
5) The .... is a comma-separated list containing the declarations of the parameters received by the called method.
6) A/An .... is a signal that is sent when some action takes place, such as a button being clicked or a value being changed.
7) The value in parentheses immediately following the keyword **switch** is called the ... .
8) A control variable initialized within a **for** loop can be used only in the body of the loop. This is called the... ..... of the variable.
9) In a **for** loop, incrementing occurs ..... the body of the structure is performed each time.
10) Specifying the order in which statements are to be executed in a computer program is .....
11) The increment operator (++) and decrement operator (--) increment and decrement a variable's value by ...
12) Each array has a public property called ..... that stores the size of the array
13) There are two methods for Passing Arguments by Value and by .....
14) A class contains data declarations and ..... declarations.
15) Arithmetic expressions in C# must be written in ..... form to facilitate entering programs into the computer.

QN3: Find the error in each of the following program segments and explain how the error can be Corrected: Please: transfer the following table in your answer notebook and Identify and correct the errors in each of the following .(10 Marks)

1)	if (gender == 1)
	Console.WriteLine("Woman");
	else;
	Console.WriteLine("Man");	

2)	void product() {
	int a = 6, b = 5, c = 4, result;
	result = a * b * c;
	Console.WriteLine("Result is " + result);
	return result;
	}	

3)	int sum(int n) {
	if (n == 0)
	return 0;
	else
	n + sum(n - 1);
	}	

4)	int g() {
	Console.WriteLine("Inside method g");
	int h() {
	Console.WriteLine("Inside method h");
	}
	}	

5)	int sum(int x, int y) {
	int result;
	result = x + y;
	}	

QN4: Write C# program for the following: (16 marks)

A. To sort the values of the 10-element array **a** into ascending order using **BubbleSort.** The program should be containing methods: **Main, BubbleSort** and **Swap**..

B. Let us assume that a class of 10 students took an exam and that each student received a letter grade of A, B, C, D or F. The program will input the letter grades and summarize the results by using **switch** to count the number of each different letter grade that students earned on an exam.

QN 5 : What will be the output of the C#.NET code snippet given below?: (9 marks)

A.

```
int i = 20 ;
for( ; ; )
{
    Console.Write(i + " ");
    if (i >= -10)
        i -= 4;
    else
        break;
}
```

B.

```
int val;
for (val = -5; val <= 5; val++)
{
    switch (val)
    {
        case 0:
            Console.Write (" Happy new year ");
            break;
    }
       if (val > 0)
        Console.Write ("B");
    else if (val < 0)
        Console.Write ("X");
}
```

With my best wishes

احصاء وبلوماتيك

الستون الثالث - الإحصاء وعلوم الحاسب - برمجة هيكلية (٣٤١)

MANSOURA UNIVERSITY
FACULTY OF SCIENCES
SUBJECT NAME: STRUCTURED PROGRAMMING
EXAMINER(S): DR.MAHMOUD ABD ELLATIF

Final Exam
SEMESTER: FIRST
DATE: 16/1/2012 DURATION : 2 HOURS
EXAM CONSISTS OF 5 QUESTIONS / 2 PAGE

QN 1: State whether each of the following is *true* or *false*. If *false*, explain why.(10 Marks)

Please : write your answer in table like that

No	Answer (T/F)	Why
1		
2		

1) C# considers the variables **number** and **NuMbEr** to be identical.
2) The compiler uses **class** statements to identify namespaces referenced in a C# program.
3) Placing a semicolon after the condition in an **if** structure is a syntax error.
4) Structured programs are clear, easy to debug and modify and more likely than unstructured programs to be bug-free in the first place.
5) The expression **(x <= y && y > 4)** is true if **x** is less than or equal to **y** or **y** is greater than 4.
6) Infinite loops are caused when the loop-termination condition is always true.
7) When a method recursively calls itself, it is known as the base case.
8) Any problem that can be solved recursively also can be solved iteratively.
9) An array can store many different types of values at the same time.
10) A **const** variable must be declared and initialized in the same statement, or a syntax error will occur.

