TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
IV SEMESTER INTERNAL ASSESSMENT II EXAMINATIONS
MATHS (ALGEBRA) QUESTION BANK

I. Multiple choice questions.

1. A homomorphism G→G' is an isomorphism iff the kernel consists of __________ [b]
(a) The identity 'e' only (b) A normal subgroup of G
(c) A factor group of G (d) Inverse of G

2. If N and H are normal subgroups of a group G, then NH is _________ [a]
(a) HN (b) H (c) N (d) None of these

3. Which of the following statements is correct? [b]
(a) Every homomorphism is an isomorphism (b) Every isomorphism is a hormorphism
(c) Homomorphism and isomorphism are not related (d) None of these

4. If N is a normal subgroup of a group G and $a \epsilon$ G then [d]
(a) Na∩ aN=∅ (b Na<aN (c) Na≠ aN (d) Na = aN

5. For any two elements a, b in a ring, a(-b) = [a]
(a) - (ab) (b) ab (c) -(ba) (d) None of these

6. If (R,+,.) is a ring then (R,+) is [b]
(a) A group (b) An abelian group (c) A finite group (d) Semi group

7. The residue clases modulo 11 with respect addition and multiplication modulo 11 is [d]
(a) Commutative ring (b) An integral domain (c) Skew field (d) A field

8. The characteristic of the residue classes mod 8 is ______ [c]
(a) 0 (b) 2 (c) 8 (d) 3

9. With the usual addition and multiplication, the set of all even integers is [a]
(a) A ring (b) A field (c) An integral domain (d) A sub ring

10. If S_1, S_2 are two subrings of a ring R, then $S_1 + S_2$ is [c]
(a) Subring (b) Ideal (c) Need not be a subring (d) Not a subring

11. If F is a field, then the number of ideals in F is ________ [c]
(a) 0 (b) 1 (c) 2 (d) Infinite

12. A subring S of a ring R is called ideal if [c]
(a) $\alpha \in S, a \in R \Rightarrow \alpha a \in S$ (b) $\alpha \in S, a \in R \Rightarrow a\alpha \in S$
(c) $\alpha \in S, a \in R \Rightarrow \alpha a, a\alpha \in S$ (d) None of these

13. If R is a non-zero ring so that $a^2 = a$ ∀ a ∈ R then characteristic of R = [d]
(a) Prime (b) 0 (c) 1 (d) 2

14. For the homomorphism f:R→ R defined by f(x) = x ∀ x ∈ R Ker f = ________
[a]
(a) {0} (b) R (c) {0,1} (d) (d) None of these

15. If f(x), g(x) are two non-zero polynomials over a ring R[x] then deg {f(x)+g(x)} is [b]

(a) = deg f(x) + deg g(x) (b) ≤ max {deg f(x), deg g(x)}

(c) ≥ max {deg f(x), deg g(x)) (d) None of these

16. If $f(x)=2+4x+2x^2$, $g(x)=2x+4x^2$ over the ring $(I, +_6, X_6)$ then deg {(fx)+g(x)}= [d]

(a) -1 (b) 1 (c) 2 (d) 0

17. Every ring of numbers with unity is ____________ [a]

(a) Integral domain (b) Divison ring (c) Field (d) None of these

18. Homomorphic image of an integral domain is _____________ [c]

(a) A ring (b) Integral domain

(c) Need not be integral domain (d) None of these

19. A finite integral domain is ___________ [a]

(a) Field (b) Ring (c) Group (d) None of these

20. A field is a ___________ [c]

(a) Non commutative ring (b) Division ring

(c) Commutative division ring (d) None of these

II. Fill in the Blanks

1. To determine the quotient group G/N of a group G, N must be a normal group of G.
2. The kernal of homomorphism of a group is a normal group
3. Any subgroup of a cyclic group is a normal subgroup of the group of cyclic
4. The alternating group is a normal subgroup of the symmetric group S_n
5. If R is a ring without zero divisors then cancellation laws hold in R.
6. A ring R has no zero divisors if there exist a, b∈R and ab = 0 ⇒ a = 0 or b = 0
7. A division ring has no zero divisors divisors.
8. In a ring R if $a^2 = a$ for a ∈ R 'a' is called idempotent element w.r.t multiplication.
9. If characteristic of a ring R=2 and a, b ∈ R commute then $(a-b)^2 = a^2 + b^2$
10. A subring of $(Z_6, +_6, X_6)$ is $\{\bar{0},\bar{3}\}$
11. The union of two ideals of a ring R, need not be an ideal of R.
12. For the ring of integers any ideal generated by prime integer is a maximal ideal
13. A maximal ideal of the ring of integers is generated by prime integer
14. If U is a maximal ideal of the ring R then there exists no ideal U' of R such that $U \subset U' \subset R$
15. A finite integral domain is a field
16. In the quotient ring R/ U the zero element is and the unity element is U, 1 + U
17. For a commutative ring R, with unity if U is a maximal ideal then R/U is a field
18. If f: R→R' is a ring homomorphism then Ker f is an ideal of R
19. Every non-zero element of a field is a unit
20. If z[i] = (a+bi | a, b ∈ z) then the ring is called ring of Gaussian integers

Short Answers.

1. State first isomorphism theorem?
2. Mention three properties of rings?
3. What is an idempotent element?
4. Define an integral domain?
5. What is a nilpotent element?
6. Find the principal ideal generated by 3 ∈ Z ?
7. Define prime ideal?
8. Define ring homomorphism?

9. State first isomorphism theorem?
10. Give two examples of prime fields?