RGPV (Diploma Wing) Bhopal	SEMESTER TEACHING LEARNING & ASSESSMENT PLAN	FORMAT- 6

NAME OF PROGRAMME	THREE YEARS DIPLOMA	SCHEME	OBE	IMPLEMENTING YEAR	2020-21

BRANCH CODE		NAME OF BRANCH	ELECTRICAL and ELCTRONICS ENGG		SEMESTER	III

S. No	COURSE CODE	COURSE NAME	PAPER CODE	CREDITS	No. of COs	No. of LOs	Total T-L Hrs.	T-L Hrs. /Week	Internal Assessment No. of LOs	Internal Assessment Total Marks	Theory Paper No. of LOs	Theory Paper Total Marks	Theory Paper Duration	Practical Exam * No. of LOs	Practical Exam * Total Marks	Practical Exam * Duration	Grand Total of Marks
1	301	DC Machines and Transformers	6840	06	5	15	120	08	6	45	6	70	3Hrs	3	35	3Hrs	150
2	302	EEMMI	6841	06	5	15	105	07	5	45	6	70	3Hrs	3	35	3Hrs	150
3	303	Electrical Circuits	6842	06	5	15	120	08	5	45	6	70	3Hrs	4	35	3Hrs	150
4	304	Digital electronics	6822	06	05	15	95	06	3+3	60	07	70	3Hrs.	02	20	3Hrs.	150
5	305	Professional development-III		02	03	06	60	04	6	75							75
				26				33		270		280			125		675

		No. of Theory Papers	04	No. of Practical Exams	04

*Exam for LOs (Psycho + Affect.)

Branch	ELECTRICAL AND ELECTRONICS ENGINEERING		Semester	III

Course Code	301/6840	Course Name	D C Machines and Transformers

Course Outcome 1	**Describe constructional details of DC machine, explain working principle and calculate performance of DC generator**	Teach Hrs	Marks
Learning Outcome 1	Describe various parts of DC machine, explain working principle of DC generator, classify DC generator and their applications. *(Cognitive domain)*	10	12
Contents	• Construction of DC machine: Parts - materials and their functions, armature windings. • DC generator: Working principle, armature reaction, commutation, interpoles, compensating winding, classification and applications.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 2	Derive emf equation and calculate induced emf, losses & efficiency of DC generators. *(Cognitive domain)*	6	8
Contents	• Emf equation, losses & efficiency of DC generators. • Numerical problems related to emf, losses and efficiency.		
Method of Assessment	*Internal: Mid Semester Exam 1 - Pen paper test & Assignment*		
Learning Outcome 3	Plot the magnetization and internal characteristics of DC shunt generator. *(Psychomotor & affective domain)*	6	7
Contents	• Magnetization and internal characteristics of DC shunt generator.		
Method of Assessment	*Internal: Performance of Task, observation &Viva Voce.*		
Learning Outcome 4	Plot the load characteristics of DC shunt generator. *(Psychomotor domain)*	8	10
Contents	• Load characteristic of DC shunt generator.		
Method of Assessment	*External: End Semester Practical Exam - Performance of Task & Viva Voce*		
Course Outcome 2	**Select type of DC motor for a given application, apply speed control methods and conduct tests of DC motors.**	Teach Hrs	Marks
Learning Outcome 5	Explain working principle of DC motor, classification, applications and describe construction, working and applications of Brushless DC motor. *(Cognitive domain)*	6	7

