Janki Devi Bajaj Government Girls College, Kota

Sample Paper

M.Sc. (Mathematics) Semester -II

Paper-Math 2 C(i) (Abstract Algebra)

Max Marks-15

There are seven questions; students are instructed to attempt five questions. Each question shall be of three marks.

1. Prove that if G is a group of order p^2, where p is a prime, then G is abelian.
2. Define $\phi: \mathbb{Z}_{12} \to \mathbb{Z}_{12}$ by $\phi(x) = 3x$, then prove that ϕ is a homomorphism.
3. Let G be a group of order 35, then prove that G is cyclic.
4. Let G be a group and let $Z(G)$ be the centre of G. If $G/Z(G)$ is cyclic, then G is abelian.
5. If G is a group of order pq, where p and q are primes, $p < q$, and p does not divide $q - 1$, then G is cyclic. In particular, G is isomorphic to $\mathbb{Z}_{pq}$.
6. Prove that the only group of order 255 is $\mathbb{Z}_{255}$.
7. Prove that the second syllow theorem and give an example.

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Sample Paper

M.Sc. (Mathematics) Semester -II

Paper-Math 2 C(ii) (Real Analysis)

Max Marks-15

There are five questions; students are instructed to attempt three questions. Each question shall be of five marks.

1.Show that every interval is measurable set.

2.Prove that the family M of all measurable sets is an algebra of sets in P(R).

3.Let f be measurable function defined on a measurable set E and g and f are equivalent functions. prove that g is measurable function.

4.Show that the sequence $\{f_n(x)\}$, where $f_n(x = x^{n-1}(1 - x)$ converges uniformly on [0,1].

5.Prove that if a sequence $\{f_n(x)\}$ of continuous function is uniformly convergent to a function f(x) on [a,b],then f(x) is continuous on [a,b].

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Sample Paper

M.Sc. (Mathematics) Semester -II

Paper-Math 2 C(iii) (Partial Differential Equation)

Max Marks-15

There are seven questions; students are instructed to attempt five questions. Each question shall be of three marks.

1. Obtain four Picard approximations if $y' = 1 + y^2$ and $y(0) = 0$. Find an interval for which the sequence of Picard approximations will converge to the actual solution.
2. Find the envelopes of the family of the curves $y = \cos(x + c)$.
3. Find the envelopes of the family of the curves $(x - c)^2 = 3y^2 - y^3$.
4. Find 1-parameter family of solutions of the Clairaut equation $y = y'x + (y')^2$. Also investigate for the envelopes of the family of solutions.
5. Every tangent to a curve has the property that the sum of its intercepts has a constant value k. Find the curve.
6. Find the complete integral of the PDE: $p^2z^2 + q^2 = 1$.
7. Examine the existence and uniqueness of solution of the following IVP:

$$\frac{dy}{dx} = y^2, \qquad y(-1) = 1$$

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Sample Paper

M.Sc. (Mathematics) Semester -II

Paper-Math 2 C(iv) (Special Function)

Max Marks-15

There are five questions; students are instructed to attempt three questions. Each question shall be of five marks.

1.State and prove Dixon's theorem.

2.Derive expressions for integral representation of p^{F_q}.

3.State and prove orthogonal property for Bessel's function.

4.State and prove Whipple's theorem for generalised hypergeometric function.

5.Describe complete solution of confluent hypergeometric differential equation.

<u>Janki Devi Bajaj Government Girls College, Kota</u>

Sample Paper

M.Sc. (Mathematics) Semester -II

Paper-Math 2 C(v) (Discrete Mathematics)

Max Marks-15

There are seven questions; students are instructed to attempt five questions. Each question shall be of three marks.

1. Test the validity of the following argument:
2. If I like mathematics, then I will study.
3. Either I study or I fail.
4. Therefore, If I fail then I do not like mathematics.
5. Obtain DNF of the statement $\sim(p \vee q) \leftrightarrow p \wedge q$.
6. Prove the implication "If n is an integer not divisible by 3, then $n^2 \equiv 1 (mod 3)$".
7. Prove by contradiction that in a room of 13 people, 2 or more people have their birthdays in the same month.
8. During a month with 30 days a baseball team plays at least 1 game a day, but not more than 45 games. Show that there must be a period of some number of consecutive days during which the team must play exactly 14 games.
9. Prove addition principle for three sets.
10. Show that 1601 is a prime number.

प्राचार्य

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