**SCHEME OF INSTRUCTION**

NBKR INSTITUTE OF SCIENCE & TECHNOLOGY: VIDYANAGAR (AUTONOMOUS)

**ARTIFICIAL INTELLIGENCE & DATA SCIENCE – OVERALL SCHEME OF INSTRUCTION (**With effect from the academic year 2020-21) R20(a)

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| **S. No** | **I B.Tech** | **II B.Tech** | **III B.Tech** | **IV B.Tech** |
|  | **I Sem** | **L** | **T** | **P** | **C** | **I Sem** | **L** | **T** | **P** | **C** | **I Sem** | **L** | **T** | **P** | **C** | **I Sem** | **L** | **T** | **P** | **C** |
| 1 | HSMC -Communicative English 20SH1101 | 3 | 0 | 0 | 3 | BSC-Numerical Methods, Probability and Statistics 20SH2103 | 3 | 0 | 0 | 3 | PCC- Data Warehousing and Mining 20CS3101 | 3 | 0 | 0 | 3 | PEC- Professional Elective–III | 3 | 0 | 0 | 3 |
| 2 | BSC – Applied Physics 20SH1102 | 3 | 0 | 0 | 3 | BSC- Applied Linear Algebra20SH2104 | 2 | 0 | 0 | 2 | PCC – Formal Languages and Automata Theory 20CS3102 | 3 | 0 | 0 | 3 | PEC- Professional Elective–IV | 3 | 0 | 0 | 3 |
| 3 | BSC – EngineeringMathematics –I 20SH1105 | 3 | 0 | 0 | 3 | PCC- Discrete Mathematical Structures 20CS2101 | 3 | 0 | 0 | 3 | PCC- Artificial Intelligence 20AD3101 | 3 | 0 | 0 | 3 | PEC- Professional Elective–V  | 3 | 0 | 0 | 3 |
| 4 | ESC – Programming for Problem Solving \*\* 20CS1101 | 3 | 0 | 0 | 3 | PCC-Database Management Systems 20CS2102 | 3 | 0 | 0 | 3 | OEC- Open Elective – I  | 3 | 0 | 0 | 3 | JE-Job Oriented Elective - II | 3 | 0 | 0 | 3 |
| 5 | ESC –Basic ElectricalEngineering 20EE1102 | 3 | 0 | 0 | 3 | ESC-Digital Logic Design 20EC2107 | 3 | 0 | 0 | 3 | PEC- Professional Elective–I | 3 | 0 | 0 | 3 | HSMC -Elective | 3 | 0 | 0 | 3 |
| 6 | BSC –Applied Physics Lab 20SH11P2 | 0 | 0 | 3 | 1.5 | PCC- Computer Organization 20AD2101 | 3 | 0 | 0 | 3 | PCC - Data Warehousing and Mining Lab 20CS31P1 | 0 | 0 | 3 | 1.5 | MOOCs 20AD41MO | 0 | 0 | 0 | 3 |
| 7 | ESC – Programming forProblem Solving Lab 20CS11P1 | 0 | 0 | 3 | 1.5 | PCC-Database Management Systems Lab 20CS21P1 | 0 | 0 | 3 | 1.5 | PCC- Artificial Intelligence Lab 20AD31P1 | 0 | 0 | 3 | 1.5 | SC– Data Representation and Analysis using Python 20AD41SC | 1 | 0 | 2 | 2 |
| 8 | ESC - EngineeringWorkshop 20ME11P2 | 0 | 0 | 3 | 1.5 | ESC – Digital Logic Design Lab 20EC21P6 | 0 | 0 | 2 | 1 | SS – Communication and Soft Skills 20SH31SC | 1 | 0 | 2 | 2 | Industry/ Research Internship 20AD41IS | 0 | 0 | 0 | 3 |
|  9 |  | - | - | - | - | SC – Application Development using JAVA Lab 20CS21SC | 1 | 0 | 2 | 2 |  MC:: Entrepreneurship 20MC3101 | 2 | 0 | 0 | 0 |  | - | - | - | **-** |