Contents	• Principle of operation, back emf and its significance, torque equation, classification of DC motors. • Construction, working and applications of Brushless DC motor.		
Method of Assessment	*Internal: Mid Semester Exam 1 - Pen paper test & Assignment*		
Learning Outcome 6	Explain performance characteristics, starting methods of DC motors and calculate back emf, torque, speed, losses and efficiency.(*Cognitive domain*)	10	12
Contents	• Characteristics and starting methods of DC motors. • Necessity of starters, construction & working of three point and four-point starter. • Speed control of DC shunt and series motor: Flux and Armature control method. • Numerical related to back emf, torque, speed, losses and efficiency.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 7	Apply field and armature control methods to vary speed of DC shunt motor. *(Psychomotor domain)*	8	10
Contents	• Field and armature control methods of DC shunt and series motor.		
Method of Assessment	*External: End Semester Practical Exam - Performance of Task, Viva Voce.*		
Learning Outcome 8	Perform Swinburne and brake test on DC motor. *(Psychomotor & affective domain)*	6	8
Contents	• Swinburne's test on DC shunt motor. • Brake test on DC series motor.		
Method of Assessment	*Internal: Performance of Task, observation & Viva Voce.*		
Course Outcome 3	**Classify types of single phase transformer and determine its performance by conducting various tests.**	Teach Hrs	Marks
Learning Outcome 9	Describe construction, explain working principle, derive emf equation and classify single phase transformer. *(Cognitive domain)*	6	8
Contents	• Construction of transformer: Parts-materials and their functions. • Principle of operation, emf equation, transformation ratio and name plate rating. • Types of transformer: Shell type and core type, step up and step down, distribution and power transformer.		
Method of Assessment	*Internal: Mid Semester Exam 2- Pen paper test & Assignment*		
Learning Outcome 10	Draw & explain equivalent circuits, phasor diagrams and determine efficiency & voltage regulation of single phase transformer. *(Cognitive domain)*	10	14
Contents	• Equivalent circuits and phasor diagrams. • Losses, efficiency, condition for maximum efficiency, All day efficiency and voltage regulation.		

	• Numerical problems.
Method of Assessment	*External : End Semester Theory Exam –Pen paper test*

Learning Outcome 11	Conduct various tests of single phase transformer and perform parallel operation of two single phase transformer. *(Psychomotor domain)*	12	15
Contents	• Perform polarity test on a single phase transformer. • Perform open circuit & short circuit test on single phase transformer and determine voltage regulation and efficiency. • Perform parallel operation of two single phase transformers.		
Method of Assessment	*External: End Semester Practical Exam - Performance of Task &Viva Voce.*		

Course Outcome 4	**Compare and illustrate various types of 3-phase transformer.**	Teach Hrs	Marks
Learning Outcome 12	Compare single unit of three phase transformer with bank of 3 single phase transformers and sketch the different types of connections of 3-phase transformers including vector groups. *(Cognitive domain)*	10	12
Contents	• Bank of 3 single phase transformers, single unit of three phase transformer. • Connections, vector groups, Scott and open delta connection.		
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*		
Learning Outcome 13	Explain need and condition of parallel operation of three phase transformer and describe criteria for selection of distribution and power transformer. *(Cognitive domain)*	6	7
Contents	• Need and conditions of parallel operation of three phase transformer. • Cooling methods and criteria for selection of distribution transformer and power transformer as per- IS: 10028 (Part-1)-1985.		
Method of Assessment	*Internal: Mid Semester Exam 2 - Pen paper test & Assignment*		

Course Outcome 5	**Select special purpose transformers for various applications**	Teach Hrs	Marks
Learning Outcome 14	Describe constructional features and working principles of various special purpose transformers. *(Cognitive domain)*	10	12
Contents	• Single phase and three phase auto transformers: Construction and working principle. • Instrument transformers: Construction and working of Current transformer &Potential transformer. • Isolation transformer: Constructional features • Single phase welding transformer: Constructional features.		

	• Pulse transformer: Constructional features.
Method of Assessment	*External : End Semester Theory Exam - Pen paper test*

Learning Outcome 15	State applications of different type of special purpose transformers.	6	8
Contents	Applications of- • Single & three phase auto transformers. • Instrument transformers. • Isolation transformer. • Single phase welding transformer and • Pulse transformer.		
Method of Assessment	*External: End Semester Theory Exam - Pen paper test*		

Reference Books:
1. P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93-86173-607), New Delhi
2. Kothari, D. P. and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi,
ISBN: 9780070699670
ISBN: 9780070593572
3. Theraja B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi, ISBN: 9788121924375
4. Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi,
ISBN: 9789332902855
5. Mehta, V. K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi, ISBN: 9788121930888
6. Mittle, V.N. and Mittle, Arvind., Basic Electrical Engineering, McGraw Hill Education, New Delhi,
7. S.K. Sahdev, Electrical Machines, Cambridge University Press,ISBN:9781108431064
8. M. K. Deodiya, Vidhyut Machine (Hindi), Madhya Pradesh Hindi Granth Academy, Bhopal.

