

SEVA BHARATI MAHAVIDYALAYA
Internal Assessment - 2018

Subject: Mathematics (Hons.)

Class: 1 Sem. (Hons.): Paper - C-1T

Marks: 10 Time: 45 min. Date: 06/11/2018

A. Answer ~~all~~ the following Questions (Any Five)

$$\boxed{2 \times 5 = 10}$$

1. State Leibnitz's theorem for successive Derivative.

2. Evaluate: $\lim_{h \rightarrow 0} \frac{(1+h)^n - 1}{h}$

3. Evaluate: $\lim_{x \rightarrow 0} (1 + \sin x)^{\frac{1}{x}}$

4. Find the asymptotes (if any) of the curve $x^3 - y^3 = 3xy$.

5. Determine the extreme values of the function $f(x) = (x^3 - 3x + 1)e^{-x}$

6. Find the points of inflection of the curve $y = (x+1)\tan^{-1}x$

7. Evaluate $\int_0^{\pi/2} \sin^5 x \, dx$

8. Find the volume of the solid generated by $y = \sqrt{x}$, $y = 6-x$ and $y=0$ revolved about x-axis.

SEVA BHARATI MAHAVIDYALAYA
Internal ~~Ass~~ Assessment - 2019

Subject: Mathematics (Hons.)

Class: 3rd Sem. (Hons.), Paper: C-6T

Topic: Group Theory-I, Marks - 10

Time: 45 min. Date: 13/12/2019

A. Answer the following questions (Any Five)

$$\boxed{2 \times 5 = 10}$$

- (a) Define cyclic group. Give an example of a cyclic group.
- (b) Prove that every cyclic group is Abelian.
- (c) Prove that intersection of two normal subgroups of a group is also a normal subgroup.
- (d) Find all subgroups of the group $(\mathbb{Z}, +)$.
- (e) Prove that all proper subgroups of order 8 are commutative.
- (f) Prove that every subgroup of Q_8 is normal.
- (g) Find all homomorphisms from the group $(\mathbb{Z}_6, +)$ to $(\mathbb{Z}_4, +)$.
- (h) Let $\phi: (G, \circ) \rightarrow (G', *)$ be a homomorphism. Prove that $\ker \phi$ is a normal subgroup of G .

SEVA BHARATI MAHAVIDYALAYA

Internal Assessment - 2020

Subject: Mathematics (Hons.) Paper: C-11T

Topic: Partial Diff. Equⁿ.

Marks: 10 Time: 45 min. Date: 20/11/20

A. Answer the following questions (Any Five)

$$\boxed{2 \times 5 = 10}$$

(1) Find order, degree and linearity of the P.D.E. $3px + 2y = z^m$

(2) Eliminate arbitrary constants a and b from $z = (x^m + a)(y^m + b)$

(3) Solve: $y^m(x-y)p + x^m(y-x)q = z(x^m + y^m)$

(4) Find the complete integral of $z = 3p^m$

(5) Classify the P.D.E. $2z_{xx} - 4z_{xy} + 2z_{yy} + 3z = 0$

(6) Reduce the P.D.E. $z_{xx} + x^m z_{yy} = 0$ to its canonical equⁿ. for $x \neq 0$

(7) Reduce the equⁿ. $z_{xx} - 4z_{xy} + 4z_{yy} + z = 0$ to its canonical form.

(8) Show that the P.D.E

$$(1+x^m)z_{xx} + (1+y^m)z_{yy} + 2yz_x + 2xz_y = 0$$

is elliptic type.

SEVA BHARATI MAHAVIDYALAYA

Internal Assessment - 2021

Dept. of Mathematics.

Subject: mathematics (Hons.) Paper: C-14T

Marks: 10 Time: 45 min. Date: 12/05/21

A. Answer the following questions (Any Five)

205 = 10

- (1) Give an example of a commutative ring with unity and contain no divisor of zero.
- (2) Prove that every field is an integral Domain.
- (3) Define Integral Domain. Give an example of a Integral Domain.
- (4) Examine if the ring of matrices $\left\{ \begin{pmatrix} a & b \\ 2b & a \end{pmatrix} : a, b \in \mathbb{R} \right\}$ contains divisors of zero.
- (5) Define characteristic of a ring. Find the characteristic of the ring $(\mathbb{Z}_n, +, \cdot)$
- (6) Prove that the characteristic of an integral domain is either zero or a prime number.
- (7) Prove that the ring of matrices $\left\{ \begin{pmatrix} a & b \\ 2b & a \end{pmatrix} : a, b \in \mathbb{Q} \right\}$ is a field.

SEVA BHARATI MAHAVIDYALAYA
Internal Assessment - 2022
Subject: Mathematics Paper: C-3T
Class: 2nd Sem. (Hons.)

Marks: 10 Time: 45 min. Date: 24/11/22

A. Answer any five Questions: $\boxed{2 \times 5 = 10}$

- (1) Prove that intersection of two closed sets of \mathbb{R} is a closed set in \mathbb{R} .
- (2) State Archimedean property of \mathbb{R} . Prove that $0 < \frac{1}{n} < 1 \quad \forall n \in \mathbb{N}$
- (3) Define null sequence. Give an example of a Null sequence.
- (4) Prove that every convergent sequence is bounded.
- (5) Prove that the sequence $\left\{ \left(1 + \frac{1}{n}\right)^n \right\}$ is bounded above.
- (6) State Bolzano-Weierstrass theorem on sequence.
- (7) Test the convergence of the series:

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{2^n} + \frac{1}{3^n} + \frac{1}{2^3} + \frac{1}{3^3} + \dots$$

(a) A