

Course Code: B20HS4102					
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)				R20	
III B.Tech. I Semester MODEL QUESTION PAPER					
MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY					
(For ECE & EEE)					
Time: 3 Hrs.		Max.Marks:70M			
Answer ONE Question from EACH UNIT					
All questions carry equal marks					
Assume suitable data if necessary					
S.No.		CO	KL	M	
UNIT-I					
1.	Define Managerial Economics. Explain its nature and scope	1	2	14	
OR					
2.	What do you understand by Demand Forecasting? Explain different methods of Demand Forecasting.	1	2	14	
UNIT-II					
3.	What is the importance of Cost analysis? Discuss the types of costs incurred in a manufacturing company.	2	3	14	
OR					
4.	Show the graphical representation of Break-even analysis. State the assumptions and applications of Break-even analysis.	2	3	14	
UNIT-III					
5.	What are Market Structures and explain the features of Oligopoly?	3	2	14	
OR					
6.	Describe the importance of Pricing. List out some methods of pricing and explain them.	3	2	14	
UNIT-IV					
7.	Define Accounting. Discuss the significance of Accounting and types of accounts.	4	3	14	
OR					
8.	The Trial Balance of a firm on 31.12 2010 is as follows. Prepare final accounts of this firm.		4	3	14
	Adjustment: Closing stock Rs. 17,000.				
		Debit (Rs)			
	Capital amount	1,60,000	1,00,000		
	Plant and machinery				
	Sales				

	Purchases	1,20,000			
	Returns	2,000	1,500		
	Opening stock	700			
	Bank charges	150			
	Sundry debtors	90,000			
	Sundry creditors		51,600		
	Furniture	60,000			
	Wages	20,000			
	Salaries	13,600			
	Carriage inwards	1,500			
	Carriage outwards	2,400			
	Bad debts provision		1,050		
	Rent, rates and taxes	20,000			
	Advertisements	4,000			
	Cash in hand	1,800			
	Cash at bank	12,000			
	UNIT-V				
9.	Explain about Capital and its types. What are the methods of rising finance		5	2	14
	OR				
10.	What are the defining characteristics of a startup? Discuss the various types of startups and the challenges they face in India.		5	2	14

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

Estd. 1980

AUTONOMOUS

NOTE : Questions can be given as A,B splits or as a single Question for 14 marks

IV B.Tech. I Semester MODEL QUESTION PAPER

ELECTRIC VEHICLES

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE** Question from **EACH** UNIT

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Illustrate and derive Velocity profile when constant tractive force applied on the vehicle.	1	4	7
	b).	Explain the major components of anelectric vehicle with the help of block diagram.	1	4	7
OR					
2.	a).	Compare EV switch ICE Engine Vehicles.	1	4	7
	b).	Illustrate Vehicle load forces, in detail.	1	4	7
UNIT-II					
3.	a).	Explain in detail EV motor sizing.	2	4	7
	b).	Discuss Various configurations of Hybrid EVs in detail.	2	3	7
OR					
4.	a).	Explain the power train components of Electric Vehicles with a neat diagram.	2	4	7
	b).	Briefly explain the architecture of EVs.	2	3	7
UNIT-III					
5.	a).	Explain the operation of a fuel cell with a hydrogen storage system.	3	4	7
	b).	What are various battery performance parameter sand compare various batteries by using the battery performance parameters	3	4	7
OR					
6.	a).	Explain the construction and working of Li-ion battery with a neat diagram.	3	4	7
	b).	Explain Battery Management System in EVs	3	4	7
UNIT-IV					
7.	a).	Explain the operation of PM Synchronous Motor drive.	4	4	7
	b).	Explain the different configuration sand operation of SRMD rive	4	4	7
OR					
8.	a).	Explain the working and operation of PM-BLDC motor with its	4	4	14

