TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY

Approved by AICTE & Affiliated to Rajasthan Technical University

www. technonjr.org

NJR Knowledge Campus, Plot-SPL-T, Bhamashah (RIICO) Industrial Area, Kaladwas, Udaipur - 313003 (Raj.)
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Metric ID: 1.2.2	**Number of Add on /Certificate programs offered during the last five years** 1.2.2.1. **How many Add on /Certificate programs are offered within the last 5 years.**
Findings of DVV	a. data in Data Template as per SOP b. Count in SSR does not include online courses of 421 shown the institutional data. Please clarify the correct count and provide tabulation in Data template. c. Please provide the scanned image of the list of add on courses offered along with the actual dates of conduct of the courses along with the names of students participating the same, in the College letterhead certified the Principal

Response:

(a) **Data has been updated in the data template and submitted on NAAC DVV portal.**

(b) **Online courses have been added and updated data of Add on /Certificates program as follows:**

2019-20	2018-19	2017-18	2016-17	2015-16
475	34	45	39	26

(c) **College letterhead certified by the principle for students list attached.**

पंकज पोरवाल

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TO WHOM IT MAY CONCERN

I hereby confirmed that total Add on/Certificate programs are offered in the institute with in the last 5 years as follows.

Session	No of Training	Students involved in the training	Students Name and Duration of the courses
2015-16	26	821	http://iqac.technonjr.org/dvv/1.2.2/2015-16.pdf
2016-17	39	933	http://iqac.technonjr.org/dvv/1.2.2/2016-17.pdf
2017-18	45	905	http://iqac.technonjr.org/dvv/1.2.2/2017-18.pdf
2018-19	34	698	http://iqac.technonjr.org/dvv/1.2.2/2018-19.pdf
2019-20	475	3685	http://iqac.technonjr.org/dvv/1.2.2/2019-20.pdf

Student's list and duration of the courses are available on the website and the links are mentioned in the above table.

In the 2019-20 during the lockdown period, students have completed online courses on Coursera. Total 442 unique courses had been done by 2791 students. The Coursera certificates consolidated sheet is available on website and the link of it is http://iqac.technonjr.org/dvv/1.2.2/Coursera.xlsx .

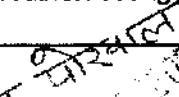पंकज पोरवाल

Pankaj Kumar Porwal

Principal

1.2.2 Number of Add on /Certificate programs offered during the last five years (10)

1.2.3 Average percentage of students enrolled in Add-on/Certificate programs as against the total number of students during the last five years (10)

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: MECHANICAL DEPARTMENT (2015-16)

Name of Add on /Certificate programs offered	Add on Training/ Certificate	No. of times	Duration of course	Number of students enrolled	Number	Course Outcome
Automation Technologies- Basic Level	External	1	2 Weeks (40 Hrs)	15	15	Manufacturing excellence through relevant automation • Controller programming and use of actuators in automation and selection criteris •Industrial control system, PLC Programming, use of function blocks, Multi tasking • Human-mechanic-interface design
Automation Technologies- Intermediate Level	External	1	4 Weeks (80 Hrs)	14	14	Described the working of various blocks of basic industrial automation system • Connects the peripherals with the PLC • Use various PLC functions and develop small application programs using sensors and actuators. • Summarize Electro Hydraulic and Electro Pneumatic systems • Use various industrial sensors for the Industrial Automation
Certification in Basic Industrial Robotics Training (CBIRT)	External	1	2 Weeks (30 Hrs)	16	16	Covered the most common applications of industrial robots. • The importance of maintenance, as well as the various approaches and methods used by maintenance workers today to keep industrial robots performing optimally.
Advanced Diploma in Industrial Robotics Training (ADIRT)	External	1	40 Days (240Hrs)	16	16	Covered different methods of protecting workers from industrial robot accidents.• Covered the functions and characteristics of the different components of an industrial robot. • Covered the function of structured programming, their methodology & conceptualization. • Covered the fundamental concepts of Variables, subprograms, function, Data list & Data manipulation in the depth of robotic programming • Described the various types of end effectors and their uses. It also explains the issue of compliance and describes how to maintain end effectors.
KUKA- Basic Robot Programming(AKGEC)	External	1	2 Weeks (40 Hrs)	10	10	Covered the classifications, characteristics, and functions of industrial robots as well as basic safety precautions for working with robots. • Covered the fundamental concepts required for programming of industrial robots • Described the various types of end effectors and their uses. It also explains the issue of compliance and describes how to maintain end effectors. • Described the most common robot axes. Explained how to understand these axes, and how they are used to control robot movement. • Introduced to the troubleshooting process and gone through to identify problems and their causes.

1.2.2 Number of Add on /Certificate programs offered during the last five years (10)

1.2.3 Average percentage of students enrolled in Add-on/Certificate programs as against the total number of students during the last five years (10)

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: MECHANICAL DEPARTMENT (2016-17)

Name of Add on /Certificate programs offered	Add on Training/ Certificate	No. of tim es	Durati on of course	Nu mb er of	Nu mb er of	Course Outcome
KUKA- Basic Robot Programming	External	1	2 Weeks (40 Hrs)	5	5	Covered the classifications, characteristics, and functions of industrial robots as well as basic safety precautions for working with robots. • Covered the fundamental concepts required for programming of industrial robots • Described the various types of end effectors and their uses. It also explains the issue of compliance and describes how to maintain end effectors. • Described the most common robot axes. Explained how to understand these axes, and how they are used to control robot movement. • Introduced to the troubleshooting process and gone through to identify problems and their
Automation Technologies- Basic Level	External	1	2 Weeks (40 Hrs)	11	11	Manufacturing excellence through relevant automation • Controller programming and use of actuators in automation and selection criteris •Industrial control system, PLC Programming, use of function blocks, Multi tasking • Human-mechanic-interface design
Automation Technologies- Intermediate Level	External	1	4 Weeks (80 Hrs)	11	11	Described the working of various blocks of basic industrial automation system • Connects the peripherals with the PLC • Use various PLC functions and develop small application programs using sensors and actuators. • Summarize Electro Hydraulic and Electro Pneumatic systems • Use various industrial sensors for the Industrial Automation
Automation Technologies- Basic Level	External	1	2 Weeks (40 Hrs)	16	16	Manufacturing excellence through relevant automation • Controller programming and use of actuators in automation and selection criteris •Industrial control system, PLC Programming, use of function blocks, Multi tasking • Human-mechanic-interface design

1.2.2 Number of Add on /Certificate programs offered during the last five years (10)

1.2.3 Average percentage of students enrolled in Add-on/Certificate programs as against the total number of students during the last five years (10)

RT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: MECHANICAL DEPARTMENT (201

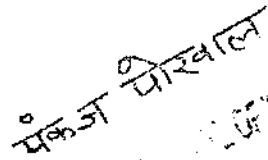| Name of Add on /Certificate programs offered	Add on Training /	No. of times offered	Duration of course	Number of student	Number of Stude	Course Outcome
Basic Automation Training(PLC & SCADA)	External	1	30 days	16	16	Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition •Variable Frequency Drive (VFD) • Human Machine Interface (HMI) • Industrial Control Panel (Designing & Maintenance)
Robotics & Industrial Automation(KUKA-CIT)	External	1	2 Weeks	22	22	Covered the classifications, characteristics, and functions of industrial robots as well as basic safety precautions for working with robots. • Covered the fundamental concepts required for programming of industrial robots • Described the various types of end effectors and their uses. It also explains the issue of compliance and describes how to maintain end effectors. • Described the most common robot axes. Explained how to understand these axes, and how they are used to control robot movement. •
Control & Automation (AGIIT)	External	1	30 days	22	22	Covered the most common applications of industrial robots. • The importance of maintenance, as well as the various approaches and methods used by maintenance workers today to keep industrial robots performing optimally.

Advanced Diploma in Industrial Robotics (AGIIT)	External	1	30 days	22	22	Covered different methods of protecting workers from industrial robot accidents. • Covered the functions and characteristics of the different components of an industrial robot. • Covered the function of structured programming, their methodology & conceptualization. • Covered the fundamental concepts of Variables, subprograms, function, Data list & Data manipulation in the
Vehicle Design & Development (Specialized)	External	1	15 Days	25	25	Rollcage/Chassis Design-CAD & PVC model Generation • Suspension & Steering design & Analysis •Braking and subassembly, Engine and transmission, electrical system,
Industrial Training Program(AKGEC)	External	1	6 Weeks	3	3	Manufacturing excellence through relevant automation • Controller programming and use of actuators in automation and selection criteris •Industrial control system, PLC Programming, use of function blocks, Multi tasking • Human-mechanic-interface design

1.2.2 Number of Add on /Certificate programs offered during the last five years (10)

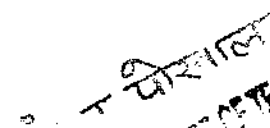**REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: MECHANICAL DEPARTMENT (2018-19)**

Name of Add on /Certificate programs offered	Add on Traini ng/	No. of times offere d	Duratio n of course	Num ber of stude	Numb er of Stude nts	Course Outcome
Robotics & Industrial Automation (KUKA-CIT)	Extern al	1	2 Weeks	16	16	Covered the classifications, characteristics, and functions of industrial robots as well as basic safety precautions for working with robots. • Covered the fundamental concepts required for programming of industrial robots • Described the various types of end effectors and their uses. It also explains the issue of compliance and describes how to maintain end effectors. • Described the most common robot axes. Explained how to understand these axes, and how they are used to control robot movement. • Introduced to the troubleshooting process and gone through to identify problems and their causes.
Power Plant Engineering	Extern al	2	30 Days	(9+9)	18	Understanding of Basic power plant engineering, Working of Rankine cycle in actual power plant . • Types of boiler, accessories and mounting • Coal & Ash handling power plant • Water treatment plant, water to steam path, Auxiliary cooling Water pump system • Mechanical interlock and protection of power plant • Boiler startup (permissive and protection) • Turbine startup (permissive and protection) • Process & instrumentation diagram, Heat mass balance diagram, Turbine Lube Oil System, Key performance & index • Safety and Environment
Industrial Training Program(AKGEC)	Extern al	1	6 Weeks	4	4	Industrial Hydraulics, Pneumatics. • PLCs • Interfacing of pneumatics with PLC • Introduction to SCADA system (win studio) • Hands on with Sensors, Hydraulic System, Pneumatic System, PLC, HMI, SCADA. Etc.

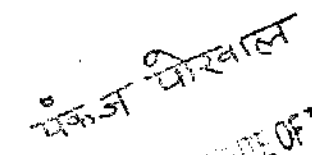| Thermax Limited | External | 2 | 30 Days | 3 | 3 | Understanding of Basic power plant engineering, Working of Rankine cycle in actual power plant . • Types of boiler, accessories and mounting • Coal & Ash handling power plant • Water treatment plant, water to steam path, Auxiliary cooling Water pump system • Mechanical interlock and protection of power plant • Boiler startup (permissive and protection) • Turbine startup (permissive and protection) • Process & instrumentation diagram, Heat mass balance diagram, Turbine Lube Oil System, Key performance & index • Safety and Environment |

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: MECHANICAL DEPARTMENT (2019-20)

Name of Add on /Certificate programs offered	Add on Training/ Certificate	No. of times offered	Duration of course	Number of student	Number of Students completing the course in the year	Course Outcome
Basic Automation Training (PLC & SCADA)	External	2	30 days	10+5	15	Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition •Variable Frequency Drive (VFD) • Human Machine Interface (HMI) • Industrial Control Panel (Designing & Maintenance)

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRICAL DEPARTMENT (2015-16)

Name of Add on /Certificate programs offered	External/ In-House	No. of times offered during the year	Number (students enrolled)	Number of Students (completed)	Course Outcome
Eduvance Training	External Training	1	13	13	•Able to develope IoT based project. • Able to design Embedded systems
Power Converter Design, MATL	In-house training	1	41	41	•Able to develope power converter project. •Able to Simulate power converter circuits.
PLC/SCADA	In-house training	1	40	40	•Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition • Industrial Control Panel (Designing & Maintenance)
Power System Design	In-house training	1	49	49	•Able to design Power System basic transmission line Simulations •Power System protection simulations
Panel Designing and wiring	In-house training	1	38	38	• Able to develop basic electrical drawing •Able to design basic electrical panel wiring

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRICAL DEPARTMENT (2016-17)

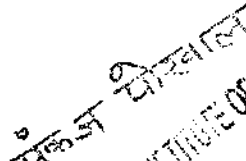| Name of Add on /Certificate programs offered	External/ In-House	No. of times offered during the year	Number (students enrolled)	Number of Students (completed)	Course Outcome
Cranes Software International Limited, Bangalore Training on Prog In C & DS / Linux System Prg.	External Training	1	2	2	• Able to develop codes for embedded systems • Able to develop IDE for Embedded systems
Cranes Software International Limited, Bangalore Training on Matlab & Embedded	External Training	1	2	2	• Able to design Embedded systems • Able to basic codes for MATLAB
RRVNL	External Training	1	49	10	• Able to understand all types of electrical grid •Able to understand basic working of elertrical grid system and transmission parameter
Power Converter Design, MATLAB	In-house training	1	25	25	•Able to develope power converter project. •Able to Simulate power converter circuits.
PLC/SCADA	In-house training	1	41	41	•Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition • Industrial Control Panel (Designing & Maintenance)
Power System Design	In-house training	1	40	40	•Able to design Power System basic transmission line Simulations •Power System protection simulations
Control System Design	In-house training	1	49	49	• Able to develop basic electrical drawing •Able to design basic electrical panel wiring

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRICAL DEPARTMENT (2017-18)

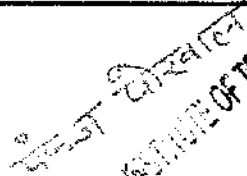| Name of Add on /Certificate programs offered	External/ In-House	No. of times offered	Number (students	Number of Students	Course Outcome
Bharat Sanchar Nigam Limited	External Training	1	4	4	• Provide understanding of operation of industrial systems • To provide opportunity for interaction with industry experts for practical knowledge
CSIR - Central Electronics Engineering Research Institute	External Training	1	1	1	•Able to develope IoT based project. • Able to design Embedded systems
KTPS- Kota Super Thermal Power Station	External Training	1	2	2	•Able to describe the power generation process and Transmission systems • Industrial exposure from industrial experts
Cranes Software International Limited, Bangalore Training on Matlab & Embedded	Cranes Varsity	1	1	1	• Able to design Embedded systems • Able to basic codes for MATLAB
Kalisindh Thermal Power Project	External Training	1	3	3	•Able to describe the power generation process and Transmission systems • Industrial exposure from industrial experts
MERC: Basic Automation Training	External Training	1	3	3	Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition •Variable Frequency Drive (VFD) • Human Machine Interface (HMI) • Industrial Control Panel (Designing & Maintenance)
Pyrotech Electronics Private Limited	External Training	1	2	2	•Able to describe the production of various sensors and electrocnics circuits. • Industrial exposure from industrial experts
Tempsens Instruments India Private Limited	External Training	1	2	2	•Able to describe the production of various sensors and electrocnics circuits. • Industrial exposure from industrial experts
Power Converter Design, MATLAB	In-house training	1	14	14	•Able to develope power converter project. •Able to Simulate power converter circuits.

