

VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF GENERAL ENGINEERING

QUESTION BANK



II SEMESTER

GE6252 – Basic Electrical and Electronics Engineering

Regulation – 2013

Academic Year 2016 – 17

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SUBJECT : GE6252 /Basic Electrical & Electronics Engineering

SEM / YEAR: II / 2016-2017 (EVEN)

UNIT I - ELECTRICAL CIRCUITS & MEASUREMENTS

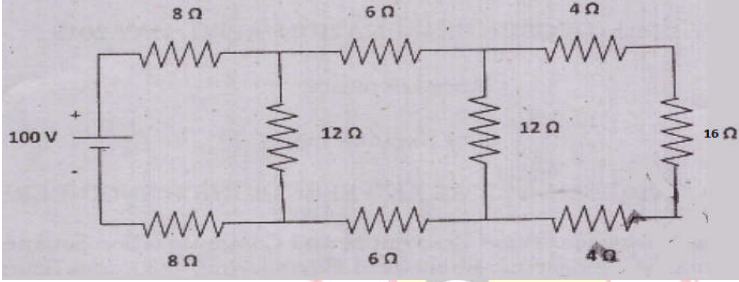
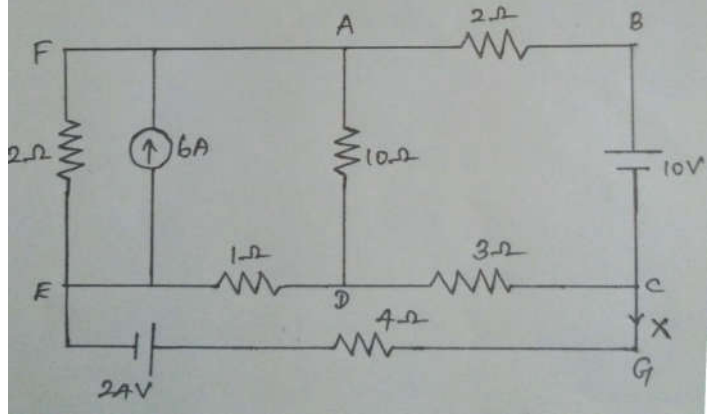
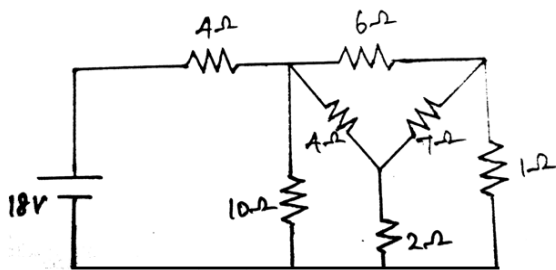
Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

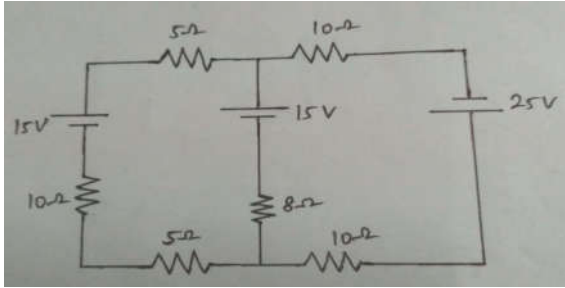
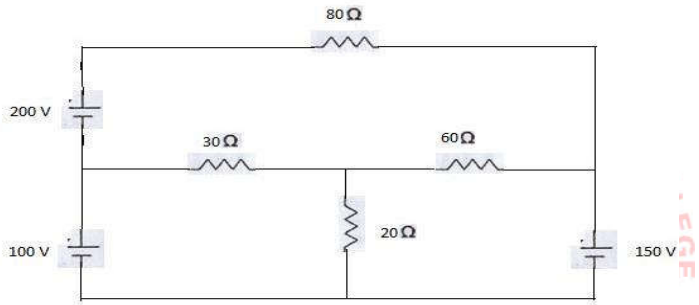
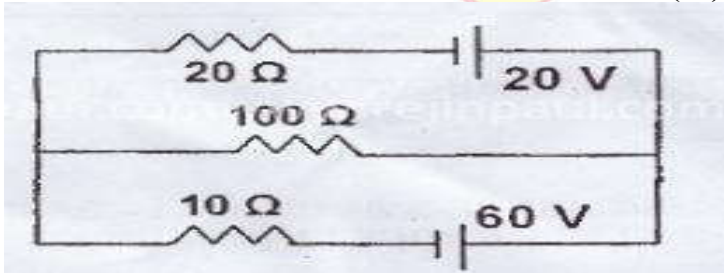
PART – A