		Drive Control.			
		UNIT-V			
9.	a).	Illustrate the Architecture of EV Charger with schematic.	5	4	7
	b).	Explain detail about the Charging standards used worldwide	5	3	7
		OR			
10.	a).	Explain the basic requirements for charging system in EV.	5	4	7
	b).	Explain in detail V2G and V2V Technology	5	4	7

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

POWER SYSTEM OPERATION AND CONTROL

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Explain the four operating states of Power system with a neat sketch	1	3	7
	b).	Explain briefly about the Stability Enhancement methods	1	3	7
OR					
2.	a).	Explain the concepts of coherent area dynamic with a detailed example.	1	4	7
	b).	Explain the contingency analysis procedure with neat sketch?	1	3	7
UNIT-II					
3.	a).	Derive general transmission line loss formula and state assumptions made in calculating B- coefficients.	2	4	7
	b).	A constant 30MW supplied by two 150MW generators, 1 and 2 for which the respective incremental fuel costs are $dC_1/dP_1=0.1P_1+20$, $dC_2/dP_2=0.2P_2+25$. With P in MW and C in Rs/h. Calculate (i) the most economical division of load between the generators (ii) the saving in Rs/day there by obtain compared to equal load sharing between the machines.	2	4	7
OR					
4.	a).	Write step by step procedure for obtaining optimal scheduling of generating units by neglecting the transmission losses	2	4	7
	b).	A power system consists of two 200MW units whose input cost data are represented by the equations: $C_1 = 0.03P_1^2 + 21P_1 + 750$ Rs/hour, $C_2 = 0.5P_2^2 + 18P_2 + 980$ Rs/hour. If the total received power $P_R = 350$ MW, compute the load division between the units for the most economic operation.	2	4	7
UNIT-III					
5.	a).	Describe the hydrothermal economic load scheduling. Derive the necessary equations?	3	3	7
	b).	Using dynamic programming method to determine the most economical units to be committed to supply a load of 6 MW. There are four units with the following data $C_1=0.8 P_1^2 +21 P_1$, $C_2=0.6P_2^2 +22P_2$, $C_3=0.5P_3^2 +21P_3$ and $C_4=0.6P_4^2 +20P_4$. The maximum and	3	3	7

		minimum limits for each unit are 6 MW and 1 MW respectively.			
		OR			
6.	a).	With the help of flow chart, explain the solution of unit commitment problem using dynamic programming.	3	3	7
	b).	Discuss about different constraints considered in solving a unit commitment problem	3	3	7
		UNIT-IV			
7.	a).	Explain the mathematical modeling of speed governing system and derive the transfer function of speed governor model. State the assumptions made	4	4	7
	b).	A 200 MVA synchronous generator is operating at 3000 rpm, 50Hz. A load of 40MW is suddenly applied to the machine and the steam valve of the turbine opens only after 0.4 sec due to the time lag in the generator action. Calculate the frequency to which the generated voltage drops before the steam flow commences to increase to meet the new load. Given that the value of H of the generator is 5.5 kW-sec/KVA of the generator capacity.	4	4	7
		OR			
8.	a).	Draw the block diagram representation of a single area system and derive the expression for static and dynamic response of system under uncontrolled case.	4	4	7
	b).	Two generators are operating in parallel with 4% and 5% drop characteristics of their respective governors sharing a load of 600MW. Compute the load shared by the machines and the system for this load. The normal frequency of the system was 50Hz.	4	4	7
		UNIT-V			
9.	a).	Explain the effects of generation rate constraints and speed governor dead band on automatic generation control.	5	3	7
	b).	Discuss the importance of combined load frequency control and economic dispatch control with a neat block diagram	5	3	7
		OR			
10.	a).	Obtain the mathematical modeling of tie line power in an interconnected system and its block diagram	5	4	7
	b).	Explain briefly the Automatic Voltage regulator with a neat sketch and deduce its mathematical modeling.	5	4	7

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IV B.Tech. I Semester MODEL QUESTION PAPER