Branch	ELECTRICAL AND ELECTRONICS ENGINEERING		Semester	3

Course Code	302/6841	Course Name	Electrical and Electronics Measurements and Measuring Instruments (EEMMI)

Course Outcome 1	Identify various type of measuring instruments	Teach Hrs	Marks
Learning Outcome 1	Explain fundamentals of measuring instruments (Cognitive domain)	7	10
Contents	• Measurement: Significance, units, fundamental quantities and standards. • Static and dynamic characteristics of instruments, types of errors. • Calibration: Need and procedure.		
Method of Assessment	Internal: Assignment and viva voce		
Learning Outcome 2	Classify measuring instruments (Cognitive domain)	6	9
Contents	• Static and dynamic characteristics, types of errors. • Calibration: Need and procedure. • Classification of Instruments: Null and deflection type instruments, absolute and secondary instruments, analog and digital instruments, indicating, recording and integrating instruments.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 3	Calibrate given measuring instruments (Psychomotor domain)	4	6
Contents	• To perform calibration and calculation of errors for Ammeter and Voltmeter • To perform calibration and calculation of errors for Wattmeter.		
Method of Assessment	Internal: Performance of given task and viva voce		

Branch		Electrical Engineering		Semester	3
Course Code	302/6841	Course Name	Electrical and Electronics Measurements and Measuring Instruments (EEMMI)		

Course Outcome 2	Use different types of measuring instruments for measuring current, voltage and frequency.	Teach Hrs	Marks
Learning Outcome 4	Explain basics of electrical measuring instruments and their construction (Cognitive domain)	7	10
Contents	• Basics of measuring instruments. • Electrical measuring instruments: Construction of PMMC meter, Electrodynamometer, Moving iron and Induction type instruments. • Construction of Instrument transformers and Tong tester. • Frequency meter: Construction of Weston and Resonance type meter.		
Method of Assessment	Internal: Mid semester-I theory examination (Pen paper test)		
Learning Outcome 5	Identify use of electrical measuring instruments and explain their working (Cognitive domain)	7	9
Contents	• Electrical measuring instruments: Operation of PMMC meter, Electrodynamometer, Moving iron and Induction type instruments • Working of instrument transformers. • Frequency meter: Operation of Weston and Resonance type meter. Extension of range of Ammeter and Voltmeter using shunt, multiplier, CT and PT. Simple numerical problems.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 6	Extend the range of instruments for given requirement (Psychomotor domain)	6	9
Contents	• To measure current and voltage using C.T. and P.T. for extension of instrument range.		
Method of Assessment	Internal: Performance of given task and viva voce		

Branch		Electrical Engineering		Semester	3
Course Code	302/6841		**Course Name**	Electrical and Electronics Measurements and Measuring Instruments (EEMMI)	

Course Outcome 3	Use different types of measuring instruments for measurement of power, energy and power factor.	Teach Hrs	Marks
Learning Outcome 7	Explain construction of instruments used in power and energy measurement (Cognitive domain)	**7**	**10**
Contents	• Dynamometer type Wattmeter: Construction. • Single phase and three phase electronic energy meter: Constructional features (block diagram). • Dynamometer type power factor meter and digital power factor meter (block diagram)		
Method of Assessment	Internal: Mid semester-II theory examination (Pen paper test)		
Learning Outcome 8	Make use of various instruments for measurement of power, energy and power factor (Cognitive domain)	**10**	**14**
Contents	• Power measurement using Voltmeter - Ammeter method. • Dynamometer type Wattmeter: Working, errors, compensations and extension of range of Wattmeter using CT and PT. • Single phase and three phase electronic energy meter: Working principle and constructional features (block diagram). • Dynamometer type power factor meter and digital power factor meter (block diagram) • Synchroscope: Working principle and application.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 9	Use of given instrument for measurement of electrical quantities (Psychomotor and affective domain)	**10**	**14**
Contents	• Measurement of P.F. by Ammeter, Voltmeter and Wattmeter method. • Measurement of 3-phase power by two Wattmeter method and follow standard safety norms. • Demonstration and measurement of energy by digital Energy meter.		
Method of Assessment	External: Performance of given task and Observation / viva voce		

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Branch		Electrical Engineering		Semester	3

Course Code	302/6841	Course Name	Electrical and Electronics Measurements and Measuring Instruments (EEMMI)

