Sanjay Ghodawat University, Kolhapur
Established as State Private University under Govt. of Maharashtra.
Act No XL, 2017

2018-19
EXM/P/09/00

Year and Program:2018-2019 B.Sc.	**School of Science**	**Department of Mathematics**
Course Code – MTS 202	**Course Title – Mathematics -IV**	**Semester – IV**
Day and Date – Saturday 25-05-2019	**End Semester Examination** (A)	**Time:** 30 min. 2·30 – 3·00 pm
		Max Marks: 100
PRN number –	**Seat no-**	**Answer Booklet No.-**
Students' Signature -		**Invigilator's Signature –**

Instructions:

1) All questions are compulsory.
2) **Attempt Q.1 within first 30 minutes.**
3) Each MCQ type question is followed by four plausible alternatives, Tick (√) the correct one.
4) Answer to question 1 should be written in the question paper and submit to the Jr. Supervisor.
5) If you tick more than one option it will not be evaluated
6) Figures to the right indicate full marks
7) Use **Blue ball pen** only.

Q.1	Tick Mark correct alternative	Marks	Bloom's Level	CO
i)	The inverse of $-i$ in the multiplicative group $G = \{1, -1, i, -i\}$ is_____, where $i = \sqrt{-1}$ a) 1 b) -1 c) i d) $-i$	1	L3	CO1
ii)	If G is a group such that $o(G) = 33$ and H is a subgroup of group G then $o(H)$ is a) 5 b) 7 c) 9 d) 11	1	L3	CO1
iii)	If $G = \{1, -1, i, -i\}$ under multiplication is cyclic group then order of an element i is _______, where $i = \sqrt{-1}$ a) 1 b) 2 c) 4 d) 8	1	L4	CO2
iv)	If φ is Euler's totient function then $\varphi(15)$ is a) 2 b) 6 c) 4 d) 8	1	L3	CO2

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v)	If a group G is of prime order then a) G is cyclic c) G is not abelian b) Every subgroup is not normal d) G is not semi group	1	L4	CO3
vi)	If $\frac{G}{H}$ is a quotient group then it's identity element is a) $\{e\}$ b) G c) H d) e	1	L1	CO3
vii)	Which one of the following statements is true a) A commutative division ring is called field. b) Every field is an integral domain. c) A commutative ring R in which cancellation law hold then R is a field. d) Commutative ring with unity is field.	1	L1	CO4
viii)	Which one of the following statements is true a) Every ring is not abelian group with respect to addition. b) Every subring is not abelian group with respect to addition. c) Every ideal is abelian group with respect to addition. d) Every ring is commutative.	1	L3	CO4
ix)	R is a ring with unity **A:** If 1 is of additive order n then $ch\ R = n$ **B:** If 1 is of additive order infinity then $ch\ R = \infty$ a) Only A is true b) Only B is true c) Both A and B are true d) Both are false	1	L3	CO4
x)	Which one of the following is commutative ring without unity a) Set of real numbers with usual addition and multiplication b) Set of rational numbers with usual addition and multiplication c) Set of integer numbers with usual addition and multiplication d) Set of even numbers with usual addition and multiplication	1	L4	CO4

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xi) Every ring has at least_______subrings. 1 L1 CO4

a) 6 b) 2 c) 3 d) 4

xii) Which one of the following statements is false 1 L1 CO4

a) Sum of two subrings is a subring

b) Subring generated by S is a subring, where S is subset of ring R

c) Center of the ring is a subring of ring R

d) Every ideal is a subring

xiii) Which one of the following is commutative ring with units 1 L3 CO4

a) Set of even numbers with usual addition and multiplication

b) Set of all 2×2 matrices with matrix addition and matrix multiplication

c) Set of rational numbers with usual addition and multiplication

d) All the above are true.

xiv) A simple ring has _______ ideals. 1 L1 CO5

a) 4 b) 2 c) 3 d) Infinitely many

xv) Every field has______ maximal ideal/ideals. 1 L4 CO5

a) 1 b) 2 c) 3 d) Infinitely many

xvi) **A:** Every ideal of R is a subring of R. 1 L1 CO5

B: Every a subring of R is an ideal of R.