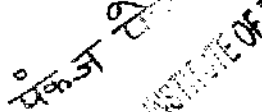|					
PLC/SCADA	In-house training	1	25	25	•Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition • Industrial Control Panel (Designing & Maintenance)
Power System Design	In-house training	1	41	41	•Able to design Power System basic transmission line Simulations •Power System protection simulations
Protection of Power System Simulation using PSCAD	In-house training	1	40	40	• Able to develop basic electrical drawing •Able to design basic electrical panel wiring

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRICAL DEPARTMENT (2018-19)

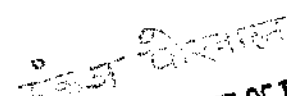| Name of Add on /Certificate programs offered	External/ In-House	No. of times offered	Number (students enrolled)	Number of Students (completed)	Course Outcome
Cranes Software International Limited, Bangalore Training on Prog In C & DS / Linux System Prg.	Cranes Varsity	1	3	3	• Able to develop codes for embedded systems • Able to develop IDE for Embedded systems
Thermax Limited	External Training	2	3	3	Understanding of Basic power plant engineering, Working of Rankine cycle in actual power plant . • Types of boiler, accessories and mounting • Coal & Ash handling power plant • Water treatment plant, water to steam path, Auxiliary cooling Water pump system • Electrical calculations of generations • Turbine startup (permissive and protection) • Process & instrumentation diagram, Heat mass balance diagram, Turbine Lube Oil System, Key performance & index • Safety and Environment
Power Converter Design, MATLAB	In-house training	1	7	7	•Able to develope power converter project. •Able to Simulate power converter circuits.
PLC/SCADA	In-house training	1	14	14	•Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition • Industrial Control Panel (Designing & Maintenance)
Power System Design	In-house training	1	25	25	•Able to design Power System basic transmission line Simulations •Power System protection simulations
Power System design PSCAD Simulation	In-house training	1	41	41	• Able to develop basic electrical drawing •Able to design basic electrical panel wiring

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRICAL DEPARTMENT (2019-20)

Name of Add on /Certificate programs offered	External/ In-House	No. of times	Number (students enrolled)	Number of Students (completed)	Course Outcome
MERC: Basic Automation Training	External Training	1	7	7	Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition •Variable Frequency Drive (VFD) • Human Machine Interface (HMI) • Industrial Control Panel (Designing & Maintenance)
MERC: Basic Automation Training	External Training	1	2	2	Programmable Logic Controller (PLC)• Supervisory Control & Data Acquisition •Variable Frequency Drive (VFD) • Human Machine Interface (HMI) • Industrial Control Panel (Designing & Maintenance).
GRRAS Solutions, Linux Training	External Training	1	7	7	• Able to develop codes for embedded systems • Able to develop IDE for Embedded systems
GRRAS Solutions, Linux Training	External Training	1	4	4	• Able to develop codes for embedded systems • Able to develop IDE for Embedded systems

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRONICS AND COMMUNICATION DEPARTMENT (2016-17)					
Name of Add on	External/ In-	No. of times	Number	Number of	Course Outcome
Eduvance Training	External	1	16	16	CO1. Students will be able to use the ARM Cortex Mo based microcontroller boards.
					CO2. Students will be able to use various interface such as SPI, UART.
					CO3. Students will be able to interface various sensors to develop the IOT systems
Cranes Varsity Embedded System Training	External	1	14	14	CO1. Students will be able to use the ARM based microcontroller boards.
					CO2. Students will be able to use various interface such as SPI, UART, I2C & CAN protocols
					CO3. Students will be able to interface various sensors to develop the embedded systems

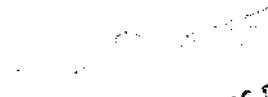| REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRONICS AND COMMUNICATION DEPARTMENT (2017-18)					
Name of Add on	External/ In-	No. of times	Number	Number of	Course Outcome
Cranes Varsity Embedded System Training	External	1	14	14	CO1. Students will be able to write C code for embedded systems
					CO2. Students will be able to use MATLAB forGUI application development.
Cranes Varsity Embedded System Training	External	1	6	6	CO1. Students will be able to use the ARM based microcontroller boards.
					CO2. Students will be able to use various interface such as SPI, UART, I2C & CAN protocols
					CO3. Students will be able to interface various sensors to develop the embedded systems

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRONICS AND COMMUNICATION DEPARTMENT (2018-19)

Name of Add on	External/ In-	No. of times	Number	Number of	Course Outcome
CEERI Pilani SDP on IoT	External	1	3+5	8	CO1. Students will be able to use the MSP430 based microcontroller boards.
					CO2. Students will be able to use various interface such as SPI, UART.
					CO3. Students will be able to interface various sensors to develop the IOT systems
					CO4. Studetns will be able to use various IoT light weight OS and communication protocols.
Cambridge Bussiness English	External	1	16	16	Co1. Students will learn to use bussines communication etiquettes.
					CO2. Students will be able to present or express themselves in corporate world.
Industrial Training in VLSI Design and Verification by DKOP Labs Pvt. Ltd.	External	1	8	8	CO1. Students will be able to use the FPGA boards.
					CO2. Students will be able to use System verilog for VLSI cicuit design
					CO3. Students will be able to use System verilog for VLSI cicuit ASIC verification

REPORT ON ADD ON / CERTIFICATE PROGRAMS OTHER THAN ONLINE COURSES: ELECTRONICS AND COMMUNICATION DEPARTMENT (2019-20)					
Name of Add on /Certificate programs offered	External/ In-House	No. of times offered during the year	Number (students enrolled)	Number of Students (completed)	Course Outcome
MERC PLC Scada training	External	1	16	16	CO1. Programmable Logic Controller (PLC). CO2. Supervisory Control & Data Acquisition CO3.Industrial Control Panel (Designing & Maintenance)
GRRAS Solutions, LINUX Training	External	1	6+7+20	33	CO1. Students Will be able to configure, install, upgrade and maintain the Linux systems.
					CO2. Students will be able to manage system monitoring for performance andf optimization.
CRANES Varsity IT Readyness Module	External	1	23	23	CO1. student will be able to use C & C++ language to develop software applications.
					CO2. Studetns will be able to choose efficient data structures to solve the problem.
					CO3.Studetns will be able to optimize the code space and time complexity.

Report on Add-on Trainings/Certificate Program
2015-16

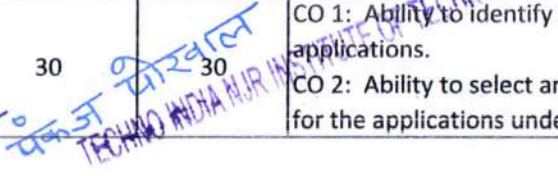| Sr.No.	Training Name	No of Students Enrolled	No of Students Completed	Course Objective
1	QA/VA Session	86	86	CO 1: To enhance the apptitude and problem solving skills of students CO 2: Students will be able to solve the logical, reasoning and apptitude in the competition exams.
2	web programming	50	50	CO 1: To learn HTML tags and JavaScript Language programming concepts and techniques. CO 2: To develop the ability to logically plan and develop web pages. CO 3: To learn to write, test, and debug web pages using HTML and JavaScript.
3	Php	48	48	CO 1: Students will be able to write PHP scripts to handle HTML forms. CO 2: Students will be able to write regular expressions including modifiers, operators, and metacharacters. CO 3: Students will be able to create PHP programs that use various PHP library functions, and that manipulate files and directories.

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TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY

(Gaurav Kumar)

Report on Add-on Trainings/Certificate Program
2016-17

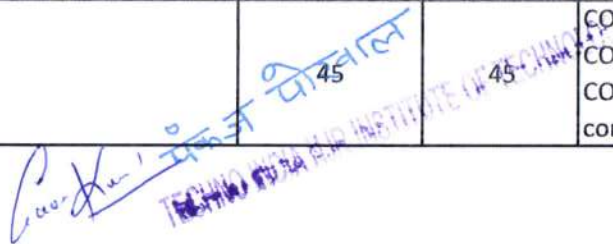| Sr.No.	Training Name	No of Students Enrolled	No of Students Completed	Course Objective
1	C/DSA	39	39	CO 1: Students will be able to choose efficient data structures and apply them to solve problems. CO 2: Students will be able to analyze the efficiency of programs based on time complexity. CO 3: Students will be able to prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.
2	C/DSA	43	43	CO 1: Students will be able to choose efficient data structures and apply them to solve problems. CO 2: Students will be able to analyze the efficiency of programs based on time complexity. CO 3: Students will be able to prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.
3	C/DSA	27	27	CO 1: Students will be able to choose efficient data structures and apply them to solve problems. CO 2: Students will be able to analyze the efficiency of programs based on time complexity. CO 3: Students will be able to prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.
4	Python	50	50	CO 1: Write, Test and Debug Python Programs. CO 2: Implement Conditionals and Loops for Python Programs. CO 3: Use functions and represent Compound data using Lists, Tuples and Dictionaries
5	Adv Java	40	40	CO 1: Student will be able to use advanced technology in Java such as Internationalization, and Remote method Invocation CO 2: Student will learn how to work with JavaBeans.
6	web programming	38	38	CO 1: To learn HTML tags and JavaScript Language programming concepts and techniques. CO 2: To develop the ability to logically plan and develop web pages. CO 3: To learn to write, test, and debug web pages using HTML and JavaScript.
7	Android Programming	40	40	CO 1: student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more. CO 2: Understand the Android platform's organization, patterns and programming mechanisms and be able to use them effectively to develop their own Android applications.
8	QA/VA Session	75	75	CO 1: To enhance the apptitude and problem solving skills of students CO 2: Students will be able to solve the logical, reasoning and apptitude in the competition exams.
9	Php	55	55	CO 1: Students will be able to write PHP scripts to handle HTML forms. CO 2: Students will be able to write regular expressions including modifiers, operators, and metacharacters. CO 3: Students will be able to create PHP programs that use various PHP library functions, and that manipulate files and directories.
10	Data Analysis using R Programn	30	30	CO 1: Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. CO 2: Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

Report on Add-on Trainings/Certificate Program
2017-18

Sr.No.	Training Name	No of Students Enrolled	No of Students Completed	Course Objective
1	BA (2015-19 Batch) along with IBM group	20	18	CO 1: Understand the concept of apply the knowledge for analyzing the business data. CO 2: Students will be provided industry oriented course for better alignment with industry needs
2	Data Science (Statistics)	63	63	CO 1: Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. CO 2: Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
3	Python	70	70	CO 1: Write, Test and Debug Python Programs. CO 2: Implement Conditionals and Loops for Python Programs. CO 3: Use functions and represent Compound data using Lists, Tuples and Dictionaries
4	Java & Adv Java	45	45	CO 1: Student will be able to use advanced technology in Java such as Internationalization, and Remote method Invocation CO 2: Student will learn how to work with JavaBeans.
5	web programming	40	40	CO 1: To learn HTML tags and JavaScript Language programming concepts and techniques. CO 2: To develop the ability to logically plan and develop web pages. CO 3: To learn to write, test, and debug web pages using HTML and JavaScript.
6	Android Programming	62	62	CO 1: student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more. CO 2: Understand the Android platform's organization, patterns and programming mechanisms and be able to use them effectively to develop their own Android applications.
7	QA/VA Session	77	77	CO 1: To enhance the apptitude and problem solving skills of students CO 2: Students will be able to solve the logical, reasoning and apptitude in the competition exams.
8	Php	60	60	CO 1: Students will be able to write PHP scripts to handle HTML forms. CO 2: Students will be able to write regular expressions including modifiers, operators, and metacharacters. CO 3: Students will be able to create PHP programs that use various PHP library functions, and that manipulate files and directories.
9	Basic Iot training on ARM mbed	40	40	CO 1: students will be able design some IOT based prototypes CO 2: Understanding of working of sensors & actuators depending on use cases
10	C/DSA	50	50	CO 1: Students will be able to choose efficient data structures and apply them to solve problems. CO 2: Students will be able to analyze the efficiency of programs based on time complexity. CO 3: Students will be able to prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.

Report on Add-on Trainings/Certificate Program
2018-19

Sr.No.	Training Name	No of Students Enrolled	No of Students Completed	Course Objective
1	SCOE Training	17	15	CO 1: Understand the concept of apply the knowledge for analyzing the business data. CO 2: Students will be provided industry oriented course for better alignment with industry needs
2	IBM-BA (2016-20 Batch)	6	6	CO 1: Understand the concept of apply the knowledge for analyzing the business data. CO 2: Students will be provided industry oriented course for better alignment with industry needs
3	IBM-BA (2015-19 Batch)	18	18	CO 1: Understand the concept of apply the knowledge for analyzing the business data. CO 2: Students will be provided industry oriented course for better alignment with industry needs
4	Php	65	65	CO 1: Students will be able to write PHP scripts to handle HTML forms. CO 2: Students will be able to write regular expressions including modifiers, operators, and metacharacters. CO 3: Students will be able to create PHP programs that use various PHP library functions, and that manipulate files and directories.
5	Android Programming	41	41	CO 1: student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more. CO 2: Understand the Android platform's organization, patterns and programming mechanisms and be able to use them effectively to develop their own Android applications.
6	Adv Java	45	45	CO 1: Student will be able to use advanced technology in Java such as Internationalization, and Remote method Invocation CO 2: Student will learn how to work with JavaBeans.
7	QA/VA Session	89	89	CO 1: To enhance the apptitude and problem solving skills of students CO 2: Students will be able to solve the logical, reasoning and apptitude in the competition exams.
8	Full stack	39	39	CO 1: Students will be able to develop a complete web application from the scratch that includes Front-end, Backend and Data-exchange technologies. CO 2: Build strong foundations (ex: OOPS) in entry level engineers thereby making them job ready as per industry requirements.
9	NVIDIA DLI Certification	40	40	CO 1: Learn the fundamental techniques and tools required to train a deep learning model CO 2: Gain experience with common deep learning data types and model architectures CO 3: Enhance datasets through data augmentation to improve model accuracy
10	Oracle SQL	45	45	CO 1: Understand basic concepts of how a database stores information via tables CO 2: Understanding of SQL syntax used with Oracle SQL
11	C/DSA	45	45	CO 1: Students will be able to choose efficient data structures and apply them to solve problems. CO 2: Students will be able to analyze the efficiency of programs based on time complexity. CO 3: Students will be able to prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.

