



**TAMIL NADU OPEN UNIVERSITY**  
**Chennai-15.**  
**Post Graduate Diploma in Mathematics**  
**SPOT ASSIGNMENT**

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| <b>COURSE</b>  | <b>COURSE CODE</b> | <b>ADMISSION YEAR</b> |
|----------------|--------------------|-----------------------|
| <b>Algebra</b> | <b>PGDMAT – 11</b> | <b>AY 2018 – 19</b>   |

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**Time: 1 Hour** **Total Marks: 25**

Answer all questions:

1. Prove that the number of  $p$  - sylow subgroups in  $G$ , for a given prime, is of the form  $1 + kp$ . 10 Marks
  
2. Let  $f(x) \in F[x]$  be of degree  $n \geq 1$ . Then prove that there is an extension  $E$  of  $F$  of degree atmost  $n!$  in which  $f(x)$  has  $n$  roots. 10 Marks
  
3. Prove that  $G$  is solvable if and only if  $G^{(k)} = \{e\}$  for some integer  $k$ . 5 Marks



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|----------------------|--------------------|-----------------------|
| <b>Real Analysis</b> | <b>PGDMAT – 12</b> | <b>AY 2018 – 19</b>   |

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**Time: 1 Hour** **Total Marks: 25**

Answer all questions:

1. Prove that every  $k$ -cell in  $\mathbb{R}^k$  is compact. 5 Marks
2. State and prove Riemann's Theorem on rearrangement. 10 Marks
3. State and prove Stone Weierstrass Theorem. 10 Marks



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|---|--------------------|-----------------------|
| <b>Topology and Functional Analysis</b> | <b>PGDMAT – 13</b> | <b>AY 2018 – 19</b>   |

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**Time: 1 Hour** **Total Marks: 25**

Answer all questions.

1. Prove that every compact subset of a Hausdorff space is closed. 5 Marks
2. State and prove Urysohn's Lemma. 10 Marks
3. State and prove the Open Mapping Theorem. 10 Marks