INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Title	PRINCIPLES OF DISTRIBUTED EMBEDDED SYSTEMS				
Course Code	BESB06				
Programme	M.Tech				
Semester	I	ES			
Course Type	PROFESSIONAL CORE ELECTIVE-II				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	-	3	-	-
Chief Coordinator	**Dr. S. Vinoth, Associate Professor, ECE**				
Course Faculty	**Dr. S. Vinoth, Associate Professor, ECE**				

COURSE OBJECTIVES:

I	Understand the design principles of distributed embedded systems.
II	Design CAN network based systems.
III	Understand RTOS to design embedded system.

COURSE OUTCOMES:

CO 1	Real-time computer system requirements, classification of real time systems, simplicity, global time, internal and external clock synchronization, real time model. Real time communication, temporal relations, dependability, power and energy awareness, real time communication, event triggered, rate constrained, time triggered.
CO 2	Inter component communication, task management and dual role of time, Inter task interactions, process input/output, agreement protocols, Error detection.
CO 3	Scheduling problem, static and dynamic scheduling, system design. Validation, time-triggered architecture.
CO 4	Introduction to CAN open CAN open standard, object directory, Electronic data sheet and devices.
CO 5	Configuration files, service data objectives, network management CAN open messages, device profile encoder.

COURSE LEARNING OUTCOMES:

BESB06.01	Understand Real Time Computer Systems requirements, Real Time Systems and Real Time Communication.\
BESB06.02	Understand global time, Internal , external clock synchronization and Real Time Model
BESB06.03	Understand Real Time Communication, temporal relations and dependability
BESB06.04	Understand Power energy awareness, event triggered, rate constrained and time triggered.
BESB06.05	Understand and remember Operating System, Real Time Operating Systems Inter component communication
BESB06.06	Understand and remember task management, dual role of time, inter task interactions process input/output and agreement protocols
BESB06.07	Understand and remember error detection and importance of RTOS.
BESB06.08	Understand and remember state and dynamic scheduling, system design and validation time -triggered architecture
BESB06.09	Understand and remember Can open CAN open standard object directory
BESB06.10	Understand and remember Electronic data sheets ,devices ,analyze CAN Standards
BESB06.11	Understand and remember CAN Standards and configuration files ,service data objectives and network management CAN open messages
BESB06.12	Understand and remember CAN Standards and device profile encoder, real time environment RTOS with examples of Real Time Communication.
BESB06.13	Analyze to understand real time system design with CAN Standards
BESB06.14	Analyze to understand RTOS to design Embedded Systems with examples
BESB06.15	Analyze to understand CAN and Design CAN network based systems with examples.

TUTORIAL QUESTION BANK

UNIT-I
REAL-TIME ENVIRONMENT

PART- A (SHORT ANSWER QUESTIONS)

S.No	QUESTION	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes
1	What makes a computer system a real-time computer system?	Understand	CO1	BESB06