RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		1	1	

Course Name	**INTERNET OF THINGS**
CO Description	**Interpret the vision of IoT from a global context.**
LO Description	**Define basic concepts of Internet of Things.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Introduction to Internet of Things-Definition and Characteristics of IoT, Applications of IoT, Limitations of IoT, Challenges to implement IoT.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked basic concepts and definitions of IoT and its application with limitations.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		1	2	

Course Name	INTERNET OF THINGS

CO Description	Interpret the vision of IoT from a global context.

LO Description	Classify various devices used in IoT.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents,	Teacher may use working animation for Searching techniques.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to explain various devices used in IoT and IoT protocol model.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		1	3	

Course Name	INTERNET OF THINGS
CO Description	Interpret the vision of IoT from a global context.
LO Description	Compare different technologies used in IoT.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates. • Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**TERM WORK THEORY -I**	Student will be asked to compare or differentiate technologies used in IoT.	**10**	**Test Paper/Quiz**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		C	0	4				2	4	

Course Name	INTERNET OF THINGS
CO Description	Illustrate the application of IoT in various Domains.
LO Description	Explain uses of IoT within a home and city.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Home automation- Smart lighting, smart appliances, intrusion detection, smoke for gas detectors; • Cities- Smart Parking, Smart lighting, Smart Roads, Structural Health Monitoring, surveillance, Emergency Response.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to write applications of IoT in home and city.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		2	5	

Course Name	**INTERNET OF THINGS**
CO Description	Illustrate the application of IoT in various Domains.
LO Description	Outline IoT applications in field of environment and life style.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Environment- Weather monitoring, air pollution monitoring, noise pollution monitoring, forest fire detection, river flood's detection; • Energy- Smart grids, renewable energy systems, prognostics; Retail- Inventory management, smart payments, smart vending machines; • Health and Life Style-Health and fitness monitoring, Wearable.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to write applications of IoT for environment and life style improvements.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C 0 4				2	6	

Course Name	INTERNET OF THINGS
CO Description	**Illustrate the application of IoT in various Domains.**
LO Description	**Summarize of IoT for industry automation.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Logistics- Route generation and scheduling, Fleet tracking, Shipment monitoring, Remote vehicle diagnostics; • Agriculture- Smart Irrigation, Green house control; • Industry- Machine diagnosis and prognosis, indoor air Quality monitoring.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**LAB WORK-1**	Student will be asked to write applications of IoT for industries.	**10**	**Assignment/ Quiz**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		3	7	

Course Name	INTERNET OF THINGS
CO Description	Relate the differences and similarities between IoT and M2M.
LO Description	Explain machine to machine communication.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Introduction IoT and M2M communication, Difference between IoT and M2M.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to compare IoT M2M communication.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		3	8	

Course Name	INTERNET OF THINGS
CO Description	Relate the differences and similarities between IoT and M2M.
LO Description	Draw networking architecture for IoT.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Software defined networking, network function virtualization, difference between SDN and NFV for IoT	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**LAB WORK-2**	Student will be asked to draw and explain architecture of IoT networking architecture.	**10**	**Assignment/Quiz**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		3	9	

Course Name	INTERNET OF THINGS
CO Description	**Relate the differences and similarities between IoT and M2M.**
LO Description	**Identify system management for internet of things.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**TERM WORK THEORY -2**	Student will be asked to write note on system management for IoT.	**10**	**Assignment/Quiz**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. 4
		C	0 4			4	10	

Course Name	INTERNET OF THINGS
CO Description	**Build basic IoT devices for machine automation.**
LO Description	**Choose IoT devices and software for automation system.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Basic Building blocks of an IoT Device, IoT Physical Devices and Endpoints. • Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), • Other IoT devices.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM PRACTICAL**	Student will be asked to list write list of different hardware and software used to develop automation application.	**10**	**Lab Test**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. 4
		C	0	4		4	11	

Course Name	INTERNET OF THINGS
CO Description	Build basic IoT devices for machine automation.
LO Description	Develop basic programs to control IoT devices.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Programming – C program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	END SEM PRACTICAL	Student will be asked to write program for controlling Arduino/Raspberry Pi interface.	10	Lab Test	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		4	12	

Course Name	INTERNET OF THINGS

CO Description	Build basic IoT devices for machine automation.

LO Description	Utilize IoT hardware for home automation application.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Controlling Hardware-Connecting LED, Buzzer, Switching High Power devices with transistors, • Controlling AC Power devices with Relays, Controlling servomotor, speed control of DC Motor, Controlling Motion Detection Sensors.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	END SEM PRACTICAL	Student will be asked to design and run home automation application.	10	Lab Test	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. 4
		C 0 4				5	13	

Course Name	INTERNET OF THINGS
CO Description	Interpret of different IoT platforms design methodology.
LO Description	Outline methodology and design for IoT system.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Introduction, IoT Design and Methodology- Purpose and requirements specification, Process specification, Domain model specification.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to write methodology of IoT system.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

			Branch Code		Course Code		CO Code	LO Code	
RGPV (Diploma Wing) Bhopal		**SCHEME FOR LEARNING OUTCOME**	Branch Code		Course Code		CO Code	LO Code	**Format No. 4**
			C	0	4			5	14	

Course Name		**INTERNET OF THINGS**
CO Description	Interpret of different IoT platforms design methodology.	
LO Description	Summarize cloud technology for IoT storage solution.	