Q.No	Questions	BT Level	Competence
1.	Illustrate Ohm's law.	BTL 3	Apply
2.	Illustrate the following laws (i) Kirchoff's current law (ii) Kirchoff's Voltage law.	BTL 3	Apply
3.	Define the following terms Active & Passive elements with suitable example for each.	BTL 1	Remember
4.	Distinguish Loop and Mesh analysis.	BTL 2	Understand
5.	Two resistances of 4Ω and 6Ω are connected in parallel across 10V battery. Calculate the current through 6Ω resistance.	BTL 3	Apply
6.	When a resistor is placed across the 415V supply, the current is 36A. What is the value of resistor that must be placed in parallel to increase the load to 40A?	BTL 1	Remember
7.	Define (i) Average value (ii) Effective (or) RMS value of an AC voltage signal.	BTL 1	Remember
8.	Express the following terms (i) Amplitude (ii) Phase angle with suitable expression.	BTL 2	Understand
9.	Define the terms (i) Form Factor (ii) Peak Factor.	BTL 1	Remember
10.	Point out the advantages of sinusoidal alternating quantity.	BTL 4	Analyze
11.	Explain the terms power and energy. And also write the expression for electrical power and energy.	BTL 4	Analyze
12.	Define (i) Apparent Power (ii) power factor.	BTL 1	Remember
13.	Explain the following terms Real (or) True (or) Average Power, Reactive Power and Apparent (or) Total Power.	BTL 4	Analyze
14.	Summarize the advantages of 3 phase circuits over single phase circuits.	BTL 5	Evaluate

15.	Compose the circuit diagram and explain the balanced load in 3-phase circuit.	BTL 6	Create
16.	Explain the term resonance in a RLC series circuit.	BTL 5	Evaluate
17.	Formulate the formula for deflecting and controlling torque for PMMC and PMMI instrument.	BTL 6	Create
18.	Discuss the different types of damping force act on the ammeter and voltmeter.	BTL 2	Understand
19.	Point out the advantages of electro-mechanical measuring instruments.	BTL 1	Remember
20.	Discuss the three torques required for the proper operation of indicating instrument.	BTL 2	Understand

PART – B

1.	<p>Calculate (i) equivalent resistance across the terminal of the supply (ii) total current supplied by the source (iii) power delivered to 16Ω resistor in the circuit shown below: (16)</p> 	BTL 4	Analyze
2.	<p>Determine the current 'X', power in the 4Ω resistance of the circuit shown below: (16)</p> 	BTL 4	Analyze
3.	<p>Describe kirchhoff's laws. For the circuit shown in the figure determine the current through 6Ω resistor. (16)</p> 	BTL 4	Analyze

