

<b>RGPV (DIPLOMA WING) BHOPAL</b>		<b>OBE CURRICULUM FOR THE COURSE</b>		<b>FORMAT-3</b>	Sheet No. 1/5
<b>Branch</b>	Electrical Engineering			<b>Semester</b>	V
<b>Course Code</b>	513	<b>Course Name</b>	Microcontroller		
<b>Course Outcome - 1</b>		<b>Use basics of Digital techniques and explain fundamental elements of Microprocessor and Microcontroller.</b>		<b>Teach Hrs</b>	<b>Marks</b>
<b>Learning Outcome E0151311</b>	Identify basics of Number Systems and logic gates. (Cognitive domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Number Systems: decimal, binary, octal, hexadecimal and BCD; definition and interconversions.</li> <li>• Compliments: 1's and 2's compliment.</li> <li>• Binary Addition and Subtraction.</li> <li>• Logic Gates: AND, OR, NOT, NAND, NOR, X-OR, X-NOR; truth tables and circuit symbols.</li> </ul>				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151312</b>	Explain elements of microprocessor and microcontroller. (Cognitive domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Microprocessor 8085 &amp; 8086: Block Diagram and Functioning.</li> <li>• Microcontroller 8051: Block Diagram, Pin Diagram and Functioning.</li> <li>• Comparison: 8085 and 8086 microprocessor, microprocessor and microcontroller.</li> </ul>				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151313</b>	Demonstrate verification of various Logic Gates. (Psychomotor domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	<ul style="list-style-type: none"> <li>• To perform experiments to verify truth table of following logic gates: AND, OR, NOT, NAND, NOR, X-OR and X-NOR.</li> </ul>				
<b>Method of Assessment</b>	External: Laboratory observation and viva voce.				

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 3/5
Branch	Electrical Engineering			Semester	V
Course Code	513	Course Name	Microcontroller		
<b>Course Outcome -2</b>		<b>Identify functions of various elements of 8051 microcontroller and program it in assembly language.</b>		Teach Hrs	Marks
<b>Learning Outcome E0151321</b>	Illustrate internal architecture of 8051 Microcontroller. (Cognitive domain)			6 Hrs	Marks 10
<b>Contents</b>	8051 Microcontroller Architecture: <ul style="list-style-type: none"> <li>• Different Buses: Data Bus, Address Bus and Control Bus.</li> <li>• Concept of Active High, Active Low, Tristate logic and bus multiplexing.</li> <li>• Registers: A, B, C, D, PC, IR, Flag Register, Stack Pointer, Instruction Decoder, Timing and control Register; Definition and Functions.</li> </ul>				
<b>Method of Assessment</b>		External: End semester theory examination (Pen paper test).			
<b>Learning Outcome E0151322</b>	Explain assembly language instruction set for 8051 microcontroller programming. (Cognitive domain)			6 Hrs	Marks 10
<b>Contents</b>	Assembly Language Instruction Set: <ul style="list-style-type: none"> <li>• Addressing modes: Immediate, Register, Direct, Indirect and Indexed.</li> <li>• Instructions: Arithmetic, logic, jump and loop instructions.</li> <li>• Call and Return instructions: Stacks and Subroutines.</li> <li>• I/O port programming: Instructions to read and write port data</li> <li>• Single Bit Instructions: SETB, CLR, CPL, JB, JNB and JBC instructions.</li> <li>• Simple Programs using all above instructions.</li> </ul>				
<b>Method of Assessment</b>		Internal: Mid semester theory examination (Pen paper test)			
<b>Learning Outcome E0151323</b>	Develop basic assembly language programs for 8051 microcontroller. (Psychomotor domain)			6 Hrs	Marks 10
<b>Contents</b>	<ul style="list-style-type: none"> <li>• To prepare programs in assembly language based on arithmetic and logic operations.</li> <li>• To prepare programs in assembly language based on subroutines.</li> <li>• To prepare programs in assembly language to receive and send data through ports.</li> </ul>				
<b>Method of Assessment</b>		External: Laboratory observation and viva voce.			

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 3/5
Branch	Electrical Engineering			Semester	V
Course Code	513	Course Name	Microcontroller		
<b>Course Outcome – 3</b>		<b>Make use of C language instructions for 8051 microcontroller programming.</b>		Teach Hrs	Marks
<b>Learning Outcome E0151331</b>	Outline C language programming for 8051 microcontroller (Cognitive domain)			6 Hrs	Marks 10
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Advantages of High Level Language, concept of compilers.</li> <li>• Introduction to C programming: Header files, data types (Unsigned char, Signed char, Unsigned int, Signed int, float, Sbit, Bit and sfr.</li> <li>• ASCII code, concept of Functions and Loops.</li> </ul>				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151332</b>	Develop program for 8051 microcontroller in C language (Cognitive domain)			6 Hrs	Marks 10
<b>Contents</b>	8051 programming in C language for: <ul style="list-style-type: none"> <li>• Data type and time delay</li> <li>• I/O programming</li> <li>• Logic operations</li> </ul>				
<b>Method of Assessment</b>	Internal: Mid semester theory examination (Pen paper test)				
<b>Learning Outcome E0151333</b>	Prepare program in C language for specified tasks. (Psychomotor domain)			6 Hrs	Marks 10
<b>Contents</b>	<ul style="list-style-type: none"> <li>• To prepare programs in C language for time delay.</li> <li>• To prepare programs in C language for I/O programming.</li> <li>• To prepare programs in C language for logic operations.</li> </ul>				
<b>Method of Assessment</b>	Internal: Laboratory observation and viva voce.				