DIGITAL DESIGN AND COMPUTER ARCHITECTURE

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Write a HDL module using system Verilog that describes a 2:1 MUX.	1	3	7
	b).	What is a latch? Write a system Verilog HDL for a D-latch. Also, explain the difference between a latch and Flip-Flop.	1	3	7
OR					
2.	a).	Give the truth table of full adder and write a system Verilog HDL description for a full adder.	1	3	7
	b).	What is a finite state machine? Write system Verilog HDL for Sequence detector (Eg 110011)	1	3	7
UNIT-II					
3.	a).	Explain about N-bit ALU with block diagram.	2	3	7
	b).	Describe the operation of shift register with parallel load.	2	3	7
OR					
4.	a).	What are the different memory types? Explain about Dynamic Random Access Memory (DRAM).	2	3	7
	b).	What is an FPGA? Illustrate with general FPGA layout.	2	3	7
UNIT-III					
5.	a).	Explain about different instruction formats.	3	3	7
	b).	Explain the addressing modes of MIPS architecture.	3	3	7
OR					
6.	a).	Illustrate MIPS memory map and explain the steps of code execution.	3	3	7
	b).	Discuss about the $\times 86$ architecture briefly.	3	3	7
UNIT-IV					
7.	a).	Explain different MIPS microarchitectures. How do you calculate the execution time of a program?	4	4	7
	b).	Illustrate single cycle MIPS microarchitecture.	4	4	7
OR					
8.	a).	Compare single cycle and multicycle processors.	4	4	7
	b).	Compare spatial and temporal parallelism? Explain the concept of	4	4	7

		pipelining in microprocessors.			
		UNIT-V			
9.	a).	Show the memory hierarchy of a typical computer system. List the metrics used for assessing memory system performance.	5	3	7
	b).	What is set associative cache? With a diagram explain two way set associative cache.	5	3	7
		OR			
10.	a).	What is virtual memory? Explain about address translation using page table.	5	3	7
	b).	What is memory mapped I/O? Explain about UART.	5	3	7

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

ENERGY STORAGE AND BATTERY MANAGEMENT SYSTEMS

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer ONE Question from EACH UNIT

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Explain the definition and role of Energy Storage systems.	1	3	7
	b).	List the financial benefits of Energy Storage systems.	1	3	7
OR					
2.		Explain the Techno-Economic characteristics of energy storage systems.	1	3	14
UNIT-II					
3.	a).	Explain the operation of Super conducting magnetic energy storage.	2	3	7
	b).	Explain the operation of compressed air energy storage.	2	3	7
OR					
4.	a).	Explain the operation of Fuel cell Hydrogen energy storage	2	3	7
	b).	Explain the operation of flywheel energy storage.	2	3	7
UNIT-III					
5.	a).	Explain the operation of Lead Acid Cell battery and mention the failure mechanisms of it.	3	3	7
	b).	Explain the operation of zinc-bromine battery	3	3	7
OR					
6.	a).	Explain the operation of Ni-MH Battery.	3	3	7
	b).	Explain the operation of Vanadium Redox Battery.	3	3	7
UNIT-IV					
7.	a).	Explain the functionality of BMS and their comparison.	4	3	7
	b).	Explain the measurement of Voltage and current in BMS.	4	3	7
OR					
8.	a).	Compare the topologies associated with BMS.	4	3	7
	b).	Explain in detail about technology associated with BMS.	4	3	7
UNIT-V					
9.	a).	Explain about the protection concepts related to the BMS.	5	3	7
	b).	Explain about the thermal management related to BMS.	5	3	7
OR					

10.	a).	Explain about the balancing concepts related to the BMS.	5	3	7
	b).	List the safety precautions associated with BMS.	5	3	7

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M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