Report on Add-on Trainings/Certificate Program
2019-20

Sr.No.	Training Name	No of Students Enrolled	No of Students Completed	Course Objective
1	DA & ML Training (2nd Year)	53	53	CO 1: Understand machine learning concepts and range of problems that can be handled by machine learning. CO 2: Students will be able to apply the machine learning concepts in real life problems.
2	DA Training (1st Year)	32	32	CO 1: Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. CO 2: Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
3	IBM-BA (2016-20 Batch)	6	6	CO 1: Understand the concept of apply the knowledge for analyzing the business data. CO 2: Students will be provided industry oriented course for better alignment with industry needs
4	Red hat	29	29	CO 1: Students will be able to Configuring, installing, upgrading, and maintaining Linux systems using established standards and procedures Providing operational support CO 2: Students will be able to managing systems for monitoring system performance and availability
5	Data Science	62	62	CO 1: Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. CO 2: Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
6	Full Stack	32	32	CO 1: Students will be able to develop a complete web application from the scratch that includes Front-end, Backend and Data-exchange technologies. CO 2: Build strong foundations (ex: OOPS) in entry level engineers thereby making them job ready as per industry requirements.
7	NVIDIA DLI Certification	25	25	CO 1: Learn the fundamental techniques and tools required to train a deep learning model CO 2: Gain experience with common deep learning data types and model architectures CO 3: Enhance datasets through data augmentation to improve model accuracy
8	Mysql	70	70	CO 1: Understand basic concepts of how a database stores information via tables CO 2: Understanding of SQL syntax used with MySQL
9	Java	70	70	CO 1: knowledge of the structure and model of the Java programming language. CO 2: Use the Java programming language for various programming technologies.
10	Adv. Java	70	70	CO 1: Student will be able to use advanced technology in Java such as Internationalization, and Remote method Invocation CO 2: Student will learn how to work with JavaBeans.
11	Sales force	30	30	CO 1: Students will be able to create the application on salesforce CRM. CO 2: Students will be able to administration work on salesforce CRM.

Report on Add on / Certificate Programs Other than online courses: Civil Engineering Department

2015-16

Name of the Program	List of Students enrolled	Duration	Assessment Procedures	Summary Report of each Program with their outcome
Staad Pro Training	Batch 2012-16	10 days	On the basis of error free files through software	Students learned about commands and design concepts of staad pro and able to do run analysis and design result of RCC structures
Winter Survey Camp (Triangulation, Contouring, Profile & Cross-sectional Leveling Estimation & Valuation, Total Station, Column Layout, Plane Table Survey)	Batch 2012-16	10 Days	Report writing and viva with presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques. Hands on practice on auto level, theodolite, total station.
Site Visit at Chirva Tunnel	Batch 2013-17 (7th Sem)	1 Day	Viva	Students Learned the structure of the tunnel and retaining structure around the tunnel

Report on Add on / Certificate Programs Other than online courses: Civil Engineering Department

2016-17

Name of the Program	List of Students enrolled	Duration	Assessment Procedures	Summary Report of each Program with their outcome
Winter Survey Camp (Triangulation, Contouring, Profile & Cross-sectional Leveling Estimation & Valuation, Total Station, Column Layout, Plane Table Survey)	Batch 2014 (5th Sem)	30 Days	Report writing and viva with presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques. Hands on practice on auto level, theodolite, total station.
Site Visit at Mahi Dam: Importance of Reservoirs, Capacity, History, Control Unit, Functioning and operation under high rains etc.	Batch 2013-17 (7th Sem)	1 Day	Viva	Students Learned the working of Mahi Dam and the characteristics of Dam like catchment area, Volume of water flow etc.
MNIT Visit : Campus visit, Area of land, new block construction, Number of labs and instruments for NDT testing, etc.	Batch 2014-18 (5th sem)	1 days	Viva	Students Learned the structural & architectural concepts of MNIT Campus
Mount Abu: Educational tour, History of the place, etc.	Batch 2014-18 (4th sem)	03 Days	Viva	Students explored the city of Mount Abu
Auto Desk Certification Training	Batch 2014-2018 Batch 2015-2019	5 Days	Certificate provided by Autodesk after exam	Concepts of planning of building through auto cad, basic commands, learning of 2d and 3d views in autocad

Report on Add on / Certificate Programs Other than online courses: Civil Engineering Department

2017-18

Name of the Program	Name of the students enrolled	Duration	Assessment Procedures	Summary Report of each Program with their outcome
Winter Survey Camp (Concrete Mix, Triangulation, Contouring, Profile & Cross-sectional Leveling Estimation & Valuation, Total Station, Column Layout, Plane Table Survey)	Batch 2015 (5th Sem)	30 Days	Report writing and viva with presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques. Hands on practice on auto level, theodolite, total station.
Summer Survey Camp(Concrete Mix, 3DS Max, Estimation, Staaad Pro, Total Station, Profile levelling, Contouring, Estimation)	Batch 2016 (6th Sem)	30 Days	Report writing and viva with presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques. Hands on practice on auto level, theodolite, total station.
Shiva Statue : About the history, Importance of structure, Design aspects for wind and seismic conditions, special materials, form work etc.	Batch 2014-18 (5th sem)	1 Day	Presentation	Students learned the structural design of Shiva statue and also various characteristics like foundation, height, material used etc.
Site Visit at Mahi Dam: Importance of Reserviour, Capacity, History, Control Unit, Fuctioning and operation under high rains etc.	Batch 2014-18 (4th sem)	1 Day	Viva	Students Learned the working of Mahi Dam and the characteristics of Dam like catchment area, Volume of water flow etc.
Site Visit at Mahi Dam: Importance of Reserviour, Capacity, History, Control Unit, Fuctioning and operation under high rains etc.	Batch 2015-19 (6th Sem)	1 Day	Viva	Students Learned the working of Mahi Dam and the characteristics of Dam like catchment area, Volume of water flow etc.

Site Visit at **Mount zee Litera school building**: Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2015-19 (6th Sem)	1 Day	Viva	Students Learned the structural and Architectural concepts of design of Zee litera School Building
Site Visit at IIIM Uaipur building: Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2015-19 (6th Sem)	1 Day	Viva	Students Learned the structural and Architectural concepts of design IIM Udaipur campus.
NATIONAL DESIGN AND RESEARCH FORUM (INSTITUTE OF CIVIL ENGINEER, BANGLORE): Paper submitted on Low-cost bricks using marble slurry, waste plastic and sand.	Lokesh Puri Goswami, Kundan Gorana	1 Day	On the basis of Paper writing	Students Learned the effects caused by adding an external agent in concrete.
STUPRENEURS (JAIPUR): Project pitched for student entrepreneur competition.	Lokesh Puri Goswami, Kundan Gorana, Kamlesh kumar, Sachin kumar. Harshit Jharoli, Mohit	2 Month	On the basis of project performance	Students won first prize
Bentley Institute Student Design Challenge 2018 : Seismic analysis of building, Staad Pro,	Kamlesh Panchal, Dheeraj Kumawat, Divya Patidar, Kirtika Kumawat, Jishan Khan, Kunal choubisa. Kamakshi Sharma.	20 Days	On the basis of project performance	Students Designed a building according to the problem statement in Staad Pro software and learned designing and analysis of a high rise building.
Bentley Institute Student Design Challenge 2018 : Seismic analysis of building, Staad Pro,	Batch 2016-20 (4th Sem)	20 Days	On the basis of project performance	Students Designed a building according to the problem statement in Staad Pro software and learned designing and analysis of a high rise building.

Development of Rain Water Harvesting System through National Highway profiles by using GIS techniques and Field survey	Shiva Chouhan, Mohit Jain, Kamlesh Panchal, Yash Bhardwaj	30 Days	On the Paper writing Presentation	Students gather data regarding elevation points and planned an efficient rain water harvesting.
Environment Friendly Bricks and Blocks using only Waste Materials	Lokesh Puri Goswami, Kunjpreet Kaur Arora, Nikita Sharma, Gaurav Suthar, Sayed Aamir, Kunjal Jain	Yearly	On the basis of performance	Students made environment friendly bricks and blocks using waste material

Report on Add on / Certificate Programs Other than online courses: Civil Engineering Department

2018-19

Name of the Program	List of Students enrolled	Duration	Assessment Procedures	Summary Report of each Program with their outcome
Requirements and plannings of Badliya village for converting it into smart village category in Banswada Rajasthan	Om Prakash Prajapat, Bhuvnesh Suthar,Suresh Kumar, Mahendra Kumar	20 Days	On the basis of performance during project and paper writing	Students surveyed the area and planned a smart village at Badliya by introducing solar lights, smart primary health center etc.
Workshop on Crushed EPS in Light weight concrete	Nikita Sharma, Gaurav Suthar, Sayed Aamir Hussain	30 days	On the basis of performance and results	Students have made light weight concrete successfully and won first prize in competition in IIT Mumbai
Winter Survey Camp (Total Station, Profile levelling, Contouring, Estimation, Market Survey, Traffic Studies)	Batch 2016 (5th Sem)	30 Days	Report writing and viva with presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques.
Shiva Statue : About the history, Importance of structure, Design aspects for wind and seismic conditions, special materials, form work etc.	Batch 2015-19 (5th Sem)	1 Day	Viva	Students learned the structural design of Shiva statue and also various characteristics like foundation, height, material used etc.
Site Visit at Kaladwas Indusrial Area(Sanchi Group) : Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2015-19 (6th Sem)	1 Day	Viva	Students learned the construction of Multistory building at SANCHI Group.
Highway project (debari-kaya byepass): Pretensioning, postensioning, piers reinforement. launhing of I girders, Mix design etc	Batch 2015-19 (6th Sem)	1 Day	Viva	Students learned the Pre-tensioning and Post-Tensioning Process in highway girders.

			Viva	Students learned the construction of Multistory building at Eklingpura building.
Site Visit At eklingpura (Multistorey building) : Frame work, slab - beam reinforement, inetrior work informations, grade of quality, in situ testing.	Batch 2015-19 (6th Sem)	1 Day		
Site Visit at Kaladwas Indusrial Area(Sanchi Group) : Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2016-20 (4th Sem)	1 Day	Viva	Students learned the building technology concepts by understanding the structural working process at the site.
Shiva Statue : About the history, Importance of structure, Design aspects for wind and seismic conditions, special materials, form work etc.	Batch 2016-20 (6th Sem)	1 Day	Viva	Students learned the structural design of Shiva statue and also various characteristics like foundation, height, material used etc.
Site Visit at Mahi Dam: Importance of Reserviour, Capacity, History, Control Unit, Fuctioning and operation under high rains etc.	Batch 2016-20 (4th Sem)	1 Day	Viva	Students Learned the working of Mahi Dam and the characteristics of Dam like catchment area, Volume of water flow etc.
Site Visit at Kaladwas Indusrial Area(Sanchi Group) : Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2017-21 (5 th Sem)	1 Day	Viva	Students learned the construction of Multistory building at SANCHI Group.
Shiva Statue : About the history, Importance of structure, Design aspects for wind and seismic conditions, special materials, form work etc.	Batch 2017-21 (5 th Sem)	1 Day	Viva	Students learned the structural design of Shiva statue and also various characteristics like foundation, height, material used etc.

			Viva	
Site Visit At Eklingpura (Multistorey building) : Frame work, slab - beam reinforement, inetrior work informations, grade of quality, in situ testing.	Batch 2017-21 (4 th Sem)	1 Day		Students learned the construction of Multistory building at Eklingpura building.
Shiva Statue : About the history, Importance of structure, Design aspects for wind and seismic conditions, special materials, form work etc.	Batch 2018-22 (4 th sem)	1 Day	Viva	Students learned the structural design of Shiva statue and also various characteristics like foundation, height, material used etc.
Site Visit at Kaladwas Indusrial Area(Sanchi Group) : Estimations , Column-footing layout plan, Information about workmanship, grade of concrete and reinforcement etc.	Batch 2018-22 (4 th sem)	1 Day	Viva	Students learned the building technology concepts by understanding the structural working process at the site.
SMART CITY PROJECT (UDAIPUR): Ayad river surveying, rejuvenation and redevelopment plan prepared.	Lokesh Puri Goswami, Kundan Gorana, Kamlesh kumar, Sachin kumar. Harshit Jharoli, Mohit	7 Days	On the basis of performance in project and planning and drawing	Students collected elevation data and proposed a plan for rejuvenation of Ayad river (Udaipur).
INTERNATIONAL CIVIL ENGINEERING SYMPOSIUM (IIT BOMBAY): Research paper presented on Low cost bricks using marble slurry, waste plastic and sand, won first prize.	Lokesh Puri Goswami, Harshit Jharoli.	2 Month	On the basis of research paper	Research paper presented on Low cost bricks using marble slurry, waste plastic and sand, won first prize.
SMART INDIA HACKATHON - HARDWARE 2018 (MHRD): Participated in 5 days grand finale at NIT Tiruchirapalli, Prototype developed and demonstrated. Won first prize and received grant for idea implementation.	Kunjal Jain, kunjpreet kour, Lokesh Puri, Gaura Suthar Syad Amir. Dharmenra.	Yearly	On the basis of performance in project and result	Participated in 5 days grand finale at NIT Tiruchirapalli, Prototype developed and demonstrated. Won first prize and received grant for idea implementation.

Bentley Institute Student Design Challenge 2019: Seismic analysis of building, Staad Pro,	Kamakshi Sharma, Syad Amir, Nikita Sharma	20 Days	On the basis of project performance	Students Designed a building according to the problem statement in Staad Pro software and learned designing and analysis of a high rise building.
IPRENEUR19 (TATA INSTITUTE OF SOCIAL SCIENCE, MUMBAI): Idea Pitched at Ipreneur compitition and won 2nd prize.	Kunjpreet kour, Lokesh Puri	Yearly	Not required	
Bentley Institute Student Design Challenge 2019 : Seismic analysis of building, Staad Pro,	Batch 2017-21 and 2018-22	20 Days	On the basis of project performance	Students Designed a building according to the problem statement in Staad Pro software and learned designing and analysis of a high rise building.

Report on Add on / Certificate Programs Other than online courses: Civil Engineering Department

2019-20

Name of the Program	List of Students enrolled	Duration	Assessment Procedures	Summary Report of each Program with their outcome
Requirements of Solid Waste Management System in Savina Vegetable Market at Smart City Udaipur in Rajasthan	Kunjal Jain, Parveen Choudhary, Kishan Dangi, Kirthesh Kalal	7 Days	On the basis of performance in project, report writing and presentation at Vyapari Mandal Sangh of Savina Market	Students gathered data regarding waste generation and their characterization and proposed a requirement of cleaning system.
Winter Survey Camp (Estimation, Total Station, Profile levelling, Contouring, Estimation)	Batch 2017 (5th Sem)	30 Days	Report writing, viva, presentation	Students learned the application of Surveying instrument in Levelling and Triangulation techniques.
Site Visit at residential building projet, AKME Paradise: Frame work, slab - beam reinforcement, interior work information, grade of quality, in situ testing.	Batch 2017-21 (5 th Sem)	1 Day	Viva	Students learned the structural and architectural concepts of multistory building at AKME Paradise
LAUNCH & ZOOM 2.0 (IIM UDAIPUR): Currently project incubated for business development.	Kunjpreet kour, Lokesh Puri	3 year	Not required	Currently project of environmentally friendly bricks incubated for business development.
AAKAR 2020 (IIT BOMBAY): Porous concrete developed and sample prepared for research work.	Batch 2018-22 and Batch 2019-23	30 days	On the performance in project	Student researched on Porous concrete manufacturing process and implemented it in the competition by making a porous.