<p>6.</p>	<p>(i) Explain Kirchhoff's Current and Voltage Law. (2) (ii) A sinusoidal current wave is given by $i=50 \sin(100\pi t)$. Solve and calculate the root mean square value. (4) (iii) Calculate the current in the 8Ω resistor in the following circuit using Kirchhoff's laws. (10)</p> 	<p>BTL 4</p> <p>BTL 3</p>	<p>Analyze</p> <p>Apply</p>
<p>7.</p>	<p>Using Mesh analysis, Estimate the current through the various branches in the circuit of the following figure. (16)</p> 	<p>BTL 2</p>	<p>Understand</p>
<p>8.</p>	<p>(i) For the circuit shown, calculate the current through each of three resistors. (10)</p>  <p>(ii) A coil of resistance 5.94Ω and inductance of 0.35 H is connected in series with a capacitance of $35 \mu \text{ F}$ across a 200V, 50Hz supply. Find and examine the value of impedance (Z), current and the phase difference between voltage and current (Φ) (6)</p>	<p>BTL 1</p> <p>BTL 1</p>	<p>Remember</p>
<p>9.</p>	<p>Obtain expression for power and power factor for three phase AC star connected balanced load circuit. (16)</p>	<p>BTL 1</p>	<p>Remember</p>

4.	Explain the principle of DC Motor.	BTL 4	Analyze
5.	Define the term back emf or counter emf and state its significance.	BTL 1	Remember
6.	List the different main constructional elements of DC Machine.	BTL 1	Remember
7.	Define the following terms in DC Machine (i) Commutator (ii) Brushes	BTL 1	Remember
8.	In DC Generator, 8 poles, lap wound armature rotated at 350rpm to generate 260V, the useful flux/pole is 0.05Wb. If the armature has 120 slots. Calculate the number of conductors per slot.	BTL 3	Apply
9.	Explain why dc series motor should not be started without load.	BTL 2	Understand
10.	List any two applications of Following DC Motors (i) DC Cumulative Compound Motor (ii) DC Differential Compound Motor	BTL 1	Remember
11.	Discuss the terms with appropriate formula for Faraday's law of Electromagnetic Induction and Lenz Law.	BTL 2	Understand
12.	Formulate the EMF equation for (i) DC Generator (ii) Transformer.	BTL 2	Understand
13.	With suitable formula explain the following terms (i) Turn ratio of transformer. (ii) Voltage regulation of Transformer.	BTL 4	Analyze
14.	Explain why single phase induction motor is not self starting? Mention the different methods for making to self start the single phase induction motor.	BTL 4	Analyze
15.	Discuss the terms (i) Efficiency (ii) All day efficiency of single phase transformer.	BTL 6	Create
16.	Draw the circuit diagram of single phase transformer.	BTL 3	Apply
17.	What is meant by transformer? Formulate the expression for step up and step down transformer according to transformation ratio.	BTL 6	Create
18.	Compare the following transformers (i) Core type transformer (ii) Shell type.	BTL 5	Evaluate
19.	Construct the circuit diagram of separately excited DC generator.	BTL 3	Apply
20.	In a single phase transformer, $N_p = 350$ turns, $N_s = 1050$ turns, $E_p = 400V$. Calculate the value of secondary voltage (E_s).	BTL 5	Evaluate
PART – B			
1.	With a neat sketch, explain the construction, working of DC Motor and also explain the different parts. (16)	BTL 4	Analyze