a) Only A is true

b) Only B is true

c) Both A and B are true

d) Both are false

xvii) Let R be a commutative ring with unity and an ideal P of R is prime ideal of R iff $\frac{R}{P}$. 1 L2 CO5

a) field c) skew field

b) integral domain d) division ring

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xviii)	Which one of the following statements is false	1	L4	CO5
	a) Sum of two ideal of R is again ideal R.			
	b) Product of two ideal of R is again ideal R.			
	c) Intersection of two ideal of R is again ideal R.			
	d) Union of two ideal of R is again ideal R.			
xix)	A division ring has______ maximal ideal/ideals.	1	L4	CO5
	a) 1 b) 2 c) Infinitely many d) 3			
xx)	**A:** Every field is simple ring.	1	L2	CO5
	B: Every division ring is simple.			
	a) A is true but not B			
	b) B is true but not A			
	c) Both A and B are true			
	d) None of these			

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EXM/P/09/01

Year and Program: 2018-2019 B.Sc.	**School of Science**	**Department of Mathematics**
Course Code: MTS 202	**Course Title: Mathematics -IV**	**Semester – IV**
Day and Date: Saturday 25-05-2019	**End Semester Examination (ESE)**	**Time:** 2.5 Hrs. 3.00 to 5.30 p.m.
	13	**Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Non-programmable calculator is allowed.

			Marks	Bloom's Level	CO
Q.2		**Solve any TWO**			
	i)	Define a) Group b) Semi group c) Center of a group	6	L1	CO1
	ii)	Show that center of a group G is a subgroup of group G.	6	L2	CO1
	iii)	Show that union of two subgroups of a group G is a subgroup of G iff one of them is contained in the other.	6	L2	CO1
Q.3		**Solve any TWO**			
	i)	Show that subgroup of a cyclic group is cyclic.	7	L2	CO2
	ii)	Show that an infinite cyclic group has precisely two generators.	7	L2	CO2
	iii)	Define Order of an element, Also show that the set $G = \{1, -1, i, -i\}$ is a cyclic group under multiplication and find order of each element of G.	7	L3	CO2
Q.4		**Solve any TWO**			
	i)	Show that if a subgroup H of a group G is normal in G iff product of two right cosets of H in G is again a right coset of H in G.	7	L2	CO3
	ii)	Define kernel of f, also show that kernel of f is normal subgroup of a group G.	7	L3	CO3
	iii)	If $f: G \to G'$ be an onto homomorphism with $K = \text{Ker} f$ then show that $\frac{G}{K} \cong G'$	7	L2	CO3
Q.5	A)	Define a) Subring b) Division ring c) Field	6	L1	CO4

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B) Solve any **TWO**

i)	Show that a non-zero finite integral domain is a field.	7	L2	CO4
ii)	Define characteristic of a ring, And show that if D is an integral domain then characteristic of D is either zero or a prime number.	7	L2	CO4
iii)	If R is a division ring then show that center $Z(R)$ of R is a field.	7	L3	CO4

Q.6 **Solve any FOUR**

i)	If A and B are two ideals of ring R then show that $A+B$ is an ideal of R containing both A and B.	5	L2	CO5
ii)	If A is an ideal of a ring R with unity such that $1 \in A$ then show that $A = R$.	5	L2	CO5
iii)	If $\theta: R \to R'$ be a homomorphism then show that a) $\theta(0) = 0'$ b) $\theta(-a) = -\theta(a)$; here 0 and $0'$ are zeros of the rings R and R' respectively.	5	L1	CO5
iv)	Show that Ker $f = (0)$ iff f is one one.	5	L3	CO5
v)	Let R be a commutative ring with unity. Show that every maximal ideal of R is prime ideal.	5	L3	CO5
vi)	If R be a commutative ring with unity and an $\frac{R}{M}$ is a field then show that an ideal M of R is maximal ideal.	5	L1	CO5

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