Online Examinations (Even Sem/Part-I/Part-II Examinations 2020 - 2021

Course Name - –Abstract Algebra
Course Code - MSCMC201

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Mark only one oval.

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- MCA
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- M.SC.(MM)
- B.A.(Eng)

Answer all the questions. Each question carry one mark.

9. 1.

The degree of the minimal polynomial of the root $\sqrt{2+\sqrt{5}}$ over Q is

Mark only one oval.

- 2
- 3
- 4
- None of these

10. 2.

Let F/K be a cyclic field extension and [F: K] =25. Then the order of the group Aut_K^F is

Mark only one oval.

- 2
- 3
- 5
- 25

11. 3. Every solvable group

Mark only one oval.

- has a composition series.
- has no composition series.
- is commutative.
- None of these

12. 4.

The characteristic of the ring Z_6 is

Mark only one oval.

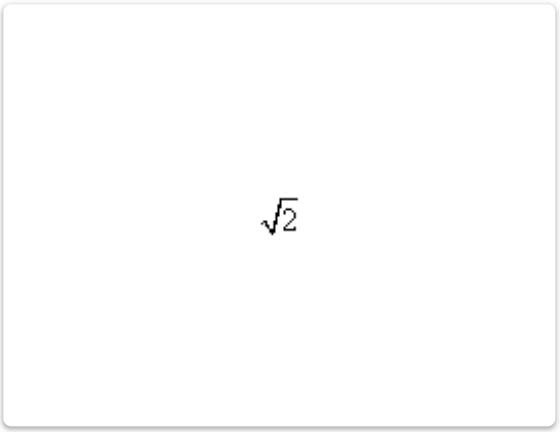
- 2
- 3
- 6
- None of these

13. 5. Which of the following is not an algebraic element over the set of all rational numbers Q?

Mark only one oval.

Option 1

i



Option 3

None of these

14. 6.

Which of the following is a simple field extension of Q?

Mark only one oval.

$Q(\sqrt{2},i)$

Option 1

$Q(\sqrt{2})$

Option 2

$Q(i)$

Option 3

$Q(2)$

Option 4

15. 7. Let R be the set of all real numbers and C be the set of all complex number. Then all R-monomorphism from C to C is

Mark only one oval.

- only the identity
- only the complex conjugation
- both identity and complex conjugation
- None of these

16. 8.

Let G be a group of order p^2, where p is a prime. Then G

Mark only one oval.

- is commutative
- is noncommutative
- has no subgroup of order p
- None of these

17. 9.

The ring Z_n is a filed then n is always a/an

Mark only one oval.

- even prime
- odd prime
- prime
- any integer

18. 10.

A rational root of the polynomial $2X^3 - 7x + 1$

Mark only one oval.

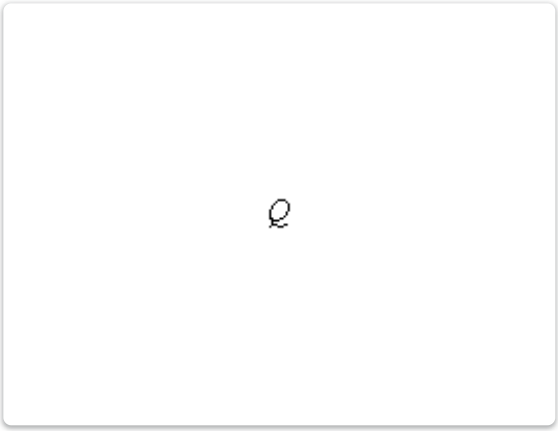
- 1/2
- 2/3
- does not exists
- exists but none of a and b

19. 11.

Which of the following is the splitting field of the polynomial X^2+1 over R

Mark only one oval.

Option 1



Option 2

C

R

20. 12. The notion of trace is defined for which of the following field extension?

Mark only one oval.

Only for finite field extension

Only for infinite field extension

We do need any field extension

We do not need any field extension

21. 13. The direct product of two groups is commutative if and only if

Mark only one oval.

- both the groups are commutative.
- both the groups are not commutative.
- one of is commutative.
- None of these

22. 14. Any simple group of order 60 is isomorphic to

Mark only one oval.

- Option 1: A_5
- Option 2: A_3
- Option 3: A_4
- None of these

23. 15. Value of the g.c.d(10,15) in the ring Z

Mark only one oval.

- 1
- 5
- 10
- 30

24. 16.

Let K/L be a finite field extension and $G(K/L)$ is the Galois group of K/L then which of the following is correct:

Mark only one oval.

- K/L is only a normal extension
- K/L only a separable extension
- K/L is both normal and separable extension
- K/L neither normal nor separable extension

25. 17.

Let F be a field with characteristic 5 then which of the following is not a possible number of elements of F?

Mark only one oval.