QN2: Fill in the blanks in each of the following statements: .(15 Marks)

Please : write your answer in table like that

No	Missing word
1	
2	

1) The process of placing the elements of an array in order is called .... the array.
2) Lists and tables of values can be stored in ....
3) The keyword ....is used in a method header to indicate that a method does not return a value.
4) A variable known only within the method in which it is defined is called a ..... .
5) The .... is a comma-separated list containing the declarations of the parameters received by the called method.
6) A/An .... is a signal that is sent when some action takes place, such as a button being clicked or a value being changed.
7) The value in parentheses immediately following the keyword **switch** is called the ... .
8) A control variable initialized within a **for** loop can be used only in the body of the loop. This is called the... ..... of the variable.
9) In a **for** loop, incrementing occurs ..... the body of the structure is performed each time.
10) Specifying the order in which statements are to be executed in a computer program is .....
11) The increment operator (++) and decrement operator (--) increment and decrement a variable's value by ...
12) Each array has a public property called ..... that stores the size of the array
13) There are two methods for Passing Arguments by Value and by .....
14) A class contains data declarations and ..... declarations.
15) Arithmetic expressions in C# must be written in ..... form to facilitate entering programs into the computer.

QN3: Find the error in each of the following program segments and explain how the error can be Corrected: Please: transfer the following table in your answer notebook and Identify and correct the errors in each of the following .(10 Marks)

1)	if (gender == 1)
	Console.WriteLine("Woman");
	else;
	Console.WriteLine("Man");	

2)	void product() {
	int a = 6, b = 5, c = 4, result;
	result = a * b * c;
	Console.WriteLine("Result is " + result);
	return result;
	}	

3)	int sum(int n) {
	if (n == 0)
	return 0;
	else
	n + sum(n - 1);
	}	

4)	int g() {
	Console.WriteLine("Inside method g");
	int h() {
	Console.WriteLine("Inside method h");
	}
	}	

5)	int sum(int x, int y) {
	int result;
	result = x + y;
	}	

QN4: Write C# program for the following: (16 marks)

A. To sort the values of the 10-element array **a** into ascending order using **BubbleSort.** The program should be containing methods: **Main, BubbleSort** and **Swap**..

B. Let us assume that a class of 10 students took an exam and that each student received a letter grade of A, B, C, D or F. The program will input the letter grades and summarize the results by using **switch** to count the number of each different letter grade that students earned on an exam.

QN 5 : What will be the output of the C#.NET code snippet given below?: (9 marks)

A.

```
int i = 20 ;
for( ; ; )
{
    Console.Write(i + " ");
    if (i >= -10)
        i -= 4;
    else
        break;
}
```

B.

```
int val;
for (val = -5; val <= 5; val++)
{
    switch (val)
    {
        case 0:
            Console.Write (" Happy new year ");
            break;
    }
       if (val > 0)
        Console.Write ("B");
    else if (val < 0)
        Console.Write ("X");
}
```

With my best wishes

جامعة المنصورة ٣ احصاء رياضي - نظرية احصائية (١) ر٣٣٣
كلية العلوم
قسم الرياضيات
التاريخ : ٥ - ١ - ٢٠١٢ م
الدرجة الكلية : ٨٠

برنامج : إحصاء وعلوم الحاسب
المستوى: الثالث
اسم المقرر : نظرية إحصائية (١)
كود المادة : ر٣٣٣
الزمن : ساعتان

اختبار نهاية الفصل الدراسى الأول للعام الدراسى ٢٠١١ – ٢٠١٢ م

أجب عن الأسئلة الآتية :-

السؤال الأول:

أ) أوجد مقدر الإمكان الأكبر لنسبة النجاح P فى توزيع ذو الحدين إذا سحبنا عينة عشوائية حجمها n و رمزنا لعدد مرات النجاح بها بـ X ؟ (١٤ درجة)

ب) أوجد دالة المعلومات للمشاهدة الواحدة $I(\mu)$ إذا كان X متغيرا عشوائيا يتبع التوزيع الطبيعى بوسط حسابى مجهول و تباين معلوم (١٤ درجة)