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**TERM WORK THEORY -3**	Student will be asked to explain cloud technology for IoT storage management.	**10**	**Assignment/Quiz**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. **4**
		C	0	4		5	15	

Course Name	INTERNET OF THINGS
CO Description	Interpret of different IoT platforms design methodology.
LO Description	List various ethics in IoT.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Characterizing the IoT, Privacy, Control – Disrupting Control, Crowd sourcing; Environment Physical thing.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END SEM THEORY EXAM**	Student will be asked to write ethics need to be followed in IoT system.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE Internet of Things			FORMAT-**3**	Sheet No. 1
Branch	**COMPUTER SCIENCE AND ENGINEERING**			**Semester**	**SIXTH**
Course Code	**6xx**	**Course Name**	**Internet of Things**		
				(Hrs)	**(Marks)**
Course Outcome 1	**Interpret the vision of IoT from a global context.**			**21**	**30**
Learning Outcome 1	**Define basic concepts of Internet of Things.**			**7**	**ET(10)**
Contents	• Introduction to Internet of Things-Definition and Characteristics of IoT, Applications of IoT, Limitations of IoT, Challenges to implement IoT.				
Method of Assessment	**End Term Examination**				
Learning Outcome 2	**Classify various devices used in IoT.**			**7**	**ET (10)**
Contents	• Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs,				
Method of Assessment	**End Term Examination**				
Learning Outcome 3	**Compare different technologies used in IoT.**			**7**	**TW(10)**
Contents	• IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.				
Method of Assessment	**Term work Theory**				

Course Outcome 2	Illustrate the application of IoT in various Domains.	21	30
Learning Outcome 4	Explain uses of IoT within a home and city.	7	ET(10)
Contents	• Home automation- Smart lighting, smart appliances, intrusion detection, smoke for gas detectors; • Cities- Smart Parking, Smart lighting, Smart Roads, Structural Health Monitoring, surveillance, Emergency Response.		
Method of Assessment	End Term Examination		
Learning Outcome 5	Outline IoT applications in field of environment and life style.	7	ET (10)
Contents	• Environment- Weather monitoring, air pollution monitoring, noise pollution monitoring, forest fire detection, river flood's detection; • Energy- Smart grids, renewable energy systems, prognostics; Retail- Inventory management, smart payments, smart vending machines; • Health and Life Style-Health and fitness monitoring, Wearable.		
Method of Assessment	End Term Examination		
Learning Outcome 6	Summarize of IoT for industry automation.	7	LW(10)
Contents	• Logistics- Route generation and scheduling, Fleet tracking, Shipment monitoring, Remote vehicle diagnostics; • Agriculture- Smart Irrigation, Green house control; • Industry- Machine diagnosis and prognosis, indoor air Quality monitoring;		
Method of Assessment	Internal Lab Work		
Course Outcome 3	Relate the differences and similarities between IoT and M2M.	21	30
Learning Outcome 7	Explain machine to machine communication.	7	ET(10)

Contents	• Introduction IoT and M2M communication, Difference between IoT and M2M,		
Method of Assessment	End Term Examination		
Learning Outcome 8	Draw networking architecture for IoT.	7	LW (10)
Contents	• Software defined networking, network function virtualization, difference between SDN and NFV for IoT.		
Method of Assessment	Internal Lab Work		
Learning Outcome 9	Identify system management for internet of things.	7	TW(10)
Contents	• Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER		
Method of Assessment	Term work Theory		
Course Outcome 4	Build basic IoT devices for machine automation.	21	30
Learning Outcome 10	Choose IoT devices and software for automation system.	7	ET(10)
Contents	• Basic Building blocks of an IoT Device, IoT Physical Devices and Endpoints. • Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), • Other IoT devices.		
Method of Assessment	External Practical		
Learning Outcome 11	Develop basic programs to control IoT devices.	7	ET (10)
Contents	• Programming – C program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.		

Method of Assessment	External Practical		
Learning Outcome 12	Utilize IoT hardware for home automation application.	7	ET(10)
Contents	• Controlling Hardware-Connecting LED, Buzzer, Switching High Power devices with transistors, • Controlling AC Power devices with Relays, Controlling servomotor, speed control of DC Motor, Controlling Motion Detection Sensors.		
Method of Assessment	External Practical		
Course Outcome 5	**Interpret of different IoT platforms design methodology.**	**21**	**30**
Learning Outcome 13	Outline methodology and design for IoT system.	7	ET(10)
Contents	Introduction, IoT Design and Methodology- Purpose and requirements specification, Process specification, Domain model specification,		
Method of Assessment	End Term Examination		
Learning Outcome 14	Summarize cloud technology for IoT storage solution.	7	TW (10)
Contents	• IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs.		
Method of Assessment	Term work Theory		
Learning Outcome 15	List various ethics in IoT.	7	ET(10)
Contents	• Characterizing the IoT, Privacy, Control – Disrupting Control, Crowd sourcing; Environment Physical thing,		
Method of Assessment	End Term Examination		

LIST OF PRACTICALS

1. Study of Arduino/Raspberry Pi, various connectors, breadboard, cable and tools used in IoT applications.

2. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.

3. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED.

4. To interface Buzzer with with Arduino/Raspberry Pi and write a program to turn ON LED when sensor detect obstacle.

5. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.

6. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.

Text Books:

1. Internet of Things – A Hands on Approach, By Arshdeep Bahga and Vijay Madisetti Universities Press.

2. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India.

3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016.

Reference Books:

1. The Internet of Things – Key Applications and Protocols, Wiley Publication, Olivier Hersent, David Boswarthick, Omar Elloumi.

2. The Internet of Things , Pearson, By Michael Miller