- 1
- 5
- 25
- 125

26. 18.

Let G be a group of order 143. Then the number of Sylow 11-subgroup is

Mark only one oval.

- unique
- more than one
- has no Sylow 11-subgroup
- None of these

27. 19.

The ring $Z[X]$ is

Mark only one oval.

- UFD
- PID
- both UFD and PID
- neither UFD nor PID

28. 20.

Let F/K be a field extension and L be an intermediate field of F/K. Then

Mark only one oval.

$[F:K]=[F:L]$

Option 1

$[F:K]=[F:L][K:L]$

Option 2

$[F:K]=[F:L][L:K]$

Option 3

$[F:K]=[L:K]$

Option 4

29. 21.

Let K be a field $\overline{K}$ an algebraic closure of K and $L \subset \overline{K}$ a finite extension of K such that L/K is a Galois extension, and let G be its Galois group. Which of the following assertions are correct:

Mark only one oval.

For any subgroup H of G, the intermediate extension $E = L^H$ is a normal extension of K.

Option 1

Two subgroups H_1 and H_2 of G are equal if and only if $L^{H_1} = L^{H_2}$.

Option 2

Any subgroup H of G is the Galois group of some extension E/K for some $E \subset L$

Option 3

None of these

30. 22. Then all Q-monomorphism from C to C fixes elements of

Mark only one oval.

C

R

Q

None of these

31. 23.

Let p be a prime integer and $n > 1$ be any integer and G be a group of order p^n, then

Mark only one oval.

G is simple.

Option 1

G is commutative.

Option 2

G is not simple.

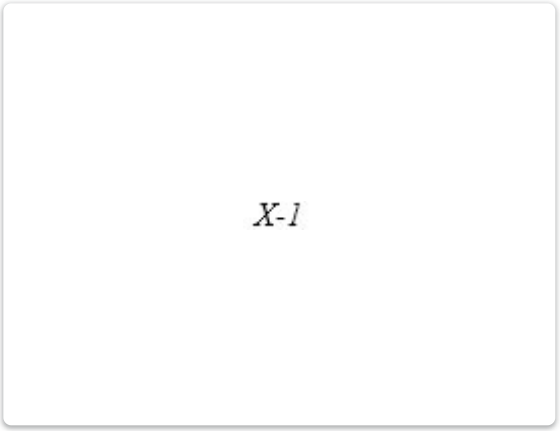
Option 3

None of these

32. 24.

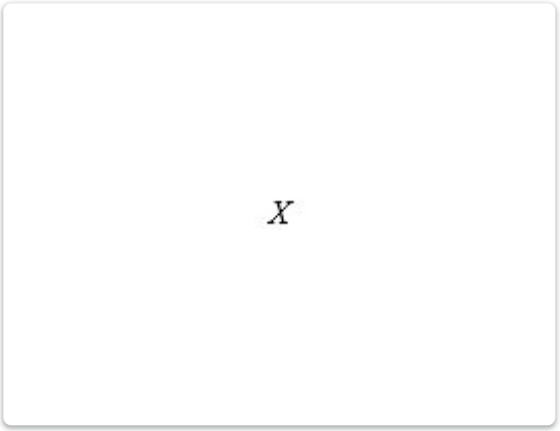
Which of the following factor divides the polynomial $2X^2+X+1$ in Z_3?

Mark only one oval.



Option 1

Option 2



Option 3

None of these

33. 25.

The value of $\left[Q(\sqrt{2}):Q\right]$ is

Mark only one oval.

0

1

2

3

34. 26.

Which of the following is a normal extension over R?

Mark only one oval.

$Q(\sqrt{2})$

Option 1

$Q(\sqrt{2},\sqrt{3})$

Option 2

R

C

35. 27.The notion of cyclotomic extension field needs the concepts of

Mark only one oval.

splitting field

separable field

inseparable field

None of these

36. 28.

The symmetric group S_3

Mark only one oval.

- is commutative.
- is solvable.
- is not solvable.
- None of these

37. 29.

Which of the following is a root of the equation $X^2+\bar{2}X+\bar{1}$ in the ring Z_4.

Mark only one oval.

- Option 1: $\bar{0}$
- Option 2: $\bar{1}$
- Option 3: $\bar{2}$
- No root

38. 30.

The degree of $\sqrt{2}$ over the set of all rational numbers Q?

Mark only one oval.

- 0
- 1
- 2
- 3

39. 31.

Multiplicity of the root 0 of the polynomial $X^3+2X=0$

Mark only one oval.

- 3
- 2
- 1
- 0

40. 32. Let R be the set of all real numbers and C be the set of all complex number. Then all R-monomorphism from C to C fixes elements of

Mark only one oval.

- R
- C
- only the integers
- only the rational

41. 33.