<div align="center">**Statement of Work**</div>

This **Statement of Work** ("Agreement" or "Other Terms") is entered into and effective as of Monday, September 28th, 2015 ("Effective Date"), by and between

IBM India Private Limited (Hereinafter referred to as "IBM") a company incorporated under the Companies Act, 1956, having its registered offices at 12, Subramanya Arcade, Bannerghatta Road, Bangalore - 560 029.

and

Techno India NJR Institute of Technology, Udaipur (Hereinafter referred to as "NJR Institute") was established in the year 2008. NJR Institute is located in Techno NJR Knowledge Campus, Plot-SPL-T, Bhamashah (RIICO) Industrial Area, Kaladwas, Udaipur – 313003, Rajasthan.

(NJR Institute and IBM are hereinafter collectively referred to as "Parties" and individually as "Party")

This Agreement shall be governed by the terms and conditions of the Agreement for Courses and Education Materials dated September 28th, 2015 signed between IBM and NJR Institute ("Agreement for Courses and Education Materials").

WHEREAS, NJR Institute and IBM have agreed to work to incorporate certain Information Technology (IT), Management and Domain industry vertical curriculum into the Program courses of NJR Institute. These courses are more particularly described in Annexure B of this Agreement ("Programs");

WHEREAS, the parties have agreed that NJR Institute will elect to engage IBM as one of the primary and preferred technology providers for education support services and as stated in this Agreement.

NOW, THEREFORE, in order to ensure that the agreement between Parties, regarding the business relationship being sought, has clarity about the engagement, the following items represent points agreed to by the parties through this Agreement.

1.   Basis of the Agreement
i) IBM and NJR Institute, acknowledge the need for IBM Technology skills, in the education sector. The objective of this Agreement is to have a number of graduating B.Tech (CSE/IT) professionals skilled on IT Solutions and Industry vertical domain Technologies. Both IBM and NJR Institute are keen to cooperate in a way that will benefit the NJR Institute students pursuing a bright career.

ii) NJR Institute and IBM establish a roadmap to build a relationship to progress the Education Engagement in the following manner:

NJR Institute and IBM are coming together to design and deliver a completely new set of courses for our aspiring future generation. These courses will imbibe deep theoretical knowledge delivered to them coupled with broad-based industry alignment, interaction, talent discoverability, and excellence in their professional make-up. It is envisaged that the new batches

thus trained and accredited at the NJR Institute will be ready for IT industry much better than their peers in other universities and colleges. They will readily fill the gap the IT industry is currently facing towards employability of graduate engineers into their customer projects.

NJR Institute will rollout a number of programs including full time graduate engineering programs and post graduate engineering programs, with Specialization in IT aligned with mutually identified Industry domain verticals and Technology offerings. IBM will provide reasonable support as set-forth below to have NJR Institute commence and conduct this initiative. Such support will include assistance in the form of providing identified IBM specialization courseware, and academic support through Subject Matter Experts (SMEs). The roles and responsibilities and deliverables from IBM and NJR Institute are described in the sections that follow. The provision of hardware/software, IBM materials and services will be governed under the Agreement for Courses and Education Materials dated September 28th, 2015 (hereinafter referred to as the "Agreement for Courses and Education Materials") executed by NJR Institute. IBM's responsibilities under this Agreement are subject to NJR Institute fulfilling its responsibilities under the Agreement.

Apart from these full time programs, NJR Institute can also offer short term certificate courses through physical, mixed mode or purely online mode to students, with mutual agreement with IBM.

iii) IBM and NJR Institute have agreed to initially launch the joint B.Tech (CSE/IT) programs, with specializations from the following indicative list of streams, to the students enrolled NJR Institute under this Agreement. Appropriate dual specialization, with preferably one domain and one technology, will be worked out as appropriate as per the requirement of future industry scenario.

The Program will be jointly developed by IBM and NJR Institute and the designated SME's. The list below is not limited and can be reviewed and updated by IBM and NJR Institute, from time to time, by mutual agreement:
- B.Tech in CSE/IT with Specialization in Cloud Computing & Virtualization
- B.Tech in CSE/IT with Specialization in Business Analytics & Optimization
- B.Tech in CSE/IT with Specialization in Mainframe Technology
- B.Tech in CSE/IT with Specialization in IT Infrastructure Management
- B.Tech in CSE/IT with Specialization in Open Computing
- B.Tech in CSE/IT with Specialization in Telecom Informatics
- B.Tech in CSE/IT with Specialization in Healthcare Informatics
- B.Tech in CSE/IT with Specialization in E-Commerce, Retail & Automation
- B.Tech in CSE/IT with specialization in Banking, Financial Services and Insurance
- B.Tech in CSE/IT with specialization in Cyber Security & Forensics
- B.Tech in CSE/IT with specialization in Graphics & Gaming
- B.Tech in CSE/IT with specialization in Manufacturing Systems

2.   Roles and Responsibilities

The roles and responsibilities of IBM and NJR Institute, and IBM Deliverables, in connection with this proposed relationship are described in detail in Annexure A ("Roles and Responsibilities").

3.   Financial Terms - Fees to be paid to IBM

In consideration of IBM performing its Roles and Responsibilities hereto, NJR Institute shall pay a fee to IBM as described in detail in Annexure C: Price Schedule.

4.   Termination

This Agreement will be initially valid for a period of six years and on its expiry will renew for periods of six years on the same terms and conditions unless terminated by a Party prior to such expiry of the Agreement in accordance with the terms of the Agreement. Either Party may terminate the Agreement with thirty days' written notice if the other Party commits a material breach of the terms and conditions enumerated in this Agreement and fails to cure the same within the aforesaid notice period. Notwithstanding such termination, all the batches of students admitted to these Programs during the currency of this Agreement will be taken to logical conclusion of their Program by both Parties wherein each Party would be bound to perform their Roles and Responsibilities as enumerated in this Agreement.

5.   Confidentiality

The existence and substance of this Agreement and the provision of services contemplated hereby will be kept confidential and will not be disclosed by any Party hereto to any third party without the prior written consent of the other Party hereto unless such disclosure is necessitated by due process of law. In all cases where disclosures are necessitated by law the other Party will be kept duly informed of the same. The notice should be sufficient so that the Party may obtain a protective order where required.

The Parties acknowledge that the exchange of confidential information by NJR Institute and IBM in connection with this Agreement will be governed by the terms and conditions of "Agreement for Exchange of Confidential Information" (described under section 9 under this Agreement).

6.   Limitation of Liability

Notwithstanding anything to the contrary contained herein or in the Agreement for Courses and Education Materials, circumstances may arise where, because of a default on IBM's part, NJR Institute is entitled to recover damages from IBM regardless of the basis on which NJR Institute is entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM's entire liability for all such claims will be as per the terms and conditions of the Agreement for Courses and Education Materials under which such Product or Service is acquired.

In no event will either Party be liable for any lost profits, lost savings, loss of data, lost business, indirect damages, incidental damages, or other economic consequential damages, even if advised of the possibility of such damages. In addition, neither Party will be liable for any damages claimed by the other party based on any third party claim except as provided otherwise or under the Agreement for Courses and Education Materials.

7.   Publicity

IBM and NJR Institute each agrees not to use the trademarks, trade names, services marks or other proprietary marks of the other party to this Agreement in any advertising, press releases, publicity matters, or other promotional materials without prior written approval of the other party.

In addition each party agrees not to initiate or distribute any press releases, publicity matters or other promotional materials related to or referencing the subject matter of this Agreement without prior written approval of the other party.

8.   Governing Law

This Agreement will be governed by and construed in accordance with the laws of India, without regard to its conflict of laws provision.

9.   Agreement for Exchange of Confidential Information

Our mutual objective under this Agreement is to provide protection for confidential information. i.e. information exchanged between the parties relating to this Agreement and marked as "Confidential" by the Discloser ("**Information**") while maintaining our ability to conduct our respective business activities. Each of the Parties agree that the following terms apply when one of us ("**Discloser**") discloses Information to the other ("**Recipient**").

9.1 Disclosure
Information will be disclosed either:
1) In writing;
2) By delivery of items;
3) By initiation of access to Information, such as may be in a data base; or
4) By oral or visual presentation.

Information should be marked with a restrictive legend of the Discloser. If Information is not marked with such legend or is disclosed orally, the Information shall be identified as confidential at the time of disclosure.

9.2 Obligations
The Recipient agrees to:
1) Use the same care and discretion to avoid disclosure, publication or dissemination of the Discloser's Information as it uses with its own similar information that it does not wish to disclose, publish or disseminate; and
2) Use the Discloser's Information for the purpose for which it was disclosed or otherwise for the benefit of the Discloser.

The Recipient may disclose Information to:
1) Its employees who have a need to know, and employees of any legal entity that it controls, controls it, or with which it is under common control, who have a need to know. Control means to own or control, directly or indirectly, over 50% of voting shares; and
2) Any other party with the Discloser's prior written consent.

Before disclosure to any of the above parties, the Recipient will have a written agreement with the party sufficient to require that party to treat Information in accordance with this Agreement.

The Recipient may disclose Information to the extent required by law. However, the Recipient will give the Discloser prompt notice, if possible, to allow the Discloser a reasonable opportunity to obtain a protective order.

9.3 Confidentiality Period

Information disclosed under this Agreement will be subject to this Agreement for two years following the initial date of disclosure.

9.4 Exceptions to Obligations
The Recipient may disclose, publish, disseminate, and use Information that is:
1) Already in its possession without obligation of confidentiality;
2) Developed independently;
3) Obtained from a source other than the Discloser without obligation of confidentiality;
4) Publicly available when received, or subsequently becomes publicly available through no fault of the Recipient; or
5) Disclosed by the Discloser to another without obligation of confidentiality.

The Recipient may use in its business activities the ideas, concepts and know-how contained in the Discloser's Information which are retained in the memories of Recipient's employees who have had access to the Information under this Agreement.

9.5 Disclaimers
THE DISCLOSER PROVIDES INFORMATION WITHOUT WARRANTIES OF ANY KIND.
The Discloser will not be liable for any damages arising out of the use of Information disclosed under this Agreement.

Neither this Agreement, nor any disclosure of Information made under it grants the Recipient any right or license under any trademark, copyright or patent now or subsequently owned or controlled by the Discloser.

9.6 General
This Agreement does not require either of us to disclose or to receive Information.

The receipt of Information under this Agreement will not in any way limit the Recipient from:
1) Providing to others products or services which may be competitive with products or services of the Discloser;
2) Providing products or services to others who compete with the Discloser; or
3) Assigning its employees in any way it may choose.

The Recipient will:
1) Comply with all applicable export and import laws and regulations, including associated embargo and sanction regulations, and

2) Unless authorized by applicable governmental license or regulation, not directly or indirectly export or re-export any technical information or software subject to this Agreement (including direct products of such technical information or software) to any prohibited destination or country (including release to nationals, wherever they may be located, of any prohibited country) as specified in such applicable export regulations. This paragraph will survive the termination or expiration of this Agreement and the confidentiality period above and will remain in effect until fulfilled.

10. General

a) This Agreement ("Other Terms"), Agreement for Courses and Education Materials dated September 28th, 2015 supersedes all prior proposals and discussions on this subject and is the complete and exclusive statement of the agreement between the parties. In case of conflict between the terms of this Agreement, and the terms of the Agreement for Courses and Education Materials, the terms of this Agreement shall prevail. This Agreement ("Other Terms") cannot be modified except by a written agreement signed by the authorized representative of each of the NJR Institute and IBM India Pvt. Ltd. Any reproduction of this Agreement ("Other Terms") by reliable means will be considered an original of this document.

b) Each party will be responsible for its own expenses in connection with these discussions.

c) Except as set forth herein, there are no restrictions on either party as a result of these discussions and either party is free to pursue a similar business relationship with others at any time.

d) Each Party will act as an independent contractor. No agency, partnership, joint venture or other joint relationship is created by this Agreement. Neither Party may make any commitments binding on the other, nor may either Party make any representation that they are acting for, or on behalf of, the other.

e) Both parties have obligation to ensure adherence to the present Agreement.

f)_Neither of the Parties may assign, or otherwise transfer, its rights or delegate its duties or obligations under this Agreement without prior written consent of the other Party. Any attempt to do so is void.

11. Arbitration

Except for seeking injunction from the court of competent jurisdiction, every dispute, difference, or question which may at any time arise between the Parties hereto or any person claiming under them, touching or arising out of or in respect of this Agreement/Agreement for Courses and Education Material dated September 28th, 2015 or the subject matter thereof will be referred to a sole arbitrator to be appointed by a mutual agreement between the Parties and if failing to agree to appoint such mutually acceptable arbitrator, to two arbitrators one to be appointed by each Party to the difference and in case of difference of opinion between them to an umpire appointed by the said two arbitrators before entering on the reference. The decision of the arbitrators will be final and binding on the Parties. The arbitration proceedings will be conducted in accordance with Arbitration and Conciliation Act, 1996.

a. The seat of arbitration will be Bangalore and the cost of arbitration will be shared by the Parties.

12. Indemnities:

NJR Institute hereby unconditionally and irrevocably agrees, to indemnify, keep indemnified and save and hold harmless IBM, its directors, employees and agents from and against any and all losses, claims, damages, liabilities, expenses and disbursements (including all legal and other costs, charges and expenses incurred by IBM in connection with this agreement whatsoever

arising out of or resulting from any legal proceedings, civil suit, defence, or other action initiated or instituted in respect of or relating to the NJR Institute agreement:

(1) Infringement by NJR Institute of IBM's or any third party's intellectual property rights;
(2) Acts of negligence and misconduct of NJR Institute, its directors, employees and agents resulting in loss of life or bodily injury, damage to real property;
(3) Non-compliance by NJR Institute of applicable laws;
(4) Representations and warranties made by NJR Institute not authorized by IBM;
(5) NJR Institute conduct and/ or relations with any third parties.

"Notwithstanding anything contained herein above the NJR Institute's indemnity in any case shall not extend to events beyond breach of agreement and it shall not extend to the events over which the party giving the indemnity i.e. NJR Institute has no personal control."

This Agreement sets forth the understanding of the parties as of September 28th, 2015.

