# RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY JAIS, AMETHI

( राजीव गांधी पेट्रोलियम प्रौद्योगिकी संस्थान, जायस, अमेठी )

(An Institute of National Importance established under the Act of Parliament)

(संसद के अधिनियम के अंतर्गत स्थापित राष्ट्रीय महत्व का संस्थान)

*A Programme*

# B.Tech. in Mathematics and Computing

*Offered by*

## Department of Mathematical Sciences

*From*

*Academic Session: 2021-22*

# Framework of the 4-Year B.Tech. Program in

## *Mathematics and Computing*

## Semester-wise Course Structure:

### Semester 1 (I Year: Odd Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Classical Physics (IS) | 3 | 1 | 0 | 11 |
| Inorganic & Physical Chemistry (IS) | 3 | 1 | 0 | 11 |
| Real Analysis & Calculus (IS) | 3 | 1 | 0 | 11 |
| Computer Programming (IE) | 3 | 1 | 2 | 13 |
| Biology (IS) | 2 | 1 | 0 | 8 |
| Chemistry Lab (IS) | 0 | 0 | 2/2 | 1 |
| Physics Lab (IS) | 0 | 0 | 2/2 | 1 |
| Engineering Graphics (EP) | 0 | 0 | 3 | 3 |
| **Total Credits** | | | | **59** |
| Basic English (HU)* | 1 | 2 | 0 | 7 |
| Universal Human Values (HU) | 1 | 1 | 0 | 5 |

*For students with less proficiency in English

### Semester 2 (I Year: Even Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Modern Physics (IS) | 2 | 1 | 0 | 8 |
| Differential Equations (IS) | 3 | 1 | 0 | 11 |
| Engineering Thermodynamics (IE) | 3 | 1 | 0 | 11 |
| Fundamentals of Electronics Engineering (IE) | 3 | 1 | 2 | 13 |
| Engg. Practices in Mathematics & Computing (EP) | 1 | 0 | 2 | 5 |
| Chemistry Lab (IS) | 0 | 0 | 2/2 | 1 |
| Physics Lab (IS) | 0 | 0 | 2/2 | 1 |
| Workshop Practices (EP) | 0 | 0 | 3 | 3 |
| **Total Credits** | | | | **53** |
| Community Internship (HU) | 0 | 0 | 5 | 5 |

## Semester 3 (II Year: Odd Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Linear Algebra & Complex Analysis (IS) | 2 | 1 | 0 | 8 |
| Discrete Mathematics (DC/CSE) | 3 | 0 | 0 | 9 |
| Data Structure & Algorithms (IE/CSE) | 3 | 0 | 2 | 11 |
| Graphics & Visual Computing (DC/CSE) | 2 | 0 | 2 | 8 |
| Programming with Python (DC/CSE) | 1 | 0 | 2 | 5 |
| Elementary Number Theory & Algebra (DC) | 3 | 1 | 0 | 11 |
| **Total Credits** | | | | **52** |

## Semester 4 (II Year: Even Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Database Management Systems (DC/CSE) | 3 | 0 | 2 | 11 |
| Computer Organization and Architecture (DC/CSE) | 3 | 0 | 0 | 9 |
| Numerical Methods (IS) | 2 | 1 | 0 | 8 |
| Statistical Methods and Data Analysis (IS) | 2 | 1 | 0 | 8 |
| Web Technology (IE/CSE) | 3 | 0 | 2 | 11 |
| Financial Engineering-I (DC) | 3 | 0 | 0 | 9 |
| **Total Credits** | | | | **56** |

## Semester 5 (III Year: Odd Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Operating Systems (DC/CSE) | 3 | 0 | 2 | 11 |
| Functional Analysis & Topology (DC) | 3 | 0 | 0 | 9 |
| Computational PDEs (DC) | 3 | 0 | 0 | 9 |
| DE-1 (DE) | 3 | 0 | 0 | 9 |
| Theory of Computation (DC/CSE) | 3 | 0 | 0 | 9 |
| B.Tech. Project-I (DP) | 0 | 0 | 10 | 10 |
| **Total Credits** | | | | **57** |
| Summer Internship/ Industrial Visit | 0 | 0 | 5 | 5 |

## Semester 6 (III Year: Even Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Design and Analysis of Algorithms (DC/CSE) | 3 | 0 | 2 | 11 |
| Computer Networks (DC/CSE) | 3 | 0 | 2 | 11 |
| Optimization Methods & Applications (DC) | 3 | 0 | 0 | 9 |
| Stochastic Processes (DC) | 3 | 0 | 0 | 9 |
| DE-2 (DE) | 3 | 0 | 0 | 9 |
| B.Tech. Project-II (DP) | 0 | 0 | 10 | 10 |
| **Total Credits** | | | | **59** |

## Semester 7 (IV Year: Odd Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Graph Theory (DC) | 3 | 0 | 0 | 9 |
| DE-3 (DE) | 3 | 0 | 0 | 9 |
| OE-1 (OE) | 3 | 0 | 0 | 9 |
| L/M-1 | 3 | 0 | 0 | 9 |
| HSS | 3 | 0 | 0 | 9 |
| B.Tech. Project-III (DP) | 0 | 0 | 10 | 10 |
| **Total Credits** | | | | **55** |

## Semester 8 (IV Year: Even Sem)

| Course/Subject | L | T | P | Cr |
|---|---|---|---|---|
| Soft Computing (DC/CSE) | 2 | 0 | 2 | 8 |
| Data Mining  (DC/CSE) | 2 | 0 | 2 | 8 |
| DE-4 (DE) | 3 | 0 | 0 | 9 |
| OE-2 (OE) | 3 | 0 | 0 | 9 |
| L/M-2 | 3 | 0 | 0 | 9 |
| **Total Credits** | | | | **43** |

## Streams in Mathematics and Computing:

|  | Mathematical Modeling & Simulation | Artificial Intelligence (CSE) | Financial Mathematics |
|---|---|---|---|
| DE-1 | Mathematical Modeling of Dynamical System | Artificial Intelligence | Mathematical Finance |
| DE-2 | Computational Fluid Dynamics | Deep Learning or Genetic Algorithm | Financial Engineering-II |
| DE-3 | Data Analytics | Data Analytics | Computational Finance |
| DE-4 | Reservoir Simulation | Computer Vision & Pattern Recognition | Financial Management |

## Open Electives:

A tentative list of Open Electives (OE) is given below. More elective courses will be included/updated in future.

1. Software Engineering. (CSE, Sem-V)
2. Compiler Design. (CSE, Sem-VI)
3. Mobile Computing (CSE, Sem-VII)
4. Digital Image Processing. (CSE, Sem-VIII)
5. Management Accounting. (MBA, Sem-I)
6. Managerial Economics. (MBA, Sem-I)
7. Business Analytics. (MBA, Sem-II)
8. Financial Derivatives. (MBA, DE)
9. Security Analysis & Portfolio Management. (MBA, DE)
10. Project Finance. (MBA, DE)
11. International Finance. (MBA, DE)
12. Management of Financial Services. (MBA, DE)
13. Financial Risk Management. (MBA, DE)
14. Corporate Finance. (MBA, DE)
15. Modern Coding Theory (EC, DE)
16. Modeling, Simulation and Optimization (CEBE, Sem-VIII)