Let G be a noncommutative group of order p^3, p a prime. Then $|Z(G)| =$

Mark only one oval.

p^3

p^2

Option 1

Option 2

p

None of these

42. 34. The characteristic of the ring R of all real numbers is

Mark only one oval.

0

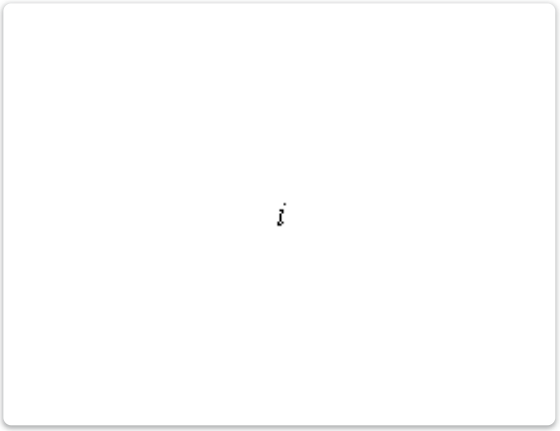
1

-1

does not exists

43. 35. Which of the following is an algebraic integer?

Mark only one oval.



Option 1

1/2

Option 3

None of these

44. 36. Let K be a perfect field then which of the following statements is true?

Mark only one oval.

Every algebraic extension of K is separable

Some algebraic extension of K is separable

Every algebraic extension of K is inseparable

Some algebraic extension of K is inseparable

45. 37. To define trace for an element of a field, we need

Mark only one oval.

- monomorphism
- isomorphism
- homomorphism
- None of these

46. 38.

Let A, B, C and D be four groups such that A is isomorphic to B and C is isomorphic to D then

Mark only one oval.

- Option 1: $A \times B$ is isomorphic to $C \times D$.
- Option 2: $A \times B$ is not isomorphic to $C \times D$.
- Option 3: A is isomorphic to D.
- None of these

47. 39.

Let G be a group of order 36, then G

Mark only one oval.

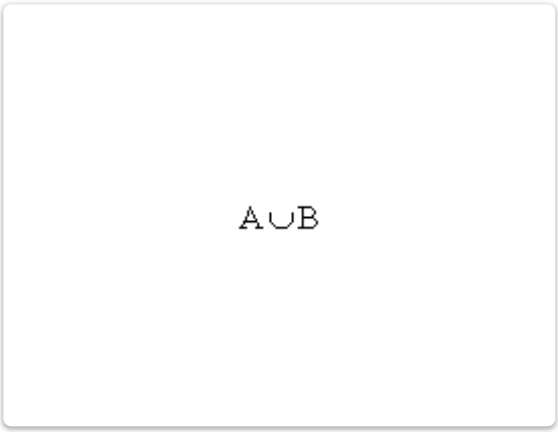
- is not simple
- is simple
- is cyclic
- None of these

48. 40.

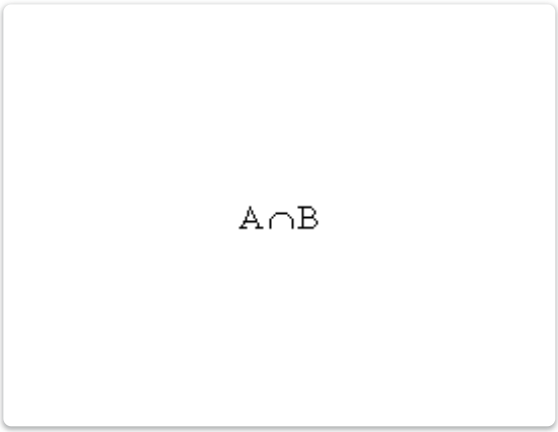
Let R be a commutative ring with 1and A and B are two distinct maximal ideal of R then AB=

Mark only one oval.

Option 1



Option 2



Option 3

None of these

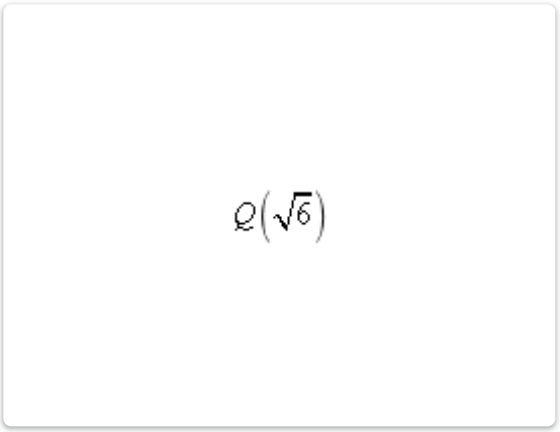
49. 41.

Which of the following is not a proper subfield of $Q(\sqrt{2},\sqrt{3})$?