Agreed to: Agreed to:
Techno India NJR Institute of Technology   **IBM India Private Limited**
By   By

_____   _____
Authorized Signature   Authorized Signature

Chairman   **Prakash Bell**

Techno India NJR Institute   **Business Unit Executive**
                                                        IBM India / South Asia
of Technology   **Systems & Technology Group**
Date: September 28th, 2015   Date: September 28th, 2015
                                                        Agreement number:

Techno India NJR Institute of Technology   **IBM** Address:
Address: 12, Subramanya Arcade, Bannerghatta Road,
Techno NJR Knowledge Campus, Plot-SPL-T,
Bhamashah (RIICO), Industrial Area,
Kaladwas,
Udaipur - 313003.   Bangalore - 560 029.
Rajasthan, India.   Karnataka, India.

After signing, please return a copy of this Agreement to the "IBM address" shown above.

IBM Innovation Center for Education

**B.Tech. Computer Science & Engineering
With specialization in**

Cloud Computing and Virtualization

Curriculum & Course Outline Book

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DFSMSdfp™	MVS™	System/390®
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INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARDS	L	T	P	C
	2	0	0	2

Goal	To provide wide knowledge on Open Source Software

OBJECTIVES	OUTCOMES
The course should enable the students to	**The student should be able to**
• **Understand the Open Source Software** • **To learn the Open Source Adoption History, Evolution**	• **Gain knowledge of Open Source Software.** • **Learn the Open Source Evolution along with case studies**

UNIT 1 INTRODUCTION TO OPEN SOURCE

Introduction to Open Source Software - History of Open Source Software, Initiation of Open Source project start; Open Source Software examples : The Origins, The GNU projects, The Operating System GNU/Linux, The Graphical User Interface KDE/GNOME, Apache Web Server, Application Software; Strengths and Advantages of Open Source Software - Network effects, Lower cost, Availability, Maintainability. Drivers for Adoption - Lower cost of ownership, Quality, Innovation reuse, Technical competence; Open Source Software Assessment, Examples of Open Source Adoption in the World, Open Source Challenges.

UNIT 2 History of Open Source

History, evolution and benefits of Open Source. History of Open Source - Evolution of UNIX, GNU General Public License - Genesis of GNU, Copyleft- All Rights reserved; Benefits of Open Source.

UNIT 3 OPEN SOURCE COMMUNITIES AND DEVELOPMENT PROCESS

Open Source Initiative (OSI); Open Source definition; Free Software foundation; Open source development process – Call for Contributions, MythBuster, Brook's law; Open Source Community; Apache Web Server; Apache Software Foundation (ASF); How to contribute to open source projects.

UNIT 4 Adoption of Open Source

Introduction; Drivers for Open Source adoption; Adoption Methods and Process; examples of Open Standard Adoptions in the World; Open Source Challenges;

UNIT 5   CASE STUDIES ON OPEN STANDARDS

Introduction; Case Study 1 - Mozilla, Open Standards Case Study 2 - Linux
The Operating System – an Overview, Linux Basics, Various Linux distributions available, Working with the System, Shells and Utilities, An Introduction to Linux, Booting – Building the Linux kernel image, Overview, booting BIOS POST, Bootsector and setup, Using LILO as a boot loader, High level initialization, SMP bootup on x86, freeing initialization data and code, Processing kernel command line, Run levels, Changing RUNLEVELS, Init scripts, Creating your own init scripts, Stopping the System- Shutdown(reboot, halt), Preparing for Installation – Installation Checklist, Hardware Requirements, Partitioning, Installation problems.

TEXT BOOKS
  • **Introduction to Open Source Software & Open Standards** (IBM ICE Publication)

REFERENCE BOOKS
  • Handbook of Research on Open Source Software: Technological, Economic, and Social   Perspectives by Kirk St. Amant and Brian Still - IGI Global © 2007.
  • Open Source: Technology and Policy by Fadi P. Deek and James A. M. McHugh - Cambridge University Press © 2008.
  • Perspectives on Free and Open Source Software by Joseph Feller, Brian Fitzgerald, Scott   A. Hissam and Karim R. Lakhani (eds) The MIT Press © 2005

Web Programming through PHP & HTML		L	T	P	C
		3	0	2	4
Goal	To learn web programming through PHP				

OBJECTIVES	OUTCOMES
The course enables students to	**The students will be able to**
• Understand PHP Basics.	• Write basic PHP programming
• Learn operators, structures and functions in PHP.	• Embed PHP in HTML
• Learn arrays and PHP file handling	• Have learnt Javascript
• Object Oriented programming features of PHP.	• Have understood advanced concepts in PHP programming.
• Learn advanced PHP programming	

Unit 1 - PHP BASICS

Introduction to PHP , Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, Assigning value to a variable, Constants, Managing Variables

Unit 2 - OPERATORS, CONTROLS STRUCTURES AND FUNCTIONS IN PHP

Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, If- else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each, Loop control: Break and Continue. Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by references, Understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

Unit 3 - ARRAYS AND PHP FILE HANDLING

Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, closing a File, Using PHP with HTML Forms.

Unit 4 - CLASS, OBJECT AND EXCEPTION HANDLING, JAVA SCRIPT

Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters. Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP. Java Introduction, JavaScript Basics,

Unit 5 - Advanced PHP-Form Handling, Session Management, Database and MYSQL, XML, PHP Development using Eclipse

Creating Forms in HTML, GET and POST, Accessing form data, File Upload, Session Management, Starting a Session, Manipulating with Existing Session. What is a Database? MYSQL, SQL, SQL Functions, PHP and MYSQL, Execute Queries.
XML, XML Syntax Rules, Creating a DOM Document. Eclipse Overview, Creating a PHP Project.

TEXT BOOKS
- **Web Technologies through PHP** (IBM ICE Publication)
- PHP Bible - Tim Converse

REFERENCE BOOKS
- PHP A beginners guide - Bill McCarthy
- PHP and MySQL Web Development - Luke Welling
- Learning PHP - OReilly Press
- http://in.php.net/quickref.php
- http://www.w3schools.com/php/default.asp
- http://www.tizag.com/php/

Web Technologies through PHP LAB

Basics Programming
- Exercise 1 – Branching Statements using character
- Exercise 2 - Branching Statements using number
- Exercise 3 – Looping Statement
- Exercise 4 – String Functions
- Exercise 5 – String Manipulation
- Exercise 6 - Calculator
- Exercise 7 - Strings

Practical using Functions
- Exercise 8 – Generate Employee ID
- Exercise 9 – Calculate Tax
- Exercise 10 – Reverse a string
- Exercise 11 – Call by value and Call by reference
- Exercise 12 – Find Grade

Practical using Arrays
- Exercise 13 – Sorting
- Exercise 14 – Find grade
- Exercise 15 – Sort Array
- Exercise 16 – Multidimensional Array
- Exercise 17 – Population Details

File Handling programs
- Exercise 18 – Writing into a existing file
- Exercise 19 – Read from a file
- Exercise 20 – Filter the contents from the file
- Exercise 21 – File Copy

PHP programming thru HTML
- Exercise 22 – PHP with HTML

Programs related with php Classes and Objects
- Exercise 23 – Student Registration
- Exercise 24 – Online Examination System
- Exercise 25 – Online Feedback System

Exception Handling in php
- Exercise 26 – User Defined Exception
- Exercise 27 – Exception Propagation
- Exercise 28 – Error Handling in PHP

Java Scripting
- Exercise 29 – Arithmetic Operation
- Exercise 30 – Html and java script

Laboratory Infrastructure Requirements

Software - Operating System -Windows 7 64-bit, Software – Open Source PHP Development Tools - Zend
Hardware - RAM: 2GB (Min), 4GB (Recommended) HDD: 250GB (min) free space, 500GB (Recommended) Processor: i3 or i5 (Recommended) or i7 or similar type of processor capabilities, internet connected system.

Introduction to IT infrastructure Landscape		L T P C 3 0 0 3
Goal	To provide introductory knowledge on IT Infrastructure Landscape	
OBJECTIVES	**OUTCOMES**	
The course enables students to • To understand the Database, Application and Middleware along with System Server hardware and Directory Services	The students will be able to • Gains good knowledge of Database, Application and middleware software along with System Hardware and networking.	

Unit 1 Database Overview

Understanding Database types, Database Terminology, Characteristics Of Databases, Introduction To Database Management Systems, Types Of Database Management Systems, Database Security And Recovery, Data Mining, Data Warehousing, And Data Marts, Data Mining (DM), Data Warehousing and Data Marts, SQL Overview , Introduction to SQL, History of SQL, Relational database schema, Data Types, Dates and Times, Creating a table, Default Values, NULL values, Constraints, Referential integrity, Creating a schema, Creating a view, Creating other database objects, Modifying database objects, Renaming database objects, Data manipulation with SQL, Selecting data, Ordering the result set, Cursors, Inserting data, Deleting data, Updating data, Table joins, Inner joins , Equi-join, Natural join, Cross join, Outer joins, Left outer join, Right outer join, Full outer join, Union, intersection, and difference operations, Union, Intersection, Difference (Except), Relational operators, Grouping operators, Aggregation operators, HAVING Clause, Sub-queries, Sub-queries returning a scalar value, Sub-queries returning vector values, Correlated sub-query, Sub-query in FROM Clauses, Mapping of object-oriented concepts to relational concepts, JDBC, What is JDBC?, JDBC Architecture:, Common JDBC Components: Database APIs, ODBC and the IBM Data Server CLI driver, Indexes , Clustered And Non-clustered Indexes, Failure Management With Db2 Cluster Services.

Unit 2 Storage Overview

Storage Networking Technology, Types Of Storage System, FC-AL (Fibre Channel Arbitrated Loop), Fabric, Storage Area Network, Zoning, Storage Virtualization.

Unit 3 Systems & Directory Services Overview

Server Technology, Operating System, Virtualization, Hypervisor, I/o Virtualization, Partitioning, Server Deployment, Server Management Console, Server Availability Concepts And Techniques, Server Workload.
Directory Server Concepts, Directory, LDAP PROTOCOL, Overview of LDAP, LDAP Architecture, LDAP Models, LDAP Replication Topologies, LDAP Data Interchange Format (LDIF).

Unit 4 Network Security and Overview

Network Overview, Network Topologies, Tree Topology, Firewalls, Switching Concepts, What Is Routing? , Virtual Lan's, Security Basics, Loss Of Privacy, Loss Of Integrity, Security Technology, Active Audit , Secure Messaging, Data Security, Network Security.

Unit 5 Application and Middleware Overview

Introduction To Common Messaging System (MQ SERIES), Application Integration – Business Need, Middleware, Message Oriented Middleware, Synchronous interaction, Asynchronous interaction, Coupling, Reliability, Scalability, Availability, IBM Websphere MQ, Websphere MQ Objects, Web Tier Deployment, Application Servers And Clustered Deployment, EMAIL, Lotus Architecture, Lotus Domino Server Types, Lotus Notes Clients, Types of Certificates, DATA WAREHOUSING, Warehouse Modeling Approaches , Basic Concepts, Dimension, Basic OLAP Operations.

Text Books:
Introduction to IT Infrastructure Landscape (IBM ICE Publication)

Introduction to IT Infrastructure Landscape Lab Exercises
- Exercise 1 Storage Overview
- Exercise 2 Systems Overview
- Exercise 3 Network Security And Overview
- Exercise 4 Lotus Domino And Notes Installation

Introduction to Virtualization and Cloud Computing		L	T	P	C
		3	0	2	4
Goal	To provide introductory knowledge on Virtualization and Cloud Computing				

OBJECTIVES	OUTCOMES
The course enables students to	The students will be able to
• To learn virtualization and cloud computing concepts.	• Gains introductory knowledge of Cloud computing along with Virtualization concepts and implementation

Unit 1 Introduction to Virtualization

Traditional IT Infrastructure, Benefits of Virtualization, Types of Virtualization, History of Virtualization.

Unit 2 Server, Storage, Network and Application Virtualization

Types of Server Virtualization, Hypervisors, Anatomy of Server Virtualization, Benefits of Storage Virtualization, Types of Storage Virtualization, VPN, VLAN, Benefits of Application Virtualization.

Unit 3 Introduction to Cloud Computing

History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, stepping stones for the development of cloud, Grid Computing, Cloud Computing.

Unit 4 Cloud Implementations / Cloud Deployment Models, Cloud Delivery Models

Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Overview, Infrastructure as a Service (IaaS) Cloud Delivery Model, Platform as a Service (PaaS) Cloud Delivery Model, Software as a Service (SaaS) Cloud Delivery Model.

Unit 5 Case Study On Virtualization, Cloud Workloads

Customer IT Landscape, Triggers of Virtualization, Preparation for Virtualization, Transition Tools for Virtualization, Cost savings , Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud.

Text Books

- **Introduction to Virtualization and Cloud Computing** (IBM ICE Publication)

References & URLs

- IBM Redbooks | System x Virtualization Strategies
- PowerVM Virtualization on IBM System p: Introduction and Configuration Fourth Ed. ...

Introduction to Virtualization and Cloud Computing Lab Exercises

1. Virtual Machine Using VMware
2. Virtual Machine Using QEMU
3. KVM on Ubuntu 12.10
4. KVM and guest operating system on CentOS6.3
5. Installation Of VMware ESX Server

Cloud Computing Architecture & Deployment Models		L	T	P	C
Goal	To provide wide knowledge on Cloud Computing Architecture & Deployment Models	3	0	2	4

OBJECTIVES	OUTCOMES
The course enables students to	**The students will be able to**
• To learn cloud computing delivery model IaaS, • To learn cloud computing delivery model PaaS, • To learn cloud computing delivery model SaaS • To learn Public cloud deployment model, • To learn Private cloud deployment model, • To learn Hybrid cloud deployment model.	• Understand Cloud delivery models in details • Understand briefly Cloud Computing Reference Architecture. • Understands Cloud deployment models in details e.g., Public, Private and Hybrid.

Unit 1 - Overview of Delivery models in Cloud Computing

Cloud Computing Platform Overview, Why Cloud Computing?, Evolution of Cloud Computing, What is Cloud Computing?, Cloud Computing Definition and Characteristics, Definition of Cloud Computing, Essential characteristics of Cloud Computing, Types of Cloud, Cloud Computing Advantages, Illustration of the benefits of cloud computing , Cloud Computing Challenges, Illustration of cloud computing challenges,   Cloud Computing Service models,   Cloud Computing Deployment models,   Cloud Service and Deployment models, Cloud adoption considerations, Cloud adoption. Cloud History – Internet technologies (SOA, Web Services, Web 2.0, mashups), Distributed computing – Utility and Grid Computing, Hardware – VMWare ESXi, Xen, KVM; Virtual Appliances and the open Virtualization format; System Management; Anatomy of Cloud; Benefits of Cloud;   Cloud Transformation roadmap; cloud delivery models and their advantages; Cloud computing architecture.

