

Subject: Mathematics Senior (19-22)

Internal Exams: for Sem-III

Case Papers: - 5 th of Real functions.

Answer any three ques. but Q.N. 1 is compulsory.

Q. ① (a): Define ϵ - δ definition of limit

(b) Define continuous functions.

(c) Define uniform continuity.

(d) Define Relative extremum.

(e) state Rolle's theorem.

② Discuss the differentiability of the following function at $x=0$

$$f(x) = \begin{cases} 2+x & \text{if } x \geq 0 \\ 2-x & \text{if } x < 0 \end{cases}$$

③ state & prove Darboux's theorem.

④ state & prove Cauchy's mean value theorem.

⑤ obtain the expansion of $(1+x)^n$.

Mathematics

Internal Exam for Sem III (19-22)

Core paper: 6 Gr. Theory.

Answer any three ques. but Q.N. 1 is compulsory.

- Q.1 (a) Define Group.
 - (b) Define Subgroup.
 - (c) Define cyclic group.
 - (d) Define External direct product.
 - (e) State Cayley's theorem.
- 2) Prove that every subgroup of a cyclic group is cyclic.
 - 3) State & prove Lagrange's theorem.
 - 4) Prove that Every cyclic group is abelian.
 - 5) State & prove Fermat's theorem.

Mathematics

Internal Exam for Sem. III (19-22)

Core paper - 7

PDE & system of ODE.

Answer any three ques but Q. No. 1 is compulsory.

- (1) (a) Define Partial differential equation.
- (b) Write Laplace equation in three variables.
- (c) Define quasi-linear equation.
- (d) Write Lagrange auxiliary equations for $Pp + Qq = R$.
- (e) solve: $px + qy = z$.
- (2) solve: $x(y-z) + y(z-x)q = z(x-y)$
- (3) solve the equation
$$y^2 p^2 + x^2 q^2 = x^2 y^2 z^2$$
- (4) Reduce the equation $y = x^2 z$ to canonical form.
- (5) solve $(p^2 + q^2)y = qz$

Mathematics

Internal Exam. for Sem III (19-22)

Paper- G.E Real Analysis.

Answer any three ques but Q.N.01 is compulsory.

- ① (a) Define finite & infinite set.
 - (b) Define bounded set.
 - (c) Define bounded sequence.
 - (d) Define monotonic sequence.
 - (e) Define infinite series.
- ② Prove that Every convergent sequence is bounded.
- ③ Prove that the sequence $\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2(\sqrt{2})}}, \dots$ converges to 2.
- ④ Test the convergency of the series whose general term is $\sqrt{n^2+1} - n$.
- ⑤ Test for convergence the series whose general term is $\frac{1}{n^{1+\frac{1}{n}}}$.