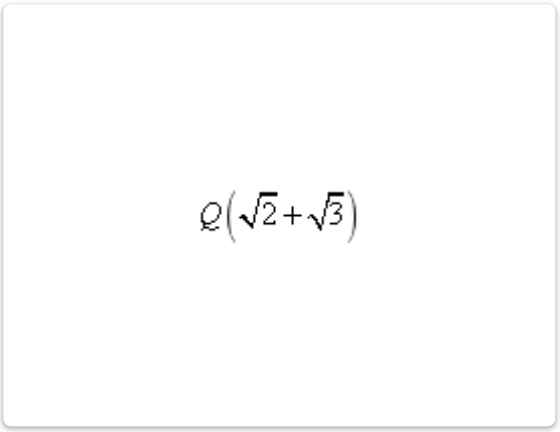
Mark only one oval.

Option 1

Option 2



Option 3



Option 4

50. 42.Let G be a simple group of order 168. What is the number of subgroups of G of order 7?

Mark only one oval.

- 1
- 7
- 8
- 28

51. 43.

Let G be a cyclic group of order p^2, p is a prime, then

Mark only one oval.

G has only one subgroup.

Option 1

more than one subgroup.

G is not commutative.

Option 3

None of these

52. 44.

$Z\left[\sqrt{-2}\right]$ is a

Mark only one oval.

UFD

PID

both UFD and PID

neither UFD nor PID

53.

The number of elements in the basis of $Q\left(\sqrt{2},\sqrt{4},\sqrt{6}\right)/Q$

Mark only one oval.

- 1
- 2
- 4
- 8

54. 46.Let K be a field, K^{-} an algebraic closure of K and L subset of K^{-} a finite extension of K of degree 2. Which of the following assertion is false:

Mark only one oval.

- The extension L/K is separable.
- The extension L/K is normal.
- The extension K/L is normal.
- None of these

55. 47. The number of subfield of a prime field is

Mark only one oval.

- 0
- 1
- 2
- 3

56. 48. Mirrors _____ light rays to make an image.

Let G be a group of order 9, then

Mark only one oval.

G is commutative.

Option 1

G is not commutative.

Option 2

G is not simple.

Option 3

None of these

57. 49. Which of the following is not a unit in the ring Z[i]?

Mark only one oval.

0

1

-1

I

58. 50.

The basis of $Q(\sqrt{2})$ over Q is

Mark only one oval.

$\{1, \sqrt[3]{2}\}$

Option 1

$\{1\}$

Option 2

$\{\sqrt[3]{2}\}$

Option 3

None of these

59. 51. Let L/K be a finite extension of fields. Which of the following assertions is false:

Mark only one oval.

If $L = K(x)$, where x is a root of a separable polynomial in $K[X]$, then L/K is separable.

Option 1

There exists $x \in L$ such that $L = K(x)$.

Option 2

For any embedding σ of K in an algebraic closed-field $\overline{K}$, there exists $\tau : L \to \overline{K}$ which extends σ.

Option 3

Both Option 1 and Option 3

60. 52. Let K be a field and f be a polynomial over K. Then the polynomial equation f=0 is solvable by radical if there exists a radical extension F over K and a splitting field L of f over K such that

Mark only one oval.

$K \subset F \subset L$

Option 1

$K \subset L \subset F$

Option 2

$K \supset L \supset F$

Option 3

$L=F$

Option 4

61. 53.

The alternating group A_4

Mark only one oval.

- is not solvable.
- is solvable.
- has a normal series.
- None of these

62. 54.

Let R be ring with1. Then the $R[X]/\langle X\rangle$ =

Mark only one oval.

- R
- R[X]
- R(X)
- Option 4

63. 55.Which of the following field is prime?

Mark only one oval.

R

Q

$Q(\sqrt{2})$

C

Option 4

64. 56.

Which of the following is the splitting field of the polynomial X^4+1.

Mark only one oval.

$\mathbb{Q}(\sqrt{2})$

Option 1

$\mathbb{Q}(i)$

Option 2

$\mathbb{Q}(\sqrt{2},i)$

Option 3

$\mathbb{Q}$

Option 4

65. 57.

Let F/K be a cyclic field extension with the order of the group Aut_K^F is 6. Then [F: K]=

Mark only one oval.

- 2
- 3
- 5
- 6

66. 58.

The group of symmetrices of a square is a $p-group$. Then $p=$

Mark only one oval.

- 5
- 2
- 3
- None of these

67. 59. The characteristic of the ring C of all complex numbers is

Mark only one oval.

- 0
- 1
- -1
- does not exists

68. 60. Let L/K be a finite extension of fields. Which of the following assertions are correct

Mark only one oval.

- If the characteristic of K is zero, then L/K is normal
- If the characteristic of K is zero, then L/K is separable.
- If L/K is normal, then L/K is a finite field extension
- If the characteristic of K is positive, then L/K is normal if and only if it is separable.