Unit 2 - IaaS, PaaS and SaaS

Introduction to Infrastructure as a Service delivery model, characteristics of IaaS, Architecture, examples of IaaS, Applicability of IaaS in the industry , Comparing ISPs and IaaS, Motivations for renting the infrastructure; IaaS Case studies; IaaS enabling Technology; Trusted cloud. Introduction to Platform as a Service delivery model, characteristics of PaaS, patterns, architecture and examples of PaaS, Applicability of PaaS in the industry ; Integrated Lifecycle Platform; Anchored Lifecycle platform; Enabling Technologies as a Platform; PaaS – best option or not.Introduction to Software as a Service delivery model, characteristics of SaaS, SaaS Origin; Evolvement of SaaS – Salseforce.com's approach;   SaaS Economics and Ecosystem; Types of SaaS Platforms; Architecture, SaaS – Providers; Collaboration as a Service; Enabling and Management tools as a Service; Applicability of SaaS in the industry.

Unit 3 - Cloud Computing Reference Architecture (CCRA)

Introduction to Cloud computing reference architecture (CCRA), benefits of CCRA, Architecture overview – The conceptual Reference Model; Cloud Consumer; Cloud provider; Cloud Auditor; Cloud carrier; Scope of control between Provider and Consumer; CCRA : Architectural Components – Service deployment , Service Orchestration, Cloud Service Management, Security; Cloud Taxonomy; IBM's Cloud Computing Reference Architecture(CCRA 2.0) – Introduction, roles, Architectural elements; CCRA evolution; Examples of Cloud Services; versions and application of CCRA for developing clouds.

Unit 4 - Private, Public and Hybrid Cloud Deployment Models

What is a Private Cloud?, Illustration of Private Cloud, Advantages of Private Cloud, Limitations of Private Cloud, Service Management, Journey into Private Cloud, Planning and Strategy, Standardization, Virtualization, Automation, Cloud, Case study – VMware vCloud, Case Study – IBM SmartCloud Entry, Private cloud. What is a Public Cloud?, Illustration of Public Cloud, Why Public Cloud, Advantages of Public Cloud, Limitations of Public Cloud, Low degree of security and control, Lack of control on infrastructure, configuration, Network latency and accessibility concerns, Highest long term cost, Public v/s Private, Journey into Public Cloud, Revisit the idea of adopting public cloud, Cloud vendor selection, Migrating to Cloud, Cloud vendor selection, SLA – Service Level Agreements, Credits/Compensation terms, Credit process, Disaster recovery plan, Exclusions, Security and Privacy, Periodic upgrade and maintenance, Data location and Jurisdiction,   Pricing and Measurability, Interoperability and Lock-in,   Exit process/Termination policies, Proven track record, Public cloud vendors, Case studies. What is a Hybrid Cloud?,   Why Hybrid Cloud, Illustration of Hybrid Cloud, Advantages of Hybrid Cloud, Challenges of Hybrid Cloud, Develop and manage hybrid workloads, Developing applications for hybrid cloud, Develop applications using PaaS, Managing hybrid workloads, Journey into Hybrid Cloud, Step 1: Asses current IT infrastructure and business, Step 2: Explore cloud computing, Step 3: Create cloud deployment strategy plan, Step 4: hybrid cloud implementation.

Unit 5 - Cloud Computing Platform Lab

OpenStack Introduction, OpenStack Architecture, Lab Environment, Hardware requirements, Software requirements, High level overview of setup.

Text Book:

- **Cloud Computing Architecture & Deployment Models** (IBM ICE Publication)

References and URLs

1. Cloud Computing For Dummies (November, 2009), Judith Hurwitz, Robin Bloor, Marcia Kaufman, Dr. Fern Halper
2. Developing and Hosting Applications on the Cloud (July, 2012), Alex Amies, Harm Sluiman, Qiang Guo Tong, Guo Ning Liu
3. IBM Cloud Computing http://www.ibm.com/cloud-computing/us/en/
4. Wikipedia page on Cloud Computing http://en.wikipedia.org/wiki/Cloud_computing

Cloud Computing Architecture & Deployment Models Lab Exercises

1. Open Stack Installation
2. Familiarize with OpenStack dashboard
3. Deploy a virtual machine instance
4. Deploy a Linux VM from an ISO Image
5. Deploy a VM from an image snapshot
6. User and Project management
7. Common Cloud Management tasks
8. Adding a new compute note
9. Overview of Nagios
10. Overview of Openstack CLI

Cloud Application Development				L	T	P	C
				3	0	2	4
Goal	To understand application development on Cloud Platform.						

OBJECTIVES	OUTCOMES
This course enables students to	**Students will be able to**
• **To understand IoT Technologies**	• **Briefly gain knowledge of IoT Technologies, Applications, IoT Design, System Engg., IoT Security and Communication Technologies.**
• **To learn IoT Applications**	
• **To understand IoT Design, System Engg., IoT Security and Communication Technologies.**	

Unit 1 - Foundations and Concepts
Vision of Cloud Computing, Defining a Cloud, Cloud Computing Reference Model, Characteristics and Benefits, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing

Unit 2: Aneka Cloud Application Platform and Concurrency
Anatomy of the Aneka, Building Cloud environment using Aneka, Software Development Kit and Management in Aneka, Concurrent Computing and Thread Programming, Multithreading with Aneka, Programming Applications with Aneka Threads;

Unit 3: High-Throughput and Data-Intensive Applications Programming
High-Throughput Computing and Task Programming, Task-based Application Models, Aneka Task-Based Programming, Task Programming Model, and Developing Applications with the Task Model; Data Intensive Computing: Map-Reduce Programming

Unit 4: Cloud Applications
Scientific Applications - ECG Data Analysis on Cloud, Protein Structure Prediction, Satellite Image Processing; Business and Consumer Applications – CRM, Social Networks, Media Applications, and Multiplayer Online Gaming.

Text Books:
   • **Cloud Application Development (IBM ICE Publication)**

Reference Books :
1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, **Mastering Cloud Computing**,
  McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India, 2013.

Lab Exercises:
[1] Write a program to print "Hello World" based on Thread model and use exactly five threads also print the executor node information along with the Submission Time and Completion Time?
[2] Write a program to compute the following mathematical equation using Aneka Threads(Note: Consider each trigonometric function in independent thread)?
P= sin(x) + cos(y) + tan(z)
[3] Write a program to compute the matrix addition using Aneka Thread Programming Model
[4] Write a program for parallel execution of *Mandelbrot generation algorithm in parallel using Aneka Threads*
[5] Write a program to compute the matrix multiplication using Aneka Thread Programming Model
[6] Write a program to parse the log files using Map/Reduce or Thread Programming Model
[7] Write a program using Map/Reduce to count the words in the given input set
[8] Write a program to run an existing program (e.g., image processing) for different parameters using Task Programming Model
[9] Write a program for sorting large number of records (say 1000 entries) stored in a file. You can create N threads (say 4 or 10) and each Thread taking responsibility for sorting a part of file (e.g., Thread1 can sort first 1000/N record; and Thread 2 can sort next set and continues) and a Master Thread can merge all these sorted sub-set of records.

Security in Cloud				L	T	P	C
				3	0	2	4
Goal	To provide knowledge on Security in Cloud						

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to gain
• To learn the security, system & program threats • To learn security risks and addressing the security risk • To learn encryption and decryption	• Knowledge of security, system and program threats • Security risk knowledge • Knowledge of decryption and encryption

Unit 1 Security Overview

Security Overview, Operating System – Security, Authentication, One Time passwords, Program Threats, System Threats, Computer Security Classifications, Application Security, Application Code Review, Secure Developer Training, Data Center Security, Security – Cloud Computing, Security Framework, Architecture Principles, System Management Components.

Unit 2 Understanding Security Risks

Understanding Security Risks, Understanding security risks, Identifying the biggest risks, Cloud computing - Working definition , Top security benefits, Top security risks, Security benefits of cloud computing, Security and the benefits of scale, Risks, Virtualization, Overview, Hypervisor, I/O Virtualization, Partitioning, Server Deployment, Virtual Server Deployment , What is a Tenant?, Defining Multi-Tenancy, Securing the Multi-Tenant Environment, Vulnerability: An Overview, Defining Vulnerability, Vulnerabilities and Cloud Risk, Cloud Computing, Core Cloud Computing Technologies , Essential Characteristics, Cloud-Specific Vulnerabilities, Core-Technology Vulnerabilities, Essential Cloud Characteristic Vulnerabilities, Defects in Known Security Controls, Prevalent Vulnerabilities in State-of-the-Art Cloud Offerings, Architectural Components and Vulnerabilities, Internal Security Breaches, Cloud Software Infrastructure and Environment, Computational Resources, Storage, Communication, Cloud Web Applications, Services and APIs, Management Access, Identity, Authentication, Authorization, and Auditing Mechanisms, Provider, Data Corruption, User account and Server Hijacking, How to Secure Your Cloud.

Unit 3 Addressing security risks in cloud

Introduction, Core Components of AAA, Example AAA Flow, Authorization Approaches, Accounting Techniques.

Unit 4 Identity Management

Identity management, Isolated identity management, Federated identity management, Centralized identity management, Authentication and Authorization, Challenges of Identity Management, Identity Theft, Identity Management Adoption and Benefits, Benefits of Identity Management, Conclusion, Evolution of IAM — moving beyond compliance, Identity access Management life cycle phases, IAM and IT trends, Mobile computing, Cloud computing, Data loss prevention, Social media, IAM and cybercrime, Case study — IAM in practice, Transforming IAM, Life cycle phase, Key considerations when transforming IAM, People, Process Technology, IAM tools, Key IAM capabilities, Conclusion, Detention, Field Acquisition & Analysis, Solid State Drives, Brief Discussion of Cylinders, Heads, and Sectors , Logical Block Addressing and Physical Block Addressing, "TRIM" Command.

Unit 5 Encryption and Decryption

Encryption and decryption, What is cryptography?, Strong cryptography, How does cryptography work?, Conventional cryptography, Caesar's Cipher, Key management and conventional encryption, Public key cryptography, How PGP works, Keys, Digital signatures, Hash functions, Digital certificates, Certificate distribution, Certificate servers, Public Key Infrastructures, Certificate formats, Validity and trust, Checking validity, Establishing trust, Meta and trusted introducers, Trust models, Levels of trust in PGP , Certificate Revocation, Communicating that a certificate has been revoked , What is a passphrase?, Key Splitting, Encryption, Data Encryption - Overview , Symmetric Encryption and Asymmetric encryption, Conclusions. Digital signature, Secure Sockets Layer (SSL), Encryption Protects Data During Transmission, Credentials Establish Identity Online, Authentication Generates Trust in Credentials, Extend Protection beyond HTTPS, Understanding SSL, Who Uses SSL?, How It Works, SSL Transactions , SSL Crypto Algorithms, SSL and the OSI Model, Secure messaging, Message digest, Security Technology, Identity, Integrity, Active Audit, Cryptography, Public key infrastructure, Non-repudiation, Public Key Encryption, Introduction to Authentication, Background, SSL authentication (server --> client), Mutual SSL Authentication (server <--> client), Capture and Analyze.

Text Books

- **Security in Cloud** (IBM ICE Publication)

References

1. www.bluecoat.com/documents
2. www.trustwave.com
3. An introduction to cryptography – By Network Associates
4. Identity and access management
5. http://www.ey.com

Backup & DR			L	T	P	C
Goal	To provide knowledge of Backup & DR		3	0	0	3

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to
• Understand Data backup and storage, High Availability and Disaster Recovery	• Gain knowledge of Data backup and storage, High Availability and Disaster Recovery

Unit 1 Fundamentals of Backup
Disk Storage, Characteristics Of A Disk Drive, Types Of Disk Drives, Access Centric Drives, Capacity Centric Drives, Disk Systems, Tape, Specifications Of Lto-6, Worm, Automated Tape Library, Backup, Recovery Objectives , Rpo: Recovery Point Objective, Rto: Recovery Time Objective, Types Of Backup, Full Backup, Incremental Backup, Differential Backup, Progressive Incremental Backup, Architectures Of Backup, Network Based Backup, Disk To Disk To Tape (d2d2t) Backup, Network Free (san) Backup, Server Free Or Server Less Backup, Network Data Management Protocol (ndmp) Backup, Virtual Tape Library, Archive.

Unit 2 High Availability
Overview Of High Availability, High Availability, Reliability, Serviceability & Availability, Need Of Availability, Terminologies, Components That Affect Availability & The Need For High Availability, Availability Levels And High Availability, How High Availability Can Be Achieved, Single System, Fault Tolerant, Redundant Components, Monitoring, Alerting And Notification, Hot Swap And Hot Plug, High Availability Clustering, High Availability Components, Types Of Ha Solutions, Ha Clustering Advantages, High Availability Criteria, Network Layer High Availability, Hardware Combinations And Ha Possibilities, Application & Operating System Layer, Hardware Layer: Storage, High Availability For Virtual Environments, Components Of A Virtual Machine, High Availability On Virtual Machines.

Unit 3 Disaster Recovery
Introduction, Disaster Recovery, Types Of Disasters, Business Continuity (bc) And Disaster Recovery (DR), Importance Of Disaster Recovery, DR Terminologies, Quantitative Terminologies, Availability Terminologies, Networking / Communication Terminologies, Location Designations, Disaster Recovery Planning, Phases Of Planning, Getting Acceptance, Form A DR Team, Agree On The Recovery Service Levels, Plan A DR Strategy, Implement The Strategy, Plan The Test And Test The Plan, DR Technology Tree, High Availability, Virtualization, Replication, Local Replication, Remote Replication, Replication Tools, Deployment Topologies, Two Site Replication, Multi-site Replication, DR Drill And The DR

Text Books
- **Backup & DR** (IBM ICE Publication)

References
1. The Backup Book: Disaster Recovery from Desktop to Data Center by Dorian Cougias,E. L. Heiberger, Karsten Koop
2. Disaster Recovery and Backup Solutions for IBM FileNet P8 Version 4.5.1 Systems (IBM Redbook)
3. http://en.wikipedia.org/wiki/Disaster_recovery

IBM Innovation Center for Education

**B.Tech. Computer Science & Engineering
With specialization in**

Business Analytics

Curriculum & Course Outline Book

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DFSMSdfp™	MVS™	System/390®
DFSMSdss™	MVS/ESA™	SAA®
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INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN STANDARDS		L	T	P	C
		2	0	0	2
Goal	**To provide wide knowledge on Open Source Software**				

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to
• Understand the Open Source Software	• Gain knowledge of Open Source Software.
• To learn the Open Source Adoption History, Evolution	• Learn the Open Source Evolution along with case studies

UNIT 1 INTRODUCTION TO OPEN SOURCE

Introduction to Open Source Software - History of Open Source Software, Initiation of Open Source project start; Open Source Software examples : The Origins, The GNU projects, The Operating System GNU/Linux, The Graphical User Interface KDE/GNOME, Apache Web Server, Application Software; Strengths and Advantages of Open Source Software - Network effects, Lower cost, Availability, Maintainability. Drivers for Adoption - Lower cost of ownership, Quality, Innovation reuse, Technical competence; Open Source Software Assessment, Examples of Open Source Adoption in the World, Open Source Challenges.