2.	What is meant by DC Generator? Describe the theory and principle of operation, working of DC Generator. (16)	BTL 1	Remember
3.	(i) Obtain the mathematical expression for generated EMF or EMF Equation of Generator and explain each term. (8) (ii) Calculate the generated EMF by 4-pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm the flux per pole is 0.02 Weber. (8)	BTL 4 BTL 3	Analyze Apply
4.	Obtain the mathematical equation for voltage or current equation and also explain for (i) DC Series Generator (ii) DC Shunt Generator (iii) DC Compound Generator with suitable diagram for each. (16)	BTL 5	Evaluate
5.	What is meant by DC Motor? Describe the terms such as (i) Faraday's Law of Electro Magnetic Induction. (ii) Fleming's Left Hand rule. (iii) Back or Counter emf. (iv) Voltage Equation of DC Shunt Motor. (v) Armature Torque of DC Motor. (16)	BTL 4	Analyze
6.	(i) Describe various types of self excited Dc generators with their circuit layout. (8) (ii) Explain the characteristics of DC shunt motor. (8)	BTL 1	Remember
7.	(i) A 200V Dc shunt motor takes a total current of 100A and runs at 750 rpm. The resistance of the armature winding and of shunt field winding is 0.1 Ω and 40 Ω respectively. Find the torque developed by the armature. (8) (ii) Explain the basic nature of the emf induced in the armature of a DC machine. (4) (iii) How can the alternating current waveform in the armature be converted into a DC waveform? (4)	BTL 3 BTL 2 BTL 2	Apply Understand Understand
8.	A 25kW, 250V, dc shunt generator has armature and field resistances of 0.06 ohm and 100 ohm respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25kW. (16)	BTL 3	Apply
9.	What is meant by Transformer? Draw the circuit diagram for Single Phase Transformer and also explain the Principle, Construction, Working of it. (16)	BTL 4	Analyze
10.	(i) Derive the EMF Equation of Transformer and explain. (8) (ii) A single phase 2000/250 V, 50Hz transformer has the core area of 36 cm ² and maximum flux density of 6 Wb/m ² . Calculate the number of turns on primary and secondary winding. (8)	BTL 6 BTL 3	Create Apply

11.	Describe the following terms in single phase transformer (i) Efficiency (ii) All day efficiency (iii) Losses in transformer (iv) Regulation of Transformer. (16)	BTL 1	Remember
12.	(i) Distinguish the following types of transformer (i) Step up and Step down Transformer (ii) Core type or Shell type Transformer. (8) (ii) In core type transformer, the no load voltage is 5000/250 V, supply frequency 50Hz .Calculate the number of turns in each winding and the flux is about 0.06 Weber. (8)	BTL 2 BTL 3	Understand Apply
13.	(i) Why do you say the single phase Induction motor is self starting? (8) (ii) Describe the following types of Single phase Induction Motor (i) Split phase Induction Motor (ii) Capacitor start type Induction Motor (iii) Shaded pole type Induction Motor. (8)	BTL 2 BTL 2	Understand Understand
14.	Explain the tests on single phase transformer and develop an equivalent circuit from the above tests. (16)	BTL 1	Remember

UNIT III - SEMICONDUCTOR DEVICES AND APPLICATIONS

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

PART – A

Q.No	Questions	BT Level	Competence
1.	What is meant by Semiconductors? Also explain (i) n-type Semiconductor (ii) p-type semiconductor.	BTL 4	Analyze
2.	Distinguish the following semiconductors (i) Intrinsic or pure Semi Conductor (ii) Extrinsic or impure Semi conductor.	BTL 2	Understand
3.	Compare PN junction diode and Zener diode with symbolic representation.	BTL 4	Analyze
4.	Draw the V-I characteristics of PN-Junction diode.	BTL 3	Apply
5.	Draw the structure with symbolic representation of NPN and PNP Transistor.	BTL 3	Apply
6.	Define Knee voltage or Junction barrier voltage for PN Junction.	BTL 2	Understand
7.	Draw the circuit for (i) Forward Bias (ii) Reverse Bias of the PN Junction diode.	BTL 3	Apply
8.	Explain the following terms (i) Avalanche breakdown (ii) Zener break down of the PN junction diode.	BTL 4	Analyze
9.	Define the following terms (i) Rectifier and its types (ii) Voltage Regulation.	BTL 1	Remember