SMART GRID

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Explain the importance and need of Smart grid.	1	3	7
	b).	Explain the Functions of Smart Grid.	1	3	7
OR					
2.	a).	Compare Conventional Grid and Smart Grid.	1	3	7
	b).	Explain the Challenges in implementation of Smart Grid.	1	3	7
UNIT-II					
3.	a).	Explain the objectives of Supervisory control and Data Acquisition system (SCADA).	2	3	7
	b).	Describe the Architecture of RTU in Distribution System	2	3	7
OR					
4.	a).	Explain the modeling challenges for Distribution Management system (DMS)	2	3	7
	b).	Describe the application of Wide Area Monitoring System (WAMS) in smart grids.	2	3	7
UNIT-III					
5.	a).	Explain the concept of phasor measuring unit (PMU) with neat block diagram.	3	3	7
	b).	Explain about Global Positioning Satellite (GPS) Systems used in protection of power system.	3	3	7
OR					
6.	a).	Describe the applications of PMUs in Power Systems.	3	3	7
	b).	Explain Intelligent Electronic Devices (IED) applications for monitoring and protection.	3	3	7
UNIT-IV					
7.	a).	Explain the concept of micro grid and its need and applications.	4	3	7
	b).	Explain briefly about control of micro grid in Master slave mode.	4	3	7
OR					

8.	a).	Briefly explain the structure of micro grid.	4	3	7
	b).	Explain about Compressed air storage system.	4	3	7
UNIT-V					
9.	a).	Explain the role of Advanced Metering Infrastructure in smart grids.	5	3	7
	b).	Discuss about Local Area Network (LAN) in smart grids.	5	3	7
OR					
10.	a).	Explain the concept of Smart Meters and benefits of Smart Meters.	5	3	7
	b).	Discuss the necessity of Cyber Security for Smart Grid.	5	4	7

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KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

ARM MICROCONTROLLER

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Explain the arm microcontroller architecture	1	3	7
	b).	Explain the processor operating modes of ARM controller	1	3	7
OR					
2.	a).	Discuss Pipelined Architecture of ARM controller	1	3	7
	b).	Explain memory map model for Cortex-M3	1	3	7
UNIT-II					
3.	a).	Explain Program status register instructions for ARM controller	2	3	7
	b).	Explain Load - Store instruction for ARM controller	2	3	7
OR					
4.	a).	Explain Data processing instructions for ARM controller	2	3	7
	b).	Explain Software interrupt instructions for ARM controller	2	3	7
UNIT-III					
5.	a).	Discuss about THUMB register usage	3	3	7
	b).	Explain the THUMB Stack instructions	3	3	7
OR					
6.	a).	Explain how data processing instructions manipulate data within registers	3	3	7
	b).	Explain the ARM – THUMB interworking	3	3	7
UNIT-IV					
7.	a).	Illustrate the interfacing of different sources of interrupts with nested vectored interrupt controller	4	4	7
	b).	What are the similarities and differences between system exceptions and external interrupts	4	4	7
OR					
8.		Explain how the processor handles Exceptions or Interrupts	4	4	14

UNIT-V					
9.		Discuss the basic steps to configure UART module for data exchange.	5	4	14
OR					
10.		Discuss the basic steps to configure CAN module.	5	4	14

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

POWER ELECTRONICS FOR RENEWABLE ENERGY

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer ONE Question from EACH UNIT

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Classify the energy sources and explain the importance of renewable energy sources?	1	3	7
	b).	Explain the attributes of power electronics to Renewable energy systems.	1	3	7
OR					
2.	a).	Describe the working principle of PEMFC with the help of diagram	1	3	7
	b).	Explain the basic operation of wind energy systems	1	3	7
UNIT-II					
3.	a).	PV module speciation are $V_{oc}=25$ V and $I_{SC} =2$ A. The load is 3-phase induction motor of rating 1 hp. If the power electronic configuration is single stage system and SPWM is used to generate the pulses for inverter. If N number of PV modules are provided design a PV array for the given load specification?	2	3	14
OR					
4.	a).	Draw and explain the operating region of P-V curve for Boost converter using basic equations?	2	3	7
	b).	Explain the advantages and disadvantages of single stage and two stage configurations for PV standalone systems	2	3	7
UNIT-III					
5.	a).	Explain the operation of Back-to-Back PWM VSI for Full Converter Turbines	3	3	7
	b).	Classify the merits and demerits of Type-III and Type-IV wind energy systems	3	3	7
OR					
6.	a).	Explain the turbine control methods for wind energy systems	3	3	7
	b).	Explain the principal of operation of PMSG?	3	3	7