UNIT 2 History of Open Source

History, evolution and benefits of Open Source. History of Open Source - Evolution of UNIX, GNU General Public License - Genesis of GNU, Copyleft- All Rights reserved; Benefits of Open Source.

UNIT 3 OPEN SOURCE COMMUNITIES AND DEVELOPMENT PROCESS

Open Source Initiative (OSI); Open Source definition; Free Software foundation; Open source development process – Call for Contributions, MythBuster, Brook's law; Open Source Community; Apache Web Server; Apache Software Foundation (ASF); How to contribute to open source projects.

UNIT 4 Adoption of Open Source

Introduction; Drivers for Open Source adoption; Adoption Methods and Process; examples of Open Standard Adoptions in the World; Open Source Challenges;

UNIT 5 CASE STUDIES ON OPEN STANDARDS

Introduction; Case Study 1 - Mozilla, Open Standards Case Study 2 - Linux ; The Operating System – an Overview, Linux Basics, Various Linux distributions available, Working with the System, Shells and Utilities, An Introduction to Linux, Booting – Building the Linux kernel image, Overview, booting BIOS POST, Bootsector and setup, Using LILO as a boot loader, High level initialization, SMP bootup on x86, freeing initialization data and code, Processing kernel command line, Run levels, Changing RUNLEVELS, Init scripts, Creating your own init scripts, Stopping the System- Shutdown(reboot, halt), Preparing for Installation – Installation Checklist, Hardware Requirements, Partitioning, Installation problems.

TEXT BOOKS
- **Introduction to Open Source Software & Open Standards** (IBM ICE Publication)

REFERENCE BOOKS
- Handbook of Research on Open Source Software: Technological, Economic, and Social Perspectives by Kirk St. Amant and Brian Still - IGI Global © 2007.
- Open Source: Technology and Policy by Fadi P. Deek and James A. M. McHugh - Cambridge University Press © 2008.
- Perspectives on Free and Open Source Software by Joseph Feller, Brian Fitzgerald, Scott A. Hissam and Karim R. Lakhani (eds) The MIT Press © 2005

Web Programming through PHP & HTML		L 3	T 0	P 2	C 4
Goal	To learn web programming through PHP				

OBJECTIVES	OUTCOMES
The course enables students to	**The students will be able to**
• Understand PHP Basics.	• Write basic PHP programming
• Learn operators, structures and functions in PHP.	• Embed PHP in HTML
• Learn arrays and PHP file handling	• Have learnt Javascript
• Object Oriented programming features of PHP.	• Have understood advanced concepts in PHP programming.
• Learn advanced PHP programming	

Unit 1 - PHP BASICS

Introduction to PHP , Support for Database, PHP Installation, Working with PHP, Why PHP?, Basic Syntax of PHP, PHP statement terminator and case insensitivity, Embedding PHP in HTML, Comments, Variables, Assigning value to a variable, Constants, Managing Variables

Unit 2 - OPERATORS, CONTROLS STRUCTURES AND FUNCTIONS IN PHP

Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator, Operator Precedence, String Manipulation: strtoupper(), strtolower(), ucfirst(), ucwords(), strcmp(), strlen(), substr(), trim(), Conditional Control Structures: If statement, If- else statement, If- else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each, Loop control: Break and Continue. Functions, User-Defined function, Function Definition, Function Call, Function with arguments, Function with return value, Call by value and call by references, Understanding variable scope, Global Variables, Static Variables, Include and Require, Built-in functions in PHP.

Unit 3 - ARRAYS AND PHP FILE HANDLING

Introduction to Array, Array in PHP, Creating an Array, Accessing Elements of an Array, Modifying Elements of an Array, Finding the Size of an Array, Printing an Array in the readable Way, Iterating Array Elements, Modifying Array while iteration, Iterating Array with Numeric index, Removing Element from an Array, Converting an Array to String, Converting String to an Array, Array Sorting, Multidimensional Array, Accessing elements of a Multidimensional Array, Iterating Multidimensional Array. Introduction, File Open, File Creation, Writing to files, Reading from File, Searching a record from a file, closing a File, Using PHP with HTML Forms.

Unit 4 - CLASS, OBJECT AND EXCEPTION HANDLING, JAVA SCRIPT

Introduction, Object, Class, Defining Class in PHP, Object in PHP, Usage of $this variable, Constructor, Constructor with Parameters. Introduction to Exception, Exception Handling mechanisms, Creating Custom Exceptions, Multiple Catch Blocks, Exception Propagation, Error Handling in PHP. Java Introduction, JavaScript Basics,

Unit 5 - Advanced PHP-Form Handling, Session Management, Database and MYSQL, XML, PHP Development using Eclipse

Creating Forms in HTML, GET and POST, Accessing form data, File Upload, Session Management, Starting a Session, Manipulating with Existing Session. What is a Database? MYSQL, SQL, SQL Functions, PHP and MYSQL, Execute Queries.
XML, XML Syntax Rules, Creating a DOM Document. Eclipse Overview, Creating a PHP Project.

TEXT BOOKS
- **Web Programming through PHP and HTML** (IBM ICE Publication)
- PHP Bible - Tim Converse

REFERENCE BOOKS
- PHP A beginners guide - Bill McCarthy
- PHP and MySQL Web Development - Luke Welling
- Learning PHP - OReilly Press
- http://in.php.net/quickref.php
- http://www.w3schools.com/php/default.asp
- http://www.tizag.com/php/

Web Programming through PHP LAB

Basics Programming
- Exercise 1 – Branching Statements using character
- Exercise 2 - Branching Statements using number
- Exercise 3 – Looping Statement
- Exercise 4 – String Functions
- Exercise 5 – String Manipulation
- Exercise 6 - Calculator
- Exercise 7 - Strings

Practical using Functions
- Exercise 8 – Generate Employee ID
- Exercise 9 – Calculate Tax
- Exercise 10 – Reverse a string
- Exercise 11 – Call by value and Call by reference
- Exercise 12 – Find Grade

Practical using Arrays
- Exercise 13 – Sorting
- Exercise 14 – Find grade
- Exercise 15 – Sort Array
- Exercise 16 – Multidimensional Array
- Exercise 17 – Population Details

File Handling programs
- Exercise 18 – Writing into a existing file
- Exercise 19 – Read from a file
- Exercise 20 – Filter the contents from the file
- Exercise 21 – File Copy

PHP programming thru HTML
- Exercise 22 – PHP with HTML

Programs related with php Classes and Objects
- Exercise 23 – Student Registration
- Exercise 24 – Online Examination System
- Exercise 25 – Online Feedback System

Exception Handling in php
- Exercise 26 – User Defined Exception
- Exercise 27 – Exception Propagation
- Exercise 28 – Error Handling in PHP

Java Scripting
- Exercise 29 – Arithmetic Operation
- Exercise 30 – Html and java script

Laboratory Infrastructure Requirements

Software - Operating System -Windows 7 64-bit, Software – Open Source PHP Development Tools - Zend
Hardware - RAM: 2GB (Min), 4GB (Recommended) HDD: 250GB (min) free space, 500GB (Recommended) Processor: i3 or i5 (Recommended) or i7 or similar type of processor capabilities, internet connected system.

Advanced Statistical Analysis		L	T	P	C
		3	0	2	4
Goal	To provide knowledge on Advanced Statistical Analysis				

OBJECTIVES	OUTCOMES
The course enables students to • **Learn how to analyze statistical data properly.** • **Understand the role of formal statistical theory and informal data analytic methods.**	The students will be able to • **Gain an understanding of statistical methods relevant to upper division interdisciplinary courses.** • **Sharpen students' statistical intuition and abstract reasoning as well as their reasoning from numerical data through community-based and other research.**

Unit 1 Introduction to Statistical Analysis

Introduction, Meaning of Statistics, The Scietific Method, Basic Steps of the Research Process, Experimental Data and Survey Data, Populations and Samples, Census and Samling Method, Parameter and Statistic, Independent and Dependent Variables, Examining Relationships, Introduction to SPSS Statistics.

Unit 2 Describing Data

Introduction, Types of Data, Data Transformation, Summarizing Data: Graphical Methods, Summarizing Data: Measures of Central Tendency, Summarizing Data: Measures of Dispersion, Levels of Measurement, Randon Variables and Probability Distributions, Discrete and Continuous Random Variable,   Making Inferences about Populations from samples, Estimator and Estimate, Confidence Interval for Population Mean (Large Sample).

Unit 3 Testing Hypothesis

Introduction, Null and Alternative Hypothesis, Type I and Type II Error, The Procedure of Hepothesis Testing, Hypothesis Testing of a Population Mean: Large Sample, Hypothesis Testing of a Population Mean: Small Sample,   Hypothesis Test of a Proportion (One Sample), Hypothesis Test of Population Variance, Hypothesis Test of Population Mean: Two Independent Samples(), Hypothesis Test of Population Mean: Dependent Samples (Paired Samples), Hypothesis Test about Two Population Proportion, Hypothesis Teest about Two Population Variances, Analysis of Variance (ANOVA), Nonparametric Test, Sign Test for Paired Data, Wilcoxon Matched Pairs Signed Ranks Test (for n>10 pairs), Mann-Whitney U Test, Kruskal-wallis Tests (H Test).

Unit 4 Examining Relationships

Introduction, Types of Correlation, Karl Pearson Coefficient Correlation, Spearman's Rank Order Correlation, Partial Correlation, Residuals and Plots, Simple Linear Regression, Multiple Regression Model, Repeated Measures, Non-linear Regression, Polynomial Regression Models, Weighted Least Squares, Two Stage Least Squares   1, Structural Equation Modeling.

Unit 5 Advanced Techniques

Identifying Groups: Classification, Probit Analysis, Discriminant Function Analysis, Proportional Odds Models, Decision Trees, Neural Networks, Cluster Analysis, Factor Analysis, Multidimensional Scaling.

Text Books
• **Advanced Statistical Analysis** (IBM ICE Publication)

Reference
• Statistical Data Analysis (Oxford Science Publications) by Glen Cowen
• Statistical Analysis : an Introduction using R.Wikibooks
• Multivariate Statistical Analysis A Conceptual Introduction, 2nd edition by Sam Kash Kachigan
• Handbook of Statistical Analysis and Data Mining Application by Robert Nisbet, John, IV Elder, Gary Miner

Advanced Statistical Analysis Lab Exercises

- Using the preexisting Drinks.sav data file

  Exercise 1: to create standardized (Z-) scores for several variables
- Using the preexisting Census.sav data file

  Exercise 2: To run Frequencies to explore the distributions of several variables.
- Using the preexisting Drinks.sav data file

  Exercise 3: To obtain summary statistics for scale variables
- Using the preexisting Census.sav data file

  Exercise 4: To create two and three-way cross tabulations to explore the relationship between several variables and to use the Chart Builder to visualize the relationship.
- Using the preexisting Census.sav data file

  Exercise 5: To run the Independent-Samples T Test, to interpret the output and visualize the results with an error bar chart.
- Using the preexisting data file Census.sav.

  Exercise 6: To use One-Way ANOVA with post hoc tests to explore the relationship between several variables. You will use the PASW Statistics.
- Using the preexisting data file Bank.sav.

  Exercise 7: To visualize the relationship between two scale variables creating scatterplots and to quantify this relationship with the correlation coefficient.
- Using the preexisting PASW Statistics data file Census.sav.

  Exercise 8: To run linear regressions and to interpret the output
- Using the preexisting data file SPSS_CUST.SAV

  Exercise 9: To use nonparametric tests to explore the relationship between several

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Data Warehouse & Multidimensional Modeling		L	T	P	C
Goal	To impart in depth knowledge in Data Warehouse & Multidimentional modelling	3	0	2	4

OBJECTIVES	OUTCOMES
The course enables students to	The students will be able to
• Understand the fundamentals of Data Warehousing • Learn modelling of datawarehousing • Understand the concepts of Multi-Dimensional Modeling and learn the Methodology • Learn Non-Temporal Design of R-OLAP • Learn Non-Temporal Design of M-OLAP.	• Have understood the fundamental concepts of data warehousing • Develop a model for datawarehousing • Do multidimensional modelling of datawarehousing. • Design R-OLAP • Design M-OLAP

Unit 1 Introduction to Data Warehousing
Data Warehouse Architectures, A perspective on decision support applications.

Unit 2 Data Warehousing and Modeling
An Introduction to Data Warehouse Modeling, Differentiating the Warehousing model from the OLTP model, Warehouse Modeling Approaches, OLAP – OnLine Analytical Processing, Basic OLAP Operations.

Unit 3 Multi-Dimensional Modeling – Methodology
Requirement Analysis, Requirements modeling, Terminologies in a Multi-dimension Model, Multi-Dimensional Model Structures, Solution Validation Techniques, Detailed Dimension Modeling.

Unit 4 Non-Temporal Design - R-OLAP
R-OLAP and its design techniques, Design techniques of an R-OLAP System, Dimension-Oriented Design techniques, Fact-oriented Design Techniques, Utilize Cubing Services to improve R-OLAP and M-OLAP performance, Cubing Services performance and scalability, Scalability, Cubing Services security, Role-based security in Cubing Services.

Unit 5 Non-Temporal Design - M-OLAP
IBM Cognos Architecture, Sparse and Dense Dimensions – with Hyperion Essbase, MOLAP characteristics, Online Data Analysis MOLAP and ROLAP.

Text Books
- **Data Warehouse & Multidimensional Modeling** (IBM ICE Publication)

References & URLs
- Data Warehousing and Mining :Concepts, Methodologies, Toolls and Applications (Vol I to VI) by John Wang
- The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, 3rd Edition by Ralph Kimball and Margy Ross
- Open Source Data Warehousing and Business Intelligence by Lakshman Bulusu Auerach Pulications
- Data Mining and Data Warehousing by Bharat Bhushan Agarwal and Sumit Prakash ,Tayal Laxmi Publications.

Data Warehouse & Multidimensional Modeling Lab Exercises

- Exercise 1: Introduction to the Case Study
- Exercise 2: Business Requirements for Rental and Sales Analysis
- Exercise 3: Business Requirements for Working Shifts
- Exercise 4: Business Requirements for Customers
- Exercise 4A. Build a snowflake model for the Customer dimension.
- Exercise 4B. Build a Customer dimension table with the same information content as the previously developed snowflake model.
- Exercise 4C. Using any design techniques you know, build an optimum model for the Customer dimension, taking all the available statistics and association properties into account.

