

**SSCB-101**  
**M.A./M.Sc. I<sup>st</sup> Semester (Reg./Pvt./ATKT)**  
**Examination, 2020**  
**Mathematics**  
**Paper – I**  
**Advanced Abstract Algebra - I**

[Maximum Marks : Reg. 85  
Pvt. 100

**Note :-** All questions from each section carry equal marks. All questions are compulsory and answer limit are approximately 250 words. Start the answer of each section from new page. Maximum limit of pages of answer booklet are approximately 16 pages. Answer should be written by the student in his/her own handwriting mandatory. The first page of answersheet should be download by the student from university website [www.bubhopal.ac.in](http://www.bubhopal.ac.in) is mandatory.

1. Define Subnormal series. State and Prove Jordan Holder Theorem.
2. Prove that a linear transformation  $T : V \rightarrow V$  is invertible if and only if its minimal polynomial has non-zero constant term.
3. Show that two transformations in  $A(V)$  are similar if and only if they have same families of elementary divisors
4. Define Perfect and Finite Field. Prove that Any finite separable extension of an infinite field is a simple extension.
5. State and prove Fundamental Theorem of Galois Theory.

BAKKATULLAH UNIVERSITY [OPEN BOOK]  
EXAMINATION December - 2020

MA/MSC. I semester Mathematics (REG/NT/ATN/EX)  
Paper II

Max Marks  
Reg = 85  
NT = 100

Real - ANALYSIS

Note - Attempt in all five questions. Each carry equal Marks

1. State and prove Necessary and sufficient condition for the function to be Riemann-Stieltjes Integral
2. Define Rectifiable Curves.  
Prove that if  $\gamma$  be a continuous by differentiable curve on  $[a, b]$ , then  $\gamma$  is rectifiable and  
$$L_\gamma[a, b] = \int_a^b |\gamma'(t)| dt$$
3. State and prove Cauchy's Criterion for Uniform Convergence.
4. Define linear Transformation, linear operator.  
A Linear operator  $A$  on a finite-dimensional vector space  $X$  is one-to-one if and if the range of  $A$  is all of  $X$ , that is  $\forall A$  is onto
5. Inverse Function theorem:- Statement and proof.



BAR KATULLAH UNIVERSITY (OPEN BOOK)

M.A/MSC. I semester Mathematics (Key/Part/Part/Part)

Examination - December 2020

Note - Attempt all five Questions - Each

Carry equal marks

Differential and Integral Equations Max Marks: 85  
Pt = 100

1) Solve

$$x^2 \frac{d^2 y}{dx^2} - (x^2 + 2x) \frac{dy}{dx} + (x+2)y = x^2 e^x$$

2. Solve  $(y^2 + z^2 - x^2) dx - 2xy dy - 2xz dz = 0$

3. Write Linear differential Equations

$$x_1' = 5x_1 - 2x_2$$

$$x_2' = 2x_1 + x_2$$

4. Consider the system of Equations

$$x_1' = ax_1 + bx_2, \quad x_2' = cx_1 + dx_2$$

where  $a, b, c, d$  are constants. Show that

$x_1$  satisfies the second order equation

$$x_1'' - (a+d)x_1' + (ad-bc)x_1 = 0$$

5. Solve the integral equation  $\phi(x) = \frac{5x+1}{6} + \int_0^x \phi(t) dt$

BARKATULLAH UNIVERSITY (OPEN BOOK) EXAMINATION  
December - 2020

M.A./M.Sc I semester Mathematics (REG/PVT/ATKT/EX)

Paper - IV

Complex Analysis - I

{ max marks  
Reg - 85  
Pvt - 100

Note:- Attempt in all five question. Each question carry equal marks.

Ques 1 state and Prove Cauchy integral formula for higher order derivatives.

Ques 2 state and Prove Taylor's theorem.

Ques - 3 state and Prove Maximum modulus Principle. Theorem

Ques - 4 Evaluate  $\int_0^\pi \frac{a \, d\theta}{a^2 + \sin^2 \theta}$ ,  $a > 0$  by the theory of residues.

Ques - 5 Cross-ratios are invariant Under bilinear transformation.



Barkatullah University (Open Book) Examination  
December 2020

MA/M.Sc I<sup>st</sup> Semester Mathematics (Reg/Pvt/ATKT/Ex)

Paper - III

Topology - I

Max marks  
Reg - 85  
Pvt - 100

Note:- Attempt in all five question. Each question carry equal marks.

Ques 1 state and Prove well ordering theorem

Ques-2 state and Prove Relation in interior Exterior closure and Boundary Points.

Ques-3 state and Prove Kuratowski theorem

Ques 4 Lindelof's theorem (state and Prove)

Ques-5 continuous image of a connected space is connected.

**Barkatullah University (Open Book) ATKT Examination,**

**December- 2020**

**MA/M.Sc. I<sup>st</sup> Semester Mathematics**

**Paper: Fundamental of Computers (OPT.)**

**Max. Marks: 85**

Note: - Attempt all questions:

1. Define Computer. Explain classification of Computers.
2. Explain different types of internal DOS command.
3. What is Header and Footer? Write steps to procedure to insert and delete Header and Footer in document.
4. What is Worksheet? Write application and advantages of spreadsheet.
5. Write steps to insert picture and clipart of slide.