10.	What is Zener effect?	BTL 1	Remember
11.	What is doping? Also express the terms (i) Donor (ii) Acceptor.	BTL 1	Remember
12.	What is Zener diode? List its applications.	BTL 1	Remember
13.	When should a transistor be biased? Name two common biasing circuits.	BTL 6	Create
14.	Which configuration is known as emitter follower and why it is named so?	BTL 6	Create
15.	What is meant by Diffusion and Depletion layer?	BTL 5	Evaluate
16.	Define the terms (i) Saturation region (ii) Cut off region (iii) Break down region of a transistor in CE Configuration.	BTL 2	Understand
17.	Define Forbidden energy gap of semi conductor.	BTL 2	Understand
18.	Define Transformer Utilization Factor.	BTL 1	Remember
19.	Compare the performance analysis of HWR, FWR (Centre tapped) & bridge rectifier.	BTL 5	Evaluate
20.	Define the term Peak Inverse Voltage.	BTL 1	Remember
PART – B			
1.	Describe the following VI Characteristics of a PN Junction diode. (i) Forward Bias Characteristics (ii) Reverse Bias Characteristics. Also write its applications. (16)	BTL 1	Remember
2.	Describe the working principle of Zener diode. And explain the terms (i) Zener Break down (ii) Avalanche Break down. (16)	BTL 1	Remember
3.	With a neat diagram explain the principle of operation and working of half wave rectifier. And also obtain the expression for (i) RMS value of Current (ii) RMS value of Voltage (iii) Peak Inverse Voltage (PIV) (iv) Transformer Utilization Factor (TUF) (v) Efficiency (vi) Ripple factor. (16)	BTL 4	Analyze
4.	With a neat diagram explain the principle of operation, working of Full wave rectifier. And also obtain the expression for (i) RMS value of Current (ii) RMS value of Voltage (iii) Peak Inverse Voltage (PIV) (iv) Transformer Utilization Factor (TUF) (v) Efficiency (vi) Ripple factor. (16)	BTL 4	Analyze
5.	(i) Explain the working of CB Configuration of NPN transistor. Also obtain the input-output characteristics. (8)	BTL 4	Analyze
	(ii) Explain the working of CE Configuration of NPN Transistor. Also obtain the (a) input-Characteristics (b) Output characteristics. (8)	BTL 4	Analyze

6.	Explain the performance of the transistor in three different types of configurations. (16)	BTL 3	Apply
7.	(i) With a neat diagram describe how a voltage regulator circuits ates the output voltage under the following conditions: (a) Load resistance increases. (b) Input voltage decreases. (8) (ii) Explain the working of CC configuration of NPN transistor. And also obtain the input characteristics and Output characteristics. (8)	BTL 2 BTL 2	Understand Understand
8.	Explain the term Bridge rectifier with suitable circuit diagram and formulate its efficiency, ripple factor, TUF and PIV. (16)	BTL 3	Apply
9.	(i) Explain the elementary treatment of small signal amplifier with proper design circuit. (8) (ii) With a neat diagram describe the construction and working principle of PN Junction diode. (8)	BTL 2 BTL 2	Understand Understand
10.	(i) Explain with neat diagram the construction and operation of a PNP transistor. (8) (ii) In a CE transistor, I_B changes from $100\mu A$ to $150\mu A$ which causes a change in I_c from $5mA$ to $7.5mA$. If V_{CE} is held constant at $10V$, find $\beta_{dc}(h_{fe})$. (8)	BTL 5 BTL 5	Evaluate Evaluate
11.	(i) Explain V-I characteristics of Zener diode and applications with necessary diagram. (8) (ii) Explain the operation of Full wave rectifier with necessary diagrams. (8)	BTL 2 BTL 2	Understand Understand
12.	Explain how you will obtain the static characteristics of common emitter configuration. (16)	BTL 6	Create
13.	Explain the working principle of half wave and full wave rectifier with neat waveform. (16)	BTL 1	Remember
14.	Explain the various characteristics of BJT in common emitter configuration with neat diagram. (16)	BTL 1	Remember

UNIT IV DIGITAL ELECTRONICS

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

PART – A

Q.No	Questions	BT Level	Competence
1.	Define Flip flop. What are the different types of flip flop?	BTL 1	Remember
2.	Which gates are called as Universal gates? What are its advantages?	BTL 1	Remember
3.	Name two types of D/ A & A/D converter.	BTL 1	Remember
4.	What is a decade counter?	BTL 1	Remember
5.	What are the basic properties of Boolean algebra?	BTL 1	Remember

