(٢) رياضيات ف١ / ٢

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics and
Computer Applications

Subject: Mathematical Analysis
Stage: Third

Date: / /2018
Time: 3 hr

04. 06. 2018

45

((Assessment of The Final Exam for The Second Semester))
Academic year 2017-2018

Note: For each question 12 marks.

Q1// Explain with example the relation among continuous, differentiable and integrable functions.

Q2//1- Let $f:[a,b] \to \mathbb{R}$ be a continuous function on $[a,b]$ and differentiable on (a,b), then prove there is a point $c \in (a,b)$ such that $f(b) - f(a) = (b-a)f'(c)$.

2- Give example to explain above.

Q3// Let $f:[0,1] \to \mathbb{R}$ be a function such that $f(x) = x \quad \forall x \in [0,1]$, then:

1- If we take the partition $p = \{0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1\}$, is f is R-integrable on p?

2- Evaluate $\int_0^1 x \, dx^2$

Q4// 1- Let $f:[0,2] \to \mathbb{R}$ be function such that $f(x) = 3x, \forall x \in [0,2]$, evaluate $\int_0^2 3x \ dx$?

2- Prove if f and h are R-integrable on [a, b], then fh is also R-integrable on [a, b].

3- Prove every subset of a negligible set is negligible.

Q5// 1- Give example for the following:

a- Integrable function is not monotonic. b- Integrable function is not continuous.

c- Set has not measure, but has outer measure.

2- If we have the set $S = (0,1) \cup \{1,2,3\}$ then, what the measure and outer measure of S?

2018. 6. 13

جامعة المثنى
كلية العلوم
اللجنة الامتحانية المركزية

M. M. KRADY

Head of Department
Asst. Prof. Mousa Makey Krady

Lecture
Dr. Amer Himza Almyaly

Good Luck

Ministry of Higher Education & Scientific Research
Al-Muthanna University
College of Science
Department of mathematics & computer applications

Subject: Numerical analysis II
Stage: Third
Date: / /2018
Time : 3 hours

31 05. 2018

((Assessment of the final exam for the second semester))
Academic year 2017-2018

45

Q1\\ Use Adams predictor-corrector method third order to solve :

$$y' = \frac{y^2}{1+t}, \quad h = 0.25 \quad , \quad 1 \le t \le 2 \text{ , exact solution equation is } y(t) = \frac{-1}{\ln(1+t)}.$$

---(7 marks)

Q2\\ Use Euler's modified method to solve

$$y' = \frac{1+t}{1+y} \quad , 1 \le t \le 2, \quad \textit{exact solution equation is } y(t) = \sqrt{t^2+2t+6} - 1.$$

Find the error values at each step.

---(7 marks)

Q3\\ Use composite Trapezoidal rule to solve

$$\int_{-0.5}^{0.5} \cos^2(x)dx, \quad n = 4,$$ find the error value that occured.

---(5 marks)

Q4\\ Use Least sequare method to fit the following data of the form $y=be^{ax}$

x	1	1.25	1.5	1.75	2
y	5.1	5.79	6.53	7.45	8.46

---(7 marks)

Q5\\ Approximate the solution of the following PDE

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, \quad 0 \le x \le 1, \quad 0 \le y \le 2$$

$$u(x,0) = x^2, \; u(x,2) = (x-2)^2, \; u(0,y) = y^2, \; u(1,y) = (y-1)^2, \; h = k = 0.5$$

---(7 marks)

Q6\\ Detremine the value of h that ensure the appoximation error of less than ***0.00002*** when approximate $\int_0^{\pi} \sin(x)dx$ by composite Simpson's rule, determine the value of ***n***.

---(7 marks)

Best of lucks

Lecturer
Assist. L. Dheyab, A. N.

M.M. KRADY
Head of Department
Assist. Proff. Krady, M. M.

2018.6.13

٢ـ

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and Computer Applications

Subject: Mathematical Statistics II
Stage: Third

Date: / /2018
Time : Three Hours

06.06.2018

((Assessment of the final exam for the second semester))
Academic year 2017-2018

45

Q1: Let $x_1, x_2, ..., x_n$ represent measurements of a random sample drawn from a population with exponential distribution with parameter θ. Find the most powerful critical region with test size α to test $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 < \theta_0$, then find the power of test. (10 Marks)

Q2: Derive the confidence interval limits for the normal distribution when the variance of this distribution σ^2 is known, and draw the acceptance and rejection regions. (10 Marks)

Q3: (a) Derive the Neyman-Pearson theorem.
(b) What is the relationship between the type I error and the power of test. Explain mathematically this relationship. (10 Marks)

Q4: Let $x_1, x_2, ..., x_n$ be a random sample drawn from a population with probability density function:

?

$$f(x,p) = \begin{cases} \theta x^{\theta-1}, & \text{if } 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

where $\theta > 0$ is an unknown parameter, what is a $100(1-\alpha)\%$ approximate CI for the parameter θ if the sample size is large?. (10 Marks)

Q5: Let $x_1, x_2, ..., x_{12}$ be a random sample drawn from a normal population with $\mu 0$ and variance is σ^2. What the most powerful test with test size 0.025 for testing $H_0 : \sigma^2 = 10$ versus $H_1 : \sigma^2 = 5$ using Neyman- Pearson theorem? (10 Marks)

Q6: If we have a ransom sample drawn from a Poisson distribution with parameter λ. Using the factorization theorem, show that $\sum_{i=1}^{n}$ is sufficient indicator for the parameter λ. (10 Marks)

?