Course Outcome 4	Measure circuit parameters using DC and AC bridges.	Teach Hrs	Marks
Learning Outcome 10	Apply various methods used to measure resistance (Cognitive domain)	8	11
Contents	• Measurement of resistance • Low resistance: Kelvin's double bridge. • Medium resistance: Voltmeter-Ammeter method, Wheatstone bridge. • High resistance: Megger and Ohm meter. • Earth resistance: Earth tester.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 11	Use of AC bridges for measurement of inductance, capacitance and frequency (Cognitive domain)	7	9
Contents	• Measurement of self-inductance: Maxwell's bridge, Hay's bridge, Anderson bridge (No phasor diagrams). • Measurement of capacitance: De-Sauty's bridge & Schering bridge (No phasor diagram) • Measurement of frequency by Wien's bridge.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 12	Measure given electrical circuit parameters (Psychomotor domain)	8	12
Contents	• Measurement of low resistance by Kelvin's Double bridge. • Measurement of medium resistance by Wheatstone bridge. • Measurement of insulation resistance by Megger. • Measurement of inductance by Maxwell's bridge.		
Method of Assessment	External: Performance of given task / viva voce		

RGPV (DIPLOMA WING) BHOPAL	OBE CRRICULUM FOR THE COURSE	FORMAT-**3**	Sheet No. 5/6

Branch		Electrical Engineering		Semester	3
Course Code	302/6841	Course Name		Electrical and Electronics Measurements and Measuring Instruments (EEMMI)	

Course Outcome 5	Apply electronic and digital instruments for measurement of various electrical quantities.	Teach Hrs	Marks
Learning Outcome 13	Explain working of oscilloscope and utilize it for measurement of various electrical quantities (Cognitive domain)	**6**	**9**
Contents	• Single & dual trace CRO: Basic block diagram, specification & working, Cathode ray tube, electrostatic deflection, vertical amplifier, time base generator, horizontal amplifier. • Use of CRO: Measurement of voltage, time period, frequency & phase difference (Lissajous patterns). • Digital Storage Oscilloscope (DSO): Block diagram and functioning.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 14	Use of electronic and digital instruments for measurement of various electrical quantities (Cognitive domain)	**6**	**9**
Contents	• Electronic Voltmeter: Block diagram and functioning of TVM, FETVM and Rectifier type voltmeter. • Digital LCR meter: Block diagram and functioning. • Digital Voltmeter: Block diagram and working of ramp type DVM. • Digital frequency meter: Block diagram and functioning.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 15	Perform measurement of voltage, frequency and phase difference by oscilloscope (Psychomotor domain)	**6**	**9**
Contents	• Use of CRO for measurement of voltage, frequency and phase difference. • Demonstration of digital storage oscilloscope.		
Method of Assessment	External: Performance of given task and viva voce		

REFERENCE BOOKS:

S.N.	Title& Publication	Author
1	Electrical and Electronics Measurements and Instrumentation., Dhanpai Rai and Co., New Delhi, ISBN : 9780000279744	Sawhney A.K.
2	Electrical Measurements, Technical Publication Pune.	Bakshi U. A., Bakshi A. V. and Bakshi K. A.
3	A Text Book of Electrical Technology Vol-I (Basic Electrical Engg.), S. Chand and Co. New Delhi, ISBN: 9788121924405	Theraja B. L. and Theraja A. K.
4	Electrical and Electronic Measurement and Instrumentation, S. Chand and Co. New Delhi, ISBN : 9789385676017	Rajput R.K.
5	Modern Electronic Instruments and Measurement Techniques, PHI, ISBN: 9788120307520	Helfrick A. D. and Cooper W. D.
6	Electrical Measurements and Measuring Instruments, Wheeler's Publishing, ISBN: 9788190630726, 8190630725	Widdis F. C. and Golding E. W.
7	Electrical Measurements and Measuring Instruments, S. K. Kataria and sons, Delhi, ISBN: 9788188458264	Gupta J. B.

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Branch	ELECTRICAL AND ELECTRONICS ENGINEERING	Semester	3

Course Code	303/6840	Course Name	Electrical circuit

Course Outcome 1	Analyse electrical circuits	Teach Hrs	Marks
Learning Outcome 1	Explain electrical circuit terms and elements (Cognitive domain)	4	5
Contents	• Circuit terms: Mesh, loop, node, branch, junctions of a network. • Sources: Ideal and practical voltage, Ideal and practical current source, sources transformation • Classification of Elements: Active and passive elements, unilateral and bilateral elements, linear and nonlinear elements,		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 2	Calculate the current, voltage, power in a given DC circuit using loop and Nodal method (Cognitive domain)	8	10
Contents	• Kirchhoff current law, Kirchhoff voltage law • Loop and Nodal method • Problem based on Kirchhoff current law, Kirchhoff voltage law, loop and Nodal method		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 3	Determine Z and Y parameters of T and π network (Psychomotor domain)	4	5
Contents	• To determine Z -parameter of T and π network • To determine Y-parameter of T and π network • To simulate T and π network for determining Z and Y parameters		
Method of Assessment	External: Performance of given task and viva voce		