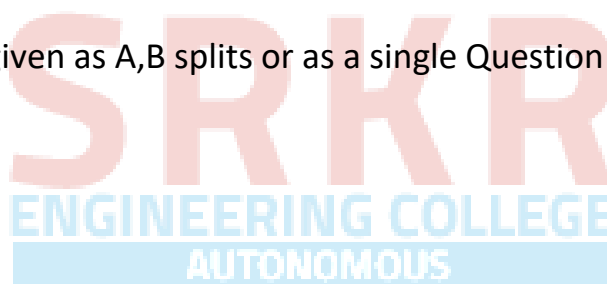
UNIT-IV					
7.	a).	Explain the use of Fly back converter for a fuel cell-based power generation system	4	3	7
	b).	Differentiate between isolated and non-isolated converters used in fuel cells?	4	3	7
OR					
8.	a).	Illustrate the operation of Bidirectional converter used for fuel cells	4	3	7
	b).	Explain basic configurations of power conversion system (PCS) for Fuel cells?	4	3	7
UNIT-V					
9.	a).	Explain the basic necessity of PLL in grid connected renewable systems?	5	3	7
	b).	Describe the difficulties encountered while integration renewable energy resources with the grid?	5	3	7
OR					
10.	a).	Explain dq current control of voltage source converters for PV Grid integration	5	3	14

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

SWITCHGEAR AND PROTECTION

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer ONE Question from EACH UNIT

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M														
UNIT-I																			
1.	a).	Classify the different faults in power system. Which of these are more frequent?	1	3	7														
	b).	Explain the phenomenon of current chopping and its effect on circuit interruption.	1	3	7														
OR																			
2.	a).	Distinguish clearly between the recovery voltage and re striking voltage and explain the significance of RRRV in the operation of a circuit breaker by deriving necessary expression.	1	4	7														
	b).	What is meant by circuit breaker? Discuss the phenomenon of arc formation in a CB.	1	3	7														
UNIT-II																			
3.	a).	Describe with the aid of neat sketch the working of minimum oil circuit breaker.	2	3	7														
	b).	Explain testing procedure of circuit breaker.	2	3	7														
OR																			
4.	a).	Explain the operation of air blast circuit breaker with a neat diagram.	2	3	7														
	b).	Describe the construction, operating principle, and applications of SF6 circuit breaker	2	3	7														
UNIT-III																			
5.	a).	The current rating of a relay is 5A and set at 150%, TMS=0.4, CT ratio is 400/5, the fault current is 6000A. Find the operating time of the relay. At TMS=1 the operating time at various PSMs are tabulated as:	3	4	7														
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PSM</td> <td>2</td> <td>4</td> <td>5</td> <td>8</td> <td>10</td> <td>20</td> </tr> <tr> <td>Operating time (Sec)</td> <td>10</td> <td>5</td> <td>4</td> <td>3</td> <td>2.6</td> <td>2.2</td> </tr> </table>	PSM	2	4	5	8	10	20	Operating time (Sec)	10	5	4	3	2.6	2.2			
PSM	2	4	5	8	10	20													
Operating time (Sec)	10	5	4	3	2.6	2.2													
	b).	With neat diagram explain the construction and operation of induction type direction a lover current relay.	3	4	7														
OR																			
6.	a).	Explain in detail about the time current character is tics of IDMT relay.	3	3	7														