Best of luck

Lecturer
Dr. Safaa Karem Kadhem

جامعة المثنى
كلية العلوم
اللجنة الامتحانية المركزية

M. M. KRAM
Head of Department

2018-6-17

Ring theory II

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics and
Computer Applications

Subject: Ring II
Stage: Third

Date: / /2018
Time: 3 hr

45

((Assessment of The Final Exam for The Second Semester))
Academic year 2017-2018

Note: For every question 10 marks

23. 05. 2018

Q1// Give a reason for the following:

1- $Z_8/\{0,4\} \cong Z_4$?

2- let $(F,+,.)$be a field then $F[x]$ is not field?

3- $(\mathbb{Z},+,.)$ is Noetherian but is not Artenian?

4- Every prime ideal is irreducible.

5- The polynomial $f(x) = x^2 - 2$ is irreducible over $\mathbb{Q}$.

Q2//1- Prove every artinian integral domain ring is a field?

2- Define and give examples for reducible and irreducible polynomial, then prove if the polynomial $f(x) \in F[x]$ of degree 2 or 3 is reducible in F iff it has a root in F. Hint: F is field.

Q3// Prove the following are equivalent? Only Two.

1- (R,+,.) satisfy A.c.c on ideals.

2- Every a nonempty collection of ideals has a maximal element.

3- Every ideal of R is finitely generated.

Q4// 1- The polynomial $f(x) \in R[x]$ is divisible by x-a iff a is root of $f(x)$.

2- If we have two submodules N_1 and N_2 of an R-module M, what the difference between $N_1 + N_2$ and $N_1 \cup N_2$?

Q5// 1- Prove every isomorphic image of a skew-field is a skew-field?

2- Let $(R,+,.)$ be a Noetherian ring then prove every proper ideal in $(R,+,.)$ is a finite intersection of irreducible ideals.

Q6// The polynomial $f(x) = x^4 - 1$, how many roots in polynomial rings $Z[x]$, $\mathbb{C}[x]$and $Z_6[x]$?Hint $\mathbb{C}$ is complex number set.

M-M-KRADY
Head of Department
Asst. Prof. Mousa Makey Krady

Good Luck

Lecture
Dr. Amer Himza Almyaly

(٢) ١ فـ ٣ ...

Ministry of Higher Education
& Scientific Research
Al Muthanna University
College of Science
Dept. of Mathematics &
Computer Applications

Subject: Partial Differential Equations II
Stage: 3rd class
Date: / /2018
Time : 3 hours

10. 06. 2018

45

((Assessment of the final exam for the second semester))
Academic year 2017 -2018

Q1// Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ $, 0 < x < 50 \ , t > 0$ *, with*
$u(0,t) = 6 \ , \ u(50,t) = 12 \ , \ u(x,0) = 5x^2$ *, then find u(1,4).*
** *(8 marks)*

Q2// Determined the type of the following PDEs and solve it.

a) $(1+q)^2 r - 2(1+p+q+pq)s + (1+p)^2 t = 0$

b) $r - 2yp + y^2 z = (y-2)e^{2x+3y}$

***(12 marks)*

Q3// Find a solution of the following PDE

$\nabla^2 u = \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial u}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0 \ ; \ |u(0,\theta)| < \infty$ *and* $u(a,\theta) = f(\theta)$

with $u(r,-\pi) = u(r,\pi) \ ; \ \frac{\partial u}{\partial r}(r,-\pi) = \frac{\partial u}{\partial r}(r,\pi)$

***(10 marks)*

Q4//Explain how to solve the Dirichlet initial boundary value problem

$u_{tt} = c^2 u_{xx} + F(t,x), \quad u(0,x) = f(x),$

$u_t(0,x) = g(x), \quad u(t,0) = u(t,l) = 0$

for the wave equation subject to the external forcing on [0,l].

***(10 marks)*

Q5// Reduce the equation to canonical form and solve it.

$y^2 r - 2xys + x^2 t = \frac{y^2}{x}p + \frac{x^2}{y}q$

***(10 marks)*

Q6// Solve $u_{tt} + 3u_t + u = u_{xx} \ , \ 0 < x < 1 \ , t > 0$ *, with*

$u(0,t) = 0 \ , u(1,t) = 0 \ ; \ u(x,0) = 0 \ , u_t(x,0) = x\sin(2\pi x)$

***(10 marks)*

note: $p = \frac{\partial z}{\partial x}, \quad q = \frac{\partial z}{\partial y}, \quad r = \frac{\partial^2 z}{\partial x^2}, \ s = \frac{\partial^2 z}{\partial x \partial y}, t = \frac{\partial^2 z}{\partial y^2}$

Good Luck

Lecturer
Dr.Yaseen Alrajhi

جامعة المثنى
كلية العلوم
اللجنة الامتحانية المركزية

M.M.KRAUD
Head of Department
Asst. Prof Mousa M. Krudy

2018.6.13