Branch		Electrical Engineering		Semester	3
Course Code	303/6840		Course Name	Electrical circuit	

Course Outcome 2	**Apply network theorems in electrical circuit.**	Teach Hrs	Marks
Learning Outcome 4	Explain different theorems and solve DC circuit using a given theorem (Cognitive domain)	8	10
Contents	• Superposition theorem • Thevenin's theorem • Maximum Power Transfer Theorem • Problems based on above theorems		
Method of Assessment	Internal: Mid semester-I theory examination (Pen paper test)		
Learning Outcome 5	Calculate the current, voltage in a given DC circuit using theorem. (Cognitive domain)	12	15
Contents	• Superposition theorem • Thevenin's theorem • Norton's theorem • Maximum Power Transfer Theorem • Numerical problems based on above theorems		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 6	Perform experiment on a given theorem and find the parameters (Psychomotor domain)	8	10
Contents	• To find branch current using Superposition theorem • To find load current using Thevenin's theorem		
Method of Assessment	External: Performance of given task / viva voce		
Learning Outcome 7	Perform experiment on a given theorem and find the parameters (Psychomotor domain)	8	10
Contents	• To find load current using Norton's theorem. • To find load resistance for Maximum Power Transfer • To simulate electrical circuit for verification of Norton's theorem and Maximum Power Transfer theorem		
Method of Assessment	Internal: Performance of given task and viva voce		

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Branch	Electrical Engineering		Semester	3
Course Code	303/6840	Course Name	Electrical circuit	

Course Outcome 3	Determine electrical quantities of single phase AC circuit	Teach Hrs	Marks
Learning Outcome 8	Represent AC quantities and Calculate electrical quantities of single phase AC circuit (Cognitive domain)	12	15
Contents	• Representation of AC quantities by phasor method, Conversion of polar to rectangular and vice versa. • RL, RC, RLC series and parallel circuits. combination of AC circuits, impedance, admittance, reactance, phasor diagram, impedance triangle, power factor, active power, reactive power, apparent power, power triangle. • Resonance in AC circuits, bandwidth, Q factor. • Numerical problems on AC fundamentals		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 9	Explain AC quantities and solve given single phase AC circuit (Cognitive domain)	8	10
Contents	• Representation of AC quantities by phasor method, Conversion of polar to rectangular and vice versa. • RL, RC, RLC series and parallel circuits. combination of AC circuits, • Impedance, admittance, reactance, phasor diagram, impedance triangle, power factor, active power, reactive power, apparent power, power triangle. • Resonance in AC circuits, bandwidth, Q factor.		
Method of Assessment	Internal: Mid semester-II theory examination (Pen paper test)		
Learning Outcome 10	Measure electrical quantities of single phase AC circuit (Psychomotor domain)	8	10
Contents	• To determine parameters impedance, admittance, reactance of given RLC series circuit. • To determine active power, reactive power, apparent power and power factor of given RLC series circuit. • To measure resonance frequency of given RLC series circuit.		
Method of Assessment	External: Performance of given task and viva voce		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-**3**	Sheet No. 4/5
Branch	**Electrical Engineering**	**Semester**	**3**
Course Code 303/6840	**Course Name**	Electrical circuit	

Course Outcome 4	**Determine electrical quantities of three phase AC circuit**	**Teach Hrs**	**Marks**
Learning Outcome 11	Explain concepts and solve problems on three phase AC circuit (Cognitive domain)	**8**	**10**
Contents	• Phasor and complex representation of three phase supply, Phase sequence and polarity • Three phase power, active, reactive and apparent power in star and delta system for balanced load.		
Method of Assessment	Internal: Assignment and Quiz		
Learning Outcome 12	Determine parameter of three phase AC circuit (Cognitive domain)	**8**	**10**
Contents	• Phasor and complex representation of three phase supply, Phase sequence and polarity • Phase and line quantities in three phase star and delta system for balanced load. • Three phase power, active, reactive and apparent power in star and delta system for balanced load.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 13	Perform experiment on three phase AC circuit (Psychomotor and affective domain)	**8**	**10**
Contents	• To verify relation between Phase and line voltage, current in a star network and follow standard safety norms. • To verify relation between Phase and line voltage, current in a delta Network and follow standard safety norms.		
Method of Assessment	External: Performance of given task and Observation / viva voce		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-**3**	Sheet No. 5/5
Branch	Electrical Engineering	**Semester**	**3**
Course Code 303/6840	**Course Name**	Electrical circuit	