6.	State and prove Distributive law.	BTL 1	Remember
7.	Demonstrate the given binary numbers in its equivalent decimal numbers with steps. (i) 10.01 (ii) 101.11	BTL 2	Understand
8.	Illustrate the excitation table of J-K flip flop.	BTL 2	Understand
9.	Give the truth table of XOR gate.	BTL 2	Understand
10.	Show the logic diagram and truth table for a half adder.	BTL 2	Understand
11.	Solve for the following binary difference: 1011010-0101110	BTL 3	Apply
12.	Identify the decimal equivalent of binary fraction 0.101	BTL 3	Apply
13.	Construct D Flip-flop from JK flip-flop.	BTL 3	Apply
14.	Distinguish between combinational logic and sequential logic.	BTL 4	Analyze
15.	Compare asynchronous and synchronous counters.	BTL 4	Analyze
16.	Construct AND and OR gates using NAND gates.	BTL 4	Analyze
17.	Prove that $A + A'B = A+B$	BTL 5	Evaluate
18.	Evaluate the expression $(A'.B.C)'+(A.B'.C)'$ using Boolean laws	BTL 5	Evaluate
19.	An active high SR latch has a '1' on the S- input and '0' on the R- input. Discuss about the status of SR latch.	BTL 6	Create
20.	Design 'D' Latch using NAND gates.	BTL 6	Create
PART – B			
1.	Find the solution of following number conversion: (i) $(96.0625)_{10} = (?)_2$ (4) (ii) $(34.67)_{10} = (?)_8$ (4) (iii) $(1101110.110)_2 = (?)_{16}$ (4) (iv) $(257)_{10} = (?)_2$ (4)	BTL 1	Remember
2.	Write short notes on the following flip flops: a) RS- Flip flop. (8) b) Toggle flips flop. (8)	BTL 1	Remember
3.	(i) How the given function will be implemented using three AND gates and one OR gate $A'BC + AB'C + ABC' + AB$ (8) (ii) Explain the operation of half adder with neat diagram. (8)	BTL 1	Remember
4.	(i) How can you implement XOR gate using NAND gates. (6) (ii) Show the operation of 4-bit synchronous UP counter with its timing diagram and its design. (10)	BTL 1	Remember
5.	Demonstrate the different states of SR flip flop for various input with logic diagram. Show its characteristics table (16)	BTL 2	Understand
6.	Demonstrate various Boolean laws with its truth table (16)	BTL 2	Understand

7.	(i) Draw the logic diagram of clocked Master – slave JK flip flop and explain its working. (8) (ii) Show how a full adder can be implemented using NAND gate. (8)	BTL 2	Understand
8.	(i) Apply Boolean laws and Simplify the following Boolean expression a) $XY + X'Z + YZ$ b) $(A'+B+C').(A+B+C).(C+D)$ (4+4) (ii) Explain the working of JK- flip flop with its logic diagram. (8)	BTL 3	Apply
9.	Develop the following flip flops and explain its operations (i) D flip flop using NAND gates. (ii) JK flip flop using NAND gates. (8+8)	BTL 3	Apply
10.	Classify the types of D/A and A/D converters .Also explain the working principle of any one type in each converter. (4+12)	BTL 4	Analyze
11.	Simplify the following logic expression using basic gates and also draw the logic diagram for implementation. (i) $Y = (A+B).(A'+C).(B+D)$ (ii) $Z = (B+C)(A+D')$ (8+8)	BTL 4	Analyze
12.	Compare the performance features of different types of ADC and DAC. (16)	BTL 4	Analyze
13.	(i) Explain the operation of successive approximation type ADC with a neat sketch. (8) (ii) Draw the circuit of Binary weighted resistor Digital to analog Converter and Explain its operation. (8)	BTL 5	Evaluate
14.	Design a 3 bit asynchronous UP counter. (16)	BTL 6	Create
<u>UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING</u>			
Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).			
PART - A			
Q.No	Questions	BT Level	Competence
1.	Differentiate analog and digital Signal.	BTL 4	Analyze
2.	Digital signals said to be noise immune. Justify.	BTL 5	Evaluate
3.	Define modulation. What are the different types of modulation?	BTL 1	Remember
4.	Define the Modulation Index for Amplitude modulation	BTL 1	Remember
5.	Mention the need of modulating the information signals.	BTL 2	Understand
6.	Express the formula of carrier power of an AM wave.	BTL 2	Understand
7.	Generalize why AM systems are preferred in broadcasting over FM Systems.	BTL 6	Create