| 10 |  | - | - | - | - | MC:: Environmental Science 20MC2101 | 2 | 0 | 0 | 0 |  Summer Internship 20AD31IS(Community Service Project) | 0 | 0 | 0 | 1.5 |  | - | - | - | - |
|  | TOTAL | 15 | - | 9 | **19.5** |  | 20 | 0 | 7 | **21.5** | TOTAL | 18 | 0 | 8 | **21.5** | TOTAL | 16 | 0 | 2 | **23** |
|  | **II Sem** | **L** | **T** | **P** | **C** | **II Sem** | **L** | **T** | **P** | **C** | **II Sem** | **L** | **T** | **P** | **C** | **II Sem** | **L** | **T** | **P** | **C** |
| 1. | BSC – EngineeringMathematics – II 20SH1204 | 3 | 0 | 0 | 3 | PCC- Design and Analysis of Algorithms 20CS2201 | 3 | 0 | 0 | 3 | PCC- Compiler Design 20CS3202 | 3 | 0 | 0 | 3 |  Project work with Internship 20AD42PR | 0 | 0 | 0 | 12 |
| 2. | BSC – Applied Chemistry 20SH1203 | 3 | 0 | 0 | 3 | PCC-Operating Systems 20CS2202 | 3 | 0 | 0 | 3 | PCC- Cryptography and Network Security 20IT3202 | 3 | 0 | 0 | 3 |  |  |  |  |  |
| 3. | ESC–Python Programming 20CS1201 | 3 | 0 | 0 | 3 | PCC - Software Engineering 20CS2203 | 3 | 0 | 0 | 3 | PCC-Data Science 20AD3202 | 3 | 0 | 0 | 3 |  |  |  |  |  |
| 4. | ESC–Data Structures20CS1202 | 3 | 0 | 0 | 3 | PCC- Computer Networks 20AD2201 | 3 | 0 | 0 | 3 | JE – Job Oriented Elective - I | 3 | 0 | 0 | 3 |  |  |  |  |  |
| 5. | ESC – Computer Aided Engineering Drawing Lab20ME12P1 | 0 | 0 | 6 | 3 | HSM- Managerial Economics and Financial Accounting20SH2201 | 3 | 0 | 0 | 3 | PEC- Professional Elective–II | 3 | 0 | 0 | 3 |  |  |  |  |  |
| 6. | BSC – English Language Lab20SH12P1 | 0 | 0 | 3 | 1.5 | PCC - Computer Networks Lab 20AD22P1 | 0 | 0 | 3 | 1.5 | PCC - Compiler Design Lab 20CS32P2 | 0 | 0 | 3 | 1.5 |  |  |  |  |  |
| 7. | BSC – Applied Chemistry Lab20SH12P4 | 0 | 0 | 3 | 1.5 | PCC-Operating Systems Lab 20CS22P2 | 0 | 0 | 3 | 1.5 | PCC- Cryptography and Network Security Lab 20IT32P2 | 0 | 0 | 3 | 1.5 |  |  |  |  |  |
| 8. | ESC – Data Structures Using Python Lab 20CS12P1 | 0 | 0 | 3 | 1.5 | PCC – Software Engineering Lab 20CS22P3 | 0 | 0 | 3 | 1.5 | PCC- Data Science Lab 20AD32P2 | 0 | 0 | 3 | 1.5 |  |  |  |  |  |
| 9. |  |  |  |  |  |  SC – Web Development Lab 20CS22SC | 1 | 0 | 2 | 2 | SC- Mobile App Development Lab 20IT32SC | 1 | 0 | 2 | 2 |  |  |  |  |  |
| 10. |  | - | - | - | - |  Universal Human Values20SH2203 | 3 | 0 | 0 | **3** | MC:: Advanced Aptitude and Reasoning Skills 20MC3202 | 2 | 0 | 0 | 0 |  |  |  |  |  |
|  | TOTAL | 12 | - | 15 | **19.5** | TOTAL | 19 | 0 | 11 | **24.5** | TOTAL | 18 | 0 | 11 | **21.5** | TOTAL | 0 | 0 | 0 | **12** |