Course Outcome 5	**Interpret transient response of an electrical circuit.**	**Teach Hrs**	**Marks**
Learning Outcome 14	Determine time constant (τ)' for R-L and R-C circuit and explain performance (Cognitive domain)	12	15
Contents	• Initial and final condition for inductors, capacitors • DC transients and steady state response of a series R-L circuit and R-C Circuit		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 15	Calculate time constant (τ)' for R-L and R-C circuit and explain its performance (Psychomotor domain)	4	5
Contents	• To simulate R-L series DC circuit and plot transients and steady state response • To simulate R-C series DC circuit and plot transients and steady state Response		
Method of Assessment	Internal: Performance of given task and viva voce		

REFERENCE BOOKS:

S.N.	Title & Publication	Author
1	Networks & Systems, Khanna Book Publishing, New Delhi.	Ashfaq Husain
2	Basic Electrical Engineering, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-2	Mittle, V.N. ;Mittle, Arvind
3	A Text Book of Electrical Technology Vol-I, S. Chand & Co. Ram-nagar, New Delhi, ISBN : 9788121924405	Theraja, B. L. : Theraja, A. K;,
4	Circuit and network, McGraw Hill Education, New Delhi, ISBN : 978-93-3921-960-4	Sudhakar, A. ; Shyammohan, S. Palli
5	Fundamentals of Electrical Engineering, Cambridge University Press Pvt. Ltd., New Delhi, ISBN : 978-11-0746-435-3	Saxena, S.B Lal; Dasgupta, K
6	Electrical Circuits (Hindi), Satya Prakashan New Delhi	Suresh Kumar Soni & Umesh Kumar Soni

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-**3**	Sheet No. 1/5

Branch	Electrical & Electronics		Semester	3

Course Code	304/6822	Course Name		Digital Electronics

Course Outcome 1	Examine the structure of various number system, codes and logic gates.	Teach Hrs	Marks
Learning Outcome 1	List out different types of number system & code and convert one to another. *(Cognitive)*	5	8

Contents	**Number System:** Decimal number, binary number, octal and Hexadecimal number. **Binary Codes:** Weighted and un-weighted codes BCD, Gray, Excess-3. **Conversion of number system and code:** (Decimal number, binary number, octal and Hexadecimal number, BCD, Gray, Excess-3)		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 2	Perform various binary arithmetic operation. *(Cognitive)*	6	10
Contents	**Binary operations:** Binaryaddition, subtraction, Multiplication, Division. **Complement of number:** Complements: 1's, 2's, 9's and 10's. Subtraction using 1's and 2's complement.		
Method of Assessment	Internal: Mid semester-I theory examination (Pen paper test)		
Learning Outcome 3	Verify truth table of all the gates. *(Psychomotor)*	7	12
Contents	**Logic Gates:** Symbol, operation and truth-table: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR Realization of logic gates using universal gates. **Logic System:** Positive and negative logic system. Verification of the basic logic gates (AND, OR,NOT NAND , NOR ,EX-OR and EX-NOR).		
Method of Assessment	External: Verification of given task and viva voce		