Data Mining and Predictive Modeling		L	T	P	C	
Goal	To provide an in-depth knowledge in data mining and predictive modelling	3	0	2	4	

OBJECTIVES	OUTCOMES
The course enables students to	The students will be able to
• To learn, how to develop models to predict categorical and continuous outcomes, using such techniques as neural networks, decision trees, logistic regression, support vector machines and Bayesian network models. • To know the use of the binary classifier and numeric predictor nodes to automate model selection. • To advice on when and how to use each model. Also learn how to combine two or more models to improve prediction	• Understand the process of formulating business objectives, data selection/collection, preparation and process to successfully design, build, evaluate and implement predictive models for a various business applications. • Compare and contrast the underlying predictive modeling techniques. • Select appropriate predictive modeling approaches to identify particular cases to progress with. • Apply predictive modeling approaches using a suitable package such as SPSS Modeler

Unit 1 Introduction to Data Mining
Introduction, What is Data Mining?, Concepts of Data mining, Technologies Used, Data Mining Process, KDD Process Model, CRISP – DM, Mining on different kinds of data, Applications of Data Mining, Challenges of Data Mining.

Unit 2 Data Understanding and Preparation
Introduction, Reading data from various sources, Data visualization, Distributions and summary statistics, Relationships among variables, Extent of Missing Data. Segmentation, Outlier detection, Automated Data Preparation, Combining data files, Aggregate Data, Duplicate Removal, Sampling DATA, Data Caching, Partitioning data, Missing Values.

Unit 3 Model development & techniques
Data Partitioning, Model selection, Model Development Techniques, Neural networks, Decision trees, Logistic regression, Discriminant analysis, Support vector machine, Bayesian Networks, Linear Regression, Cox Regression, Association rules.

Unit 4 Model Evaluation and Deployment
Introduction, Model Validation, Rule Induction Using CHAID, Automating Models for Categorical and Continuous targets, Comparing and Combining Models, Evaluation Charts for Model Comparison, Meta-Level Modeling, Deploying Model, Assessing Model Performance, Updating a Model.

Text Books:
Data Mining and Predictive Modeling (IBM ICE Publication)

References and URLs
• Bruce Ratner, Statistical and Machine-Learning Data Mining, CRC Press, 2011
• Eric Siegel & Thomas H. Davenport, Predictive Analytics, Wiley Publications, 2013
• James Wu and Stephen Coggeshall, Foundations of Predictive Analytics, CRC Press, 2012

Data Mining and Predictive Modeling Lab Exercises
• Exercise 1: Introduction to the Case Study
• Exercise 2: Data Understanding and Preparation
• Exercise 3: Partitioning Data

Descriptive Analytics (Business Intelligence)		L	T	P	C
Goal	The course describes the business intelligence concepts and the development of BI us	3	0	2	4

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to
• Learn the basics of Business Intelligence. • Learn dashboards design by utilizing key performance indicators that managers can use to improve day-to-day business operations. • To learn how to plan and implement BI development projects. • To know the administrative and deployment scenarios & issues in BI space.	• Understand & appreciate the use of analytical skills and business principles in operational and strategic decision-making by means of BI. • Design and develop dashboards. • Learn the best practices to work on BI projects. • Use IBM Cognos BI tool to develop, implement and administrate wide range of BI artifacts.

Unit 1 Introduction to Business Intelligence
Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components and architecture, BI Components, Future of Business Intelligence, SaaS and Cloud computing techniques, Functional areas of BI tools, End user assumptions, Setting up data for BI, Data warehouse, OLAP and advanced analytics, Supporting the requirements of senior executives including performance management, Glossary of terms and their definitions specific to the field of BI and BI systems.

Unit 2 Elements of Business Intelligence Solutions
Business Query and Reporting, Reporting, Dashboards and Scorecards Development, Development, Scorecards, Metadata models, Automated Tasks and Events, Mobile Business Intelligence, Software development kit (SDK).

Unit 3 Building BI Project
Stages of Business Intelligence Projects, Project Tasks, Risk Management and Mitigation, Cost justifying BI solutions and measuring success, BI Design and Development.

Unit 4 Report Authoring
Building Reports, Building a Report, Drill-up, Drill-down Capabilities.

Unit 5 BI Deployment, Administration and Security
Centralized versus Decentralized Architecture, Phased and Incremental BI road map, Setting early expectations and measuring the results, EPM (Enterprise performance Management), End-User Provisos, OLAP Implementation, Implementation, Data Warehouse Architecture, Predictive Analysis, Text Mining, Authentication, Authorization, Access Permissions, Group and Roles, Single Sign-on (SSO), Data Backup and Restoring.

Text Books
• **Descriptive Analytics (Business Intelligence)** (IBM ICE Publication)

References
- Rajiv Sabherwal and Irma Becerra-Fernandez, Business Intelligence, Wiley Publications (2010)
- Swain Scheps, Business Intelligence For Dummies, Wiley Publications (2011)
- Arshad Khan, Business Intelligence & Data Warehousing Simplified, Mercury learning & information LLC (2012)

Business Intelligence Lab Exercises
- Overview of BI Tool – Cognos Report Studio
- Authoring Reports
- List, Crosstab and Chart Reports
- Grouping and Summarizing data
- Filter, Sort and Calculation

Social, Web and Mobile Analytics		L	T	P	C
Goal	The course is to know the Mobile Analytics, Social and Web analytics	3	0	2	4

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to
• Understand Web & Social Analytics and Mobile Analytics • Understand KPIs/Metrics • Understand management of Social, Web and Mobile Analytics.	• Learn Social, Web and Mobile analyitcs, and management of Social and Web analytics.

Unit No. 1 Introduction to Web & Social Analytics
Overview of web & social media. Need of using analytics, Web analytics technical requirements. Social media environment, Impact of social media on business, How to leverage social media for better services, current analytics platforms, Open source vs licensed platform, choosing right specifications & optimal solution

Unit No. 2 Relevant Data & its collection
Participating with people centric approach, organizing for social media, Choosing focused Data sources & Social networks, collecting and understanding social media data, leverage qualitative data by understanding what, why and how much, usability alternatives, web enabled emerging user research, online surveys

Unit No. 3 KPIs/ metrics
Understand the discipline of social analytics, Aligning social objectives with business goals, Identify common social business objectives, developing KPIs; Standard vs Critical metrics. Bounce rate, exit rate, conversion rate, engagement, strategically aligned KPIs, Tactics to find out best web and social media metrics; moving from strategy to execution, build scorecards & dashboards to track KPIs. Measuring Macro & micro conversions, Quantify Economic value, measuring success for non-ecommerce and B2B websites.

Unit No. 4 Manage Web & Social media with Analytics
Explore & evaluate - Dashboard, Relationships, Sentiments, Evolving Topics, Reports, Content creation & tracking, Competitive Intelligence analysis, website traffic analysis, search & keyword analysis, audience identification & segment analysis, Optimizing social media strategy, Social media enablement audit, Understand signals and potential

Unit No. 5 Future of Social Media Analytics and Monitoring
Mashing Up Data from Disparate Sources; Integrate solution to share outcome with others

Unit No. 6 Introduction to Mobile Analytics
Overview, Web Analytics Vs Mobile Analytics, Social media Analytics Vs Mobile analytics, Need of mobile analytics, Basics of mobile computing – Smart phones, mobile browsers, Mobile applications, Bandwidth, transactions, sessions, handset types & operating systems, mobile operators & their services, WAP gateway or GGSN support, APNs or regional POPs support, Architecture components, mobile web-services, overview of mobile cloud

Unit No. 7 Mobile Customer Experience Management
Mobile as next customer experience frontier, Customers expectations, business impact & criticality, Core metrics for deeper behavior analysis, Integration of different channels – SMS, Instant messaging, chatting, apps, HTML5 enabled sites on browsers for unique experience, Multi-chennal campaning optimization, considerations for best mobile services, Location based media & support

Unit No. 8 Mobile Analytics for Content Publishers & Operators
Mobile Handset Analysis, Mobile Handset Screen Resolution - supported screen resolutions of mobile handsets browsing site in terms of page views, visits and visitors, Mobile Operator Analysis - operator names and countries of subscribers browsing your site in terms of page views, visits and visitors. The types of statistics & reports --Bandwidth (total, average per visit, total per file type), Transactions (average per visit, number of downloads, page view breakdown), Sessions (entry page, average duration, click paths, referring search engine), Subscribers (browser type, user agent, operating system), Operating system (iOS, Android, Blackberry, etc), Mobile applications (YouTube, Facebook, Twitter, etc), Content categorisation (Adult, Video, Social, Ad Networks, etc), Handsets (make, model, screen resolution), Mobile Operator (country of origin, operator name), Geo Location (Visitor location tracking, country of origin, RDNS lookup) Referrer tracking, Search term performance, Specific visitor behaviour, Page views per visit by referrer/advert, Time spent on site by referrer/advert,

Unit No. 9 Email marketing
Logs users email address, Cold callers report

Unit No. 10 Data Functionalities

Page views per annum, Data recording timeframe, Data archiving timeframe, Historic comparison, Integration to client platforms through API, HTTPS Support

Text Books:

- **Social, Web and Mobile Analytics** by IBM ICE Publication

Big Data Analytics & Hadoop		L	T	P	C
Goal	The course is to introduces Big Data Analytics & Hadoop	3	0	2	4

OBJECTIVES	OUTCOMES
The course should enable the students to	The student should be able to
- To work with unconventional & unstructured data sources like Web server logs, Internet click stream data, social media activity reports, mobile-phone call detail records and information captured by sensors to produce analytics. - To understand and use the technologies associated with big data analytics including NoSQL databases, Hadoop and MapReduce. - To practice big data operations on IBM Big Insight platform.	- Understand and appreciate the use-cases & architectural considerations for big data analytics implementation. - Learn best practices to extend data warehousing with Hadoop and other big data technologies across business operations and industries to enable big data analytics.

Unit No. 1 Big Data Concepts

What Is Big Data, Volume, Velocity, and Variety; Why It's Important, Risks Of Big Data, Need Of Big Data, Structure Of Big Data; Exploring Big Data, Filtering Big Data, The Need For Standards; Big Data and Analytics, Adoption Architecture, Benefits & Barriers, Trends for Big Data Analytics

Unit No. 2 Hadoop Fundamentals

Hadoop Architecture, Hadoop File System (HDFS); HDFS Administration ; Map / Reduce concepts; Setup of an Hadoop Cluster ; Managing Job Execution ; move data into Hadoop using Flume, Data Loading ; Overview of workflow engine

Unit No. 3 Query languages for Hadoop

Jaql basics, Jaql data types, Input/output with Jaql, Working with operators and expressions, Use of Pig & Hive

Unit No. 4 Hadoop Reporting and Analysis

Approaches to Big Data reporting and analysis, Big Data Access Technologies for Reporting and Analysis, Business Intelligence and Hadoop Architecture, Direct Batch Reporting on Hadoop, Live Exploration of Big Data, Indirect Batch Analysis on Hadoop

Unit No. 5 Analytics for Big Data at Rest & in Motion

Data Stream overview; Streams Processing Language Basics ;Streams Processing Language Development ; SPL Programming Introduction ; Adapter Operators ; Relational and Utility Operators - The Journey Begins ; Relational and Utility Operators (continued) ; Windowing and Joins ; Punctuation, aggregation and Sorting ; Timing and Coordination ; Lists, Sets, and Maps ; Nodes and Partitions ; Debugging; Adapters and Toolkits.

Text Book:

- **Big Data Analytics** by IBM ICE Publications

Memorandum of Understanding

For imparting Industrial Automation Training
Between

Mecstech Industrial Training Pvt. Ltd (MERC), Ajmer (Raj.)
AND
Techno India NJR Institute of Technology, Udaipur (Raj.)

This Memorandum of Understanding entered into on **January 21, 2020** at Ajmer between Mecstech Industrial training Pvt. Ltd , Ajmer (Raj) hereby and henceforth known as First Party and Techno India NJR Institute of Technology ,Udaipur (Raj.) hereby and henceforth known as Second Party for Conducting 30 days industrial Training represented by the Director which expression shall unless repugnant to the context means and include its successors and assigns of the First Party.

Techno India NJR Institute of Technology Udaipur (Raj.) is represented by the Director which expression shall unless repugnant to the context means and include its successors and assigns of the Second Party.

The parties have had preliminary discussions on this matter and have ascertained areas of broad consensus. The parties now, have therefore, agreed to enter in writing these areas of consensus under a Memorandum of Understanding.

This Memorandum of Understanding witnesses that:

1. The first party will Service provider for PLC Industrial training to the Undergraduate Engineering Students of Electrical & Electronics & other branch in the college.
2. The contents of the course are as per offer letter.
3. Lecture room and Computer Lab equipped with at-least one computers on two/three students will be provided by the Second Party, within its college premises.
4. The duration of the course will be end till **Jan 21, 2020 to Feb 19, 2020.** The fee structure of the training course will be **Rs. 2600 per students** complete courses. (*The fee is applicable if the minimum strength of students enrolling for the program is 50.
5. Training hours will be cover 5 Hrs daily & student doubts and practise session 2 hrs. The fee fixed by mutual consent will be collected by the First party on behalf of Second party these terms will fallow.

MERC
AUTOMATION simplified

CI No.: U80900RJ2019PTC063908

Mecstech Industrial Training (P) Ltd.
ISO Certified 9001:2008

📞 +91-9799494491 (Jaipur), +91-7737278888 (Ajmer)

✉ info@merc.net.in   🌐 www.merc.net.in

A) 50 % Advanced After 10 days of starting date.

B) 50% rest amount will be give after completion.

C) No of student 31 students (1 Student fees will be paid by first party)

D) If number of student will be increased amount will be same.

E) In this training Sunday will include.

1. Last date of Training will be   **Feb. 19, 2020**.
2. Starting date of Training will be **Jan. 21, 2020**
3. Student Project Hardware Amount will be paid by students.
4. Course will be covered in training which is mentioned in Offer letter.
5. Total No of students will be count by daily attendance or certificated.

6. Dispute Resolution:
   In the event of a dispute between the parties in connection with this Agreement, the parties shall seek to resolve such dispute through negotiation. In case of any legal intervention all cases shall be settled according to the Jurisdiction of Ajmer District Court.

In witness whereof the parties hereto have set their hands to this Agreement on the day year and at the place stated at the outset.

Date: Jan 31, 2020
Place: Techno India NJR Institute of Technology, Udaipur

Signed by
For MECSTECH INDUSTRIAL TRAINING PRIVATE LIMITED
Mr. Yogesh Jeshwani (PLC Trainer)
For and on behalf of   AUTHORISED SIGNATORY
Mecstech Industrial Training , Ajmer

For Techno India NJR. Institute of Technology

Signed by

(P.S. Vyas)
Director

Name :   Mr. R. S. Vyas
Designation: Director
For and on behalf of
Techno India NJR Institute of Technology, Udaipur (Raj.)

(College Seal and signature Authority Mandatory)