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| **III - I** | **III - II** | **IV - I** | **IV - I** |
| ***PROFESSIONAL ELECTIVE – I***20CS31E1 - Object Oriented Analysis and Design20CS31E2 - Principles of Programming Languages20CS31E3 - Computer Graphics20IT3101 –Wireless and Ad Hoc Networks | ***PROFESSIONAL ELECTIVE – II***20IT32E1 - Software Project Management20IT32E2 - Software Architecture20IT32E3 - Social Information Networks20AD32E1 - Natural Language Processing | ***PROFESSIONAL ELECTIVE –III***20CS41E2 – Machine Learning Applications20IT41E1 – Internet of Things20AD41E1 - Big Data and Applications20AD41E3 - Neural Networks and Fuzzy Logic | ***PROFESSIONAL ELECTIVE – IV***20CS41E3 - Python Programming – II20AD41E4 - Deep Learning20AD41E5 - Nature Inspired Computing for Data Science20AD41E6 - Virtual Reality |
| **IV - I** | **III - II** | **IV - I** | **IV - I** |
| ***PROFESSIONAL ELECTIVE – V***20IT41E2 - Block Chain Technologies20AD41E7 - Game Programming20AD41E8 - Reinforcement Learning20AD41E9 - Knowledge Representation and Reasoning | ***JOB ORIENTED ELECTIVE- I*** 20IT32J1 - Cloud Computing20IT32J2 - Software Testing Tools | ***JOB ORIENTED ELECTIVE- II*** 20CS41J1 - Service Oriented Architecture20CS41J2 - Cyber Security | ***HSMC ELECTIVE***20SH41E1- Management Science20SH41E2 - Customer Relationship Management20SH41E3- Strategic Management20SH41E4 - Corporate Governance and Business Ethics |

**OPEN ELECTIVEs offered by CSE**

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| --- | --- | --- | --- |
| **III - I** | **III - II** | **IV - I** |  |
| ***OPEN ELECTIVE – I***20CS31O1 - Fundamentals of Data Structures20CS31O2 – Database Management Systems20CS31O3 - Computer Networks20CS31O4 - Object Oriented Programming Through Java | ***OPEN ELECTIVE – II***20CS32O1 - Software Engineering20CS32O2 - Operating Systems20CS32O3 - Fundamentals of Algorithms20CS32O4 - Artificial Intelligence  | ***OPEN ELECTIVE –III***20CS41O1 - R Programming20CS41E3 - Python Programming – II20CS41O2 - Machine Learning 20CS41O3 - Foundations of Data Science |  |

**OPEN ELECTIVEs offered by other Departments**

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| **ECE** | **EEE** | **CE** |
| 20EC31O1 - Digital IC Applications 20EC31O2 - Digital Signal Processing20EC31O3 - Optoelectronics20EC31O4 - Embedded Systems20EC32O1 - Electronic Measurement and Techniques20EC32O2 - Microprocessors and Micro Controllers20EC32O3 - VLSI Design20EC32O4 - Cellular Mobile Communication20EC41O1 - Digital Image Processing20EC41O2 - DSP Processors & Architecture20EC41O3 - Neural Networks & Fuzzy Logic20EC41O4 - Telecommunication & Switching Networks | 20EE31O1 - Linear control systems20EE31O2 - Renewable Energy Sources20EE31O3 - MATLAB and its Applications in Engineering20EE32O1 - Energy Conversion Techniques20EE32O2 - Industrial Electrical Systems20EE32O3 - Basics of Power Systems20EE41O1 - Basics of Electrical Vehicle20EE41O2 - Reliability Engineering | 20CEXXO1 - Remote Sensing20CEXXO2 - Building Technology20CEXXO3 - Environmental Impact and Management20CEXXO4 - Disaster Management20CE31O5 - Basics of Transportation Engineering20CEXXO6 - Water Resources Management20CEXXO7 - Cost Effective Housing Techniques20CEXXO8 - Environmental Pollution and Control |
| **IT** |  |  |
| 20IT32O1 – Object Oriented Programmingthrough JAVA |  |  |