RGPV (DIPLOMA WING) BHOPAL		<b>OBE CURRICULUM FOR THE COURSE</b>		FORMAT-3	Sheet No. 4/5	
Branch	Electrical Engineering			Semester	V	
Course Code	513	Course Name	Microcontroller			
<b>Course Outcome – 4</b>		<b>Model Programming in C for interfacing of 8051 microcontroller with peripheral devices.</b>			Teach Hrs	Marks
<b>Learning Outcome E0151341</b>	Apply C language programming for 8051 microcontroller-Timers and Ports. (Cognitive domain)			6 Hrs	Marks 10	
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Programming 8051 timers.</li> <li>• Counter programming.</li> <li>• Basics of serial communication.</li> <li>• 8051 microcontroller connection to RS232.</li> <li>• Simple programming.</li> </ul>					
<b>Method of Assessment</b>		Internal: Assignments/Quiz and viva voce				
<b>Learning Outcome E0151342</b>	Describe 8051 microcontroller interrupts. (Cognitive domain)			6 Hrs	Marks 10	
<b>Contents</b>	Introduction to 8051 microcontroller Interrupts: <ul style="list-style-type: none"> <li>• Timer interrupts</li> <li>• External hardware interrupts</li> <li>• Serial communication interrupts</li> </ul>					
<b>Method of Assessment</b>		External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151343</b>	Practice programs in C Language for 8051 microcontroller Ports, Timers and Interrupt instructions. (Psychomotor domain)			6Hrs	Marks 10	
<b>Contents</b>	<ul style="list-style-type: none"> <li>• To prepare programs in C language for serial Ports of 8051 microcontroller.</li> <li>• To prepare programs in C language for Timers of 8051 microcontroller.</li> <li>• To prepare programs in C language using Interrupt instructions of 8051 microcontroller.</li> </ul>					
<b>Method of Assessment</b>		Internal: Laboratory observation and viva voce.				

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 5/5
Branch	Electrical Engineering			Semester	V
Course Code	513	Course Name	Microcontroller		
<b>Course Outcome – 5</b>		<b>Utilize various peripheral devices and program them for 8051 microcontroller interfacing in C language.</b>		<b>Teach Hrs</b>	<b>Marks</b>
<b>Learning Outcome E0151351</b>	Describe interfacing for 8051 microcontroller (Cognitive domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	Peripheral Interfacing: <ul style="list-style-type: none"> <li>• Keyboard, LED and LCD interfacing.</li> <li>• ADC, DAC and Sensor interfacing.</li> </ul>				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151352</b>	Describe peripheral devices used with 8051 microcontroller. (Cognitive domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	Relay: electromechanical, driving circuit, solid state relay Opto-isolators: operation Stepper motor: Introduction, step angle, steps per second and rpm relationship				
<b>Method of Assessment</b>	External: End semester theory examination (Pen paper test).				
<b>Learning Outcome E0151353</b>	Accomplish programming for control of various types of peripheral devices. (Psychomotor domain)			<b>6 Hrs</b>	<b>Marks 10</b>
<b>Contents</b>	<ul style="list-style-type: none"> <li>• To prepare programmes for keyboard interfacing with 8051 microcontroller.</li> <li>• To prepare programmes for LCD interfacing with 8051 microcontroller.</li> <li>• To prepare programmes for speed control of DC motor /position control of stepper motor.</li> </ul>				
<b>Method of Assessment</b>	External: Laboratory observation and viva voce.				

**REFERENCE BOOKS:**

<b>S.N.</b>	<b>Title &amp; Publication</b>	<b>Author</b>
1.	Digital Design, Publisher: Prentice Hall of India Pvt. Ltd., ISBN: 9788131794746/9788131714508, 8131714500	M. Morris Mano, Michael D. Ciletti,
2.	Digital Electronics: Principles, Devices and Applications, Publisher: Willy	Maini, A. K.
3.	8051 Microcontroller and Embedded Systems, Publisher: Pearson Education India, ISBN: 9788131710265, 9788131710265	Mazidi, M. A.
4.	Fundamentals of Microprocessors and Microcontrollers, Publisher: Dhanpat Rai Publishing Co Pvt Ltd, ISBN: 9789383182107, 9789383182107	Ram, B.
5.	Microcontrollers, Publisher: Tech-Neo Publications LLP, ISBN: 9789389251968	Shah, U. S.
6.	Microcontrollers, Publisher: Ishan Publications, Ambala City, Haryana, ISBN: 9789387646414	Gupta, S.
7.	Microcontrollers: Architecture, Implementation, & Programming - Architecture, Implementation, and Programming, Publisher: Tata McGraw Hill Education India, ISBN: 9780070606272, 9780070606272	Hintz Kenneth
8.	Programming in C, Publisher: Tata McGraw Hill India, ISBN: 9780074600474	Balagurusamy, E.