Branch		Electrical & Electronics		Semester	3

Course Code	304/6822	Course Name	Digital Electronics

Course Outcome 2	Construct and Examine simple combinational digital circuit.	Teach Hrs	Marks
Learning Outcome 4	Verify Boolean algebra laws and theorems. *(Psychomotor)*	5	8
Contents	**Laws and theorems of Boolean algebra:** Boolean laws, De-Morgan's Theorem and Duality Theorem, Complement of Boolean equations. Verification of De- Morgan's theorem.		
Method of Assessment	Internal: Verification of given task and viva voce		
Learning Outcome 5	Solve Boolean expressions using K-map and realize its logic circuit. *(Cognitive)*	6	10
Contents	**Karnaugh-map:** Boolean expressions: Sum of product and product of sum, Karnaugh maps and its use for simplification up to four variable Boolean expressions, Don't care condition. **Realization of logic equations:** The universal building blocks-NAND & NOR, AND-OR network, NAND-NAND Logic for implementation of Boolean expressions.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 6	Implement different type of adder and subtractor circuits. *(Cognitive)*	8	14
Contents	**Adder and Subtractor Circuit:** Half adder, full adder, parallel binary adder, 8421 adder, half subtractor, full subtractor, parallel binary subtractor.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 7	Design different type of coder and multiplexer circuits *(Psychomotor)*	4	7
Contents	**Coder Circuit:** Encoder, Decoder (2 to 4 line,3 to 8 line, BCD to Decimal, Decimal to7 segment) **MUX Circuit:** Multiplexers: 4 to1 and 8 to1. De-Multiplexers: 1 to 4 and 1 to 8. (Block Diagram and Truth table) Verification of encoder, decoder, multiplexer and de-multiplexer circuit.		
Method of Assessment	Internal: Performance of given task and viva voce		

Branch		Electrical & Electronics	Semester	3
Course Code	304/6822	**Course Name**	Digital Electronics	

Course Outcome 3	Analyze flip-flop circuit, counters, shift registers and understand their operation.	Teach Hrs.	Marks
Learning Outcome 8	Analyze the working of various flip-flops and verify its outputs. *(Psychomotor)*	7	12
Contents	**Flip-Flop:** S-R flip-flops(FF), D FF, Types of Triggering, Glitch, JK FF race around condition and remedies, JK Master Slave FF and T FF. Verification of various flip-flops		
Method of Assessment	External: Performance of given task and viva voce		
Learning Outcome 9	Draw and explain different type of registers. *(Cognitive)*	6	10
Contents	**Registers:** Shift Register (3 to 4 bits only)- introduction, circuit diagram and waveforms of SISO, SIPO, PISO, PIPO shift registers.		
Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 10	Design different type of synchronous and asynchronous counters. *(Psychomotor)*	7	11
Contents	**Counters:** Asynchronous: Up/down counters, Up-down counters. Synchronous Counters. Up/down counters, Ring counter, Johnson counter. Design Mode-4 counters.		
Method of Assessment	External: End semester theory examination (Pen paper test)		

Branch	Electrical & Electronics		Semester	3

Course Code	304/6822	Course Name		Digital Electronics

			Teach Hrs	Marks
Course Outcome 4	Demonstrate the functioning of A to D and D to A Converters.			
Learning Outcome 11	Draw and explain various operation of D/A conversion circuits. *(Cognitive)*		6	10
Contents	**D/A Conversion**: Weighted resister, R-2R ladder network.			
Method of Assessment	Internal: Mid semester-II theory examination (Pen paper test)			
Learning Outcome 12	Draw and explain various operation of A/D conversion circuits. *(Cognitive)*		6	10
Contents	**A/D Conversion:** Counter type, Successive approximation, Flash type, Dual slope type. (Theoretical aspects)			
Method of Assessment	External: End semester theory examination (Pen paper test)			

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Branch	**Electrical & Electronics**	**Semester**	**3**

Course Code	304/6822	**Course Name**	**Digital Electronics**

Course Outcome 5	Compare various digital logic family.	Teach Hrs.	Marks
Learning Outcome 13	Compare digital ICs on different parameters. *(Cognitive)*	5	8

Contents	**Characteristics of digital ICs:**
	    Fan-in, Fan-out, Propagation delay, Power dissipation,
	    Noise margins, Figure of merit.
	    Logic ICs:
	NAND Gate using TTL, NOR gate using ECL.		

Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 14	Construct universal gates and inverter using MOS and CMOS logic. *(Cognitive)*	6	10

Contents	**Classifications of logic families:**
	    Saturated and Non-saturated logic.
	    MOS and CMOS Logic:
	    MOS based NOT gate, Two input NAND & NOR gate.
	    CMOS based NOT gate, Two input NAND & NOR gate.		

Method of Assessment	External: End semester theory examination (Pen paper test)		
Learning Outcome 15	Make use of PAL & PLA for implementation of Boolean expression and design simple logic circuit. *(Cognitive/Affective)*	6	10

Contents	**PLD:**
	    PAL, PLA
	    Implementation of Boolean expression using PAL, PLA
	    (Up-to 2 variables)		

Method of Assessment	Internal: Assignment and Quiz		