Reg. No. : ....

Code No. : 9023 **Sub. Code : PMAC 11**

M.Phil. DEGREE EXAMINATION,
NOVEMBER 2022

First Semester

Mathematics

RESEARCH AND TEACHING METHODOLOGY

(For those who joined in July 2018 – 2019 onwards)

Time : Three hours Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

1. (a) Prove that $x \in \mathbb{R} \Leftrightarrow 1 - xy$ is a unit in A for all $y \in A$.

Or

(b) Prove that the radical of an ideal a is the intersection of the prime ideals which contain a.

2. (a) Show that if $\mathcal{R}$ is the nilradical of A, the nilradical of $S^{-1}A$ is $S^{-1}\mathcal{R}$.

Or

(b) Prove that let q be a primary ideal in a ring A, then $r(q)$ is smallest prime ideal containing q.

3. (a) Show that let $A \subseteq B$ be rings and let C be the integral closure of A in B, then C is integrally closed in B.

Or

(b) Prove that let $A \subseteq B$ be rings, B integral over A, and let p be a prime ideal of A, then there exists a prime ideal q of B such that $q \cap A = p$.

4. (a) Prove that if A is Noetherian and p is a prime ideal of A then A_p is Neotherian.

Or

(b) Prove that in a Noetherian ring the nilradical is nilpotent.

5. (a) Write short notes on Lecture Method.

Or

(b) What do you mean by Seminar?

PART B — (5 × 10 = 50 marks)

Answer ALL questions, choosing either (a) or (b).

6. (a) Prove that M is a finitely generated A–module $\Leftrightarrow M$ is isomorphic to a quotient of A^* for some integer $n > 0$.

Or

(b) State and prove Nakayama's lemma.

7. (a) Prove that let M be a finitely generated A–module, S a multiplicatively closed subset of A, then $S^{-1}(Ann(M)) = Ann(S^{-1}M)$.

Or

(b) State and prove 2nd uniqueness theorem.

8. (a) State and prove Going-up theorem.

Or

(b) Show that :

(i) B is a local ring

(ii) If B' is a ring such that $B \subseteq B' \subseteq K$, then B' is a valuation ring of K

(iii) B is integrally closed (in K).

9. (a) Prove that let B be a finitely – generated A–algebra if A is Noetherian then S_0 is B.

Or

(b) State and prove structure theorem for Artin rings.

10. (a) Explain about Integrating ICT in Teaching.

Or

(b) Explain about Evaluation.