السؤال الثانى:

أ) أخذت عينة عشوائية مكونة من 8 سيدات و طبق عليهم برنامج معين لتخفيض الوزن لمدة شهر و سجلت أوزانهم بالكجم قبل و بعد البرنامج فكانت كالتالي

الوزن قبل البرنامج	60.5	59.3	68	65.7	63.8	68.2	73	64.5
الوزن بعد البرنامج	58	60	64.5	61.5	59	63	65	61

احسب 99 % فترة ثقة لمتوسط التخفيض فى الوزن نتيجة لاستخدام هذا البرنامج لمدة شهر بافتراض أن الفروق فى الوزن لها تقريبا توزيع طبيعى (١٤ درجة)

ب) أثبت أن الوسط الحسابى $\bar{X}$ مقدر متسق للمعلم μ (١٢ درجة)

السؤال الثالث:

أ) احسب حجم العينة اللازم سحبها من مجتمع مكون من 20000 شخص لتقدير نسبة المؤيدين لمشروع معين بخطأ لا يتعدى 0.03 بدرجة ثقة 99 % (١٢ درجة)

ب) إذا كانت أعمار المصابيح الكهربائية X (بالسنين) التي تنتجها احدي الشركات يتبع توزيعا" احتماليا" دالة كثافته الاحتمالية هي $f(x)=12\,x^2(1-x)\;;\;0\le x\le 1$ إذا أخذنا عينة عشوائية مكونة من 64 مصباح فما احتمال أن يكون متوسط أعمارها أقل من $7\frac{1}{2}$ شهر (١٤ درجة)

$Z_{0.005}=2.58$, $Z_{0.025}=1.96$, $\Phi(1)=0.8413$, $t_{(0.005,7)}=3.499$, $t_{(0.025,7)}=2.365$

مع أطيب التمنيات بالتوفيق

د. فاتن شيحه

Mansoura University	**Final exam 1_st term**	**Subject. Prob.theory (1)**
Faculty of Science	**Time : 2 hours**	**Code : 331 math**
Math. Dept	**2011-2012**	**Date : 23/1/2012**
3_rd year	**Math.& Stat. and Computer Sci.**	**Total degree:80 mark**

Q1:(20 mark)

1- Let X and Y are two continuous random variables with a joint pdf of the form

$$f(x,y)=\begin{cases}k(x+y) & 0\le x\le y\le 1\\ 0 & otherwise\end{cases}$$

Find each of the following

a) the constant k b) The marginals $f_1(x)$ and $f_2(y)$

c) The conditional pdf $f(^{y}/_{x})$

2- Assume that X and Y are independent random variables with density functions

$$f(x)=\begin{cases}\frac{1}{2} & -1\le x\le 1\\ 0 & otherwise\end{cases} \quad \text{and} \quad g(y)=\begin{cases}1 & 0\le y\le 1\\ 0 & otherwise\end{cases}.$$

Find the probability that the roots of the equation $h(t)=0$ are real, where $h(t)=t^2+2Xt+Y$.

Q2: :(20 mark)

Assume that X and Y are independent random variables with $X,Y\sim Geo(p)$.

a) Find the joint CDF, $F(x,y)$

b) If $T=X+Y$, find the joint CDF, $F(x,t)$

c) Find the marginal CDF's $F_X(x)$ and $F_T(t)$

Q3: (20 mark)

If $(X,Y)\sim MULT(n,p_1,p_2)$, then find

(i) Probability density function of Y.

(ii) $E(Y/x)$

(iii) The correlation coefficient ρ between X and Y.

Q4: (20 mark)

a) Let X is a random variable has the probability distribution

$f(x)=\frac{(x+2)}{15}$ $x=2,3,4$

Find the probability distribution of $Y=(X-3)^2$.

b) Let $X\sim N(0,1)$, find the pdf of the random variable $Y=X^2$.