8.	As related to amplitude modulation, Illustrate what is under modulation, 100% modulation and over modulation.	BTL 3	Apply
9.	List any four important advantages of FM over AM.	BTL 1	Remember
10.	What is radio communication?	BTL 1	Remember
11.	Classify radio receivers.	BTL 3	Apply
12.	What are the two types of TV?	BTL 4	Analyze
13.	What is facsimile?	BTL 2	Understand
14.	Generalize the applications of Microwave communications	BTL 6	Create
15.	List the various types of microwave antennas	BTL 1	Remember
16.	Explain the basic function of a communication satellite.	BTL 4	Analyze
17.	Summarize the functions of a satellite transponder.	BTL 5	Evaluate
18.	Illustrate the advantages of Optical fiber communication.	BTL 3	Apply
19.	Define Total internal reflection.	BTL 2	Understand
20.	Draw the block diagram of optical fiber communication.	BTL 1	Remember
PART – B			
1.	(i) With a neat diagram, explain the operation of amplitude Modulation. Derive its power relations. (10) (ii) A 10MHz sinusoidal carrier wave of amplitude 10mV is modulated by a 5KHz sinusoidal audio signal wave of amplitude 6mV. Design and find the frequency components of the resultant modulated wave and their amplitudes. (6)	BTL 6	Create
2.	(i) With neat diagrams Illustrate any one method of amplitude modulation and its corresponding demodulation. (8) (ii) Illustrate with suitable diagram of Diode detector for AM signals. (8)	BTL 3	Apply
3.	Explain the principles of Amplitude & Frequency Modulation and also its need. (16)	BTL 4	Analyze
4.	(i) Illustrate the block diagram of balanced modulator and explain its operation. (8) (ii) Explain frequency modulation. Obtain the mathematical representation of frequency modulated wave. (8)	BTL 3	Apply
5.	(i) Draw the block diagram arrangement of an AM transmitter and explain its operation. (8) (ii) Explain the operation of FM transmitter. (8)	BTL 4	Analyze

6.	Discuss any one method for suppressing the unwanted sideband. Support your answer with the required diagrams. (16)	BTL 2	Understand
7.	Show and discuss the block diagram of radio broadcasting and reception system and explain the function of each block. (16)	BTL 4	Analyze
8.	With the help of block diagrams describe the working of a typical TV transmitter and receiver. (16)	BTL 1	Remember
9.	(i) With neat block diagram explain the principle of operation of FAX. (8) (ii) Draw a Typical Television video signal, Explain how this is converted to an image on a TV screen. (8)	BTL 2	Understand
10	Write short notes on the following modes of communication: (1) Microwave. (8) (2) Optical Fiber. (8)	BTL 1	Remember
11.	Explain the configuration of satellite communication with neat diagram. Give its merits and Demerits. (16)	BTL 5	Evaluate
12.	(i) Describe the satellite communication system, with the help of block diagram of earth station transmitter and earth-station receiver. (12) (ii) Give some applications of optical fiber communication. (4)	BTL 1 BTL 2	Remember Understand
13.	Discuss the usage of satellite for long distance communication with a neat block diagram of basic satellite transponder (16)	BTL 2	Understand
14.	Describe in detail with the necessary diagram the microwave and satellite communication system. (16)	BTL 1	Remember