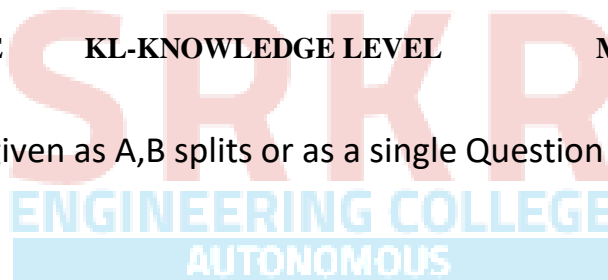
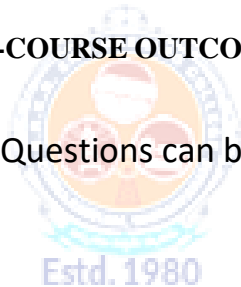
	b).	What is the universal torque question? Using this equation derive the characteristics of impedance relay.	3	3	7
UNIT-IV					
7.	a).	Discuss about the protection of parallel feeders by using the directional relays	4	3	7
	b).	Explain the protection of a generator against stator interterm fault.	4	3	7
OR					
8.	a).	What is the importance of bus-bar protection? What are the requirements of protection of lines?	4	3	7
	b).	With a neat diagram explain the operation of Metal oxide Surge Arrester.	4	3	7
UNIT-V					
9.	a).	List the advantages and disadvantages of numerical relays	5	3	7
	b).	Explain the operation of a numerical distance relay.	5	3	7
OR					
10.	a).	Describe the different types of substation earthing.	5	3	7
	b).	List out the various equipments in the substation.	5	3	7

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

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IV B.Tech. I Semester MODEL QUESTION PAPER

INTRODUCTION TO UNMANNED AERIAL VEHICLES

Electrical and Electronics Engineering

Time: 3 Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**

All questions carry equal marks

Assume suitable data if necessary

			CO	KL	M
UNIT-I					
1.	a).	Write the historical developments of unmanned aerial vehicles.	1	3	7
	b).	Discuss the general characteristics of a UAV.	1	3	7
OR					
2.	a).	Differentiate the working of a Photogrammetry UAV and LiDAR UAV.	1	3	7
	b).	Draw a diagram to show maturity levels of UAVs applications in various sectors.	1	3	7
UNIT-II					
3.	a).	What do you understand by the aerodynamics of an air vehicle? Explain Lift, Drag, and Thrust used in aerodynamics.	2	3	7
	b).	Explain in various brief ways the UAVs can be classified.	2	3	7
OR					
4.	a).	Draw a diagram and explain the (i) body frame of multirotor UAVs and (ii) propellers.	2	3	7
	b).	Discuss the role of a (i) motor, (ii) ESC, (iii) Gimbals, (iv) accelerometer, (v) gyroscope, (vi) magnetometer, (vii) IMU, (viii) battery, and (ix) GCS for operation of UAVs.	2	3	7
UNIT-III					
5.	a).	Explain the term “automatic” and “autonomous” UAVs with reference to their basic differences. What are the benefits and applications of autonomous UAVs?	3	3	7
	b).	With the help of a diagram, discuss in brief the architecture of an Autonomous UAV.	3	3	7
OR					
6.	a).	Discuss in brief the role of various components of a UAV communication system. Draw a diagram	3	3	7
	b).	Explain various types of possible communications with UAVs, along with their utility.	3	3	7
UNIT-IV					

7.	a).	Discuss various data products that can be collected with UAVs.	4	3	7
	b).	Discuss six main criteria while developing the UAVs regulations	4	3	7
OR					
8.	a).	Discuss various issues of concern while flying UAVs for data collection in reference to flying regulations.	4	3	7
	b).	Explain the features of Aviation regulations in India.	4	3	7
UNIT-V					
9.	a).	Discuss various application areas under each case where (i) photogrammetry UAVs, (ii) LiDAR UAVs, and (iii) autonomous UAVs	5	3	7
	b).	Describe the most popular uses of UAVs in various activities of the Surveying and Mapping.	5	3	7
OR					
10.	a).	Discuss in brief various industrial applications of UAVs. Explain the status of the use of UAVs in the construction industry.	5	3	7
	b).	Write short notes on using UAVs in (i) Traffic monitoring and management, (ii) Smart Cities	5	3	7

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 14 marks