المستوى الثالث - الرياضيات (٢١٢ ر) - تحليل عددي
الفصل الدراسي

3th Level Examination
Math 313
Numerical Analysis 1
Time : 2 hours
9/1/2012

ر ٣١٣
تحليل عددي ١
شعبة: الرياضيات + الأحصاء
وعلوم الحاسب

Mansoura University
Faculty of science
Department of mathematics

Answer the following questions (20 marks each)

Q_1.

(i) Define the fixed point of a function g in [a,b]

(ii) Explain how to use the fixed point method to approximate the root of $f(x) = 0$ in [a,b], then state and prove the sufficient conditions to erasure the convergence of this method.

(iii) Prove that the Newton-Raphson method is quadratic convergent providing that $f'(p) \neq 0$.

Q_2.

(i) Derive a suitable interpolation polynomial to approximation $f(1.1)$ from the following data

$f(x)$	1	1.5	2	2.5	3
x	2	3	5	4	10

(ii) Use an appropriate integration formula to approximate $\int_1^3 f(x)dx$ from the above date.

(iii) Find an approximate value of $f'(1.5)$.

Q_3.

(i) Use Euler method to approximate the solution of the initial value problem

$$y' = t - y, \quad 1 \leq t \leq 2, \quad y(1) = 1.$$

at $t = 1.4$ (take $h = 0.2$)

(ii) Prove that

$$\int_{x_0}^{x_n} f(x)dx = \frac{h}{2}\left[f(x_0) + f(x_n) + \sum_{j=1}^{n-1} f(x_j)\right] - \frac{h^2}{12}f''(\xi)$$

(iii) Show that the sequence

$$P_n = \frac{2P_{n-1}}{3} + \frac{3}{P_{n-1}},$$

$P_0 > 0$ is convergent, then find the order of convergence.

Best Wishes.

Prof. E. M. Elabbasy

المستوى الثالث - رياضيات - اصفا - ماجستير - نظرية القياس (٣١١)

Mansoura Univ.
Faculty of Science — 3rdYear: math.
Mathematics Dept. — Date Jan.2012
Subject: Math. — Time: 2 hours
Course Measure theory — Full marks: 80

Answer the following questions:

[1] i) Define the measure function. What is the difference between measure function and probability function.
ii) Prove that the interval [0,1] is uncountable. [20 marks].

[2] i) Complete the following: A set S is measurable of for any set T.....
ii) Prove that if A,B are measurable sets then $A \cap B$ is measurable.
iii) Prove Poincare theorem. [20 marks].

[3] Prove that every bounded measurable function f on a set S is Lebesgue integrable on S. Hence or otherwise prove that Dirichlet function is Lebesgue integrable on [0,1]. Prove that it is not Riemann integrable on [01]. [20 marks].

[4] i) Evaluate the integral $\int_Q f$ where f is bounded measurable function and Q is the set of rational numbers.
ii) Prove that if f is measurable then its square f^2 is measurable. [20 marks].

المستوى الثالث - رياضيات - اصفا - ماجستير - نظرية القياس (٣١١)

Mansoura Univ.
Faculty of Science — 3rdYear: math.
Mathematics Dept. — Date Jan.2012
Subject: Math. — Time: 2 hours
Course Measure theory — Full marks: 80

Answer the following questions:

[1] i) Define the measure function. What is the difference between measure function and probability function.
ii) Prove that the interval [0,1] is uncountable. [20 marks].

[2] i) Complete the following: A set S is measurable of for any set T.....
ii) Prove that if A,B are measurable sets then $A \cap B$ is measurable.
iii) Prove Poincare theorem. [20 marks].

[3] Prove that every bounded measurable function f on a set S is Lebesgue integrable on S. Hence or otherwise prove that Dirichlet function is Lebesgue integrable on [0,1]. Prove that it is not Riemann integrable on [01]. [20 marks].

[4] i) Evaluate the integral $\int_Q f$ where f is bounded measurable function and Q is the set of rational numbers.
ii) Prove that if f is measurable then its square f^2 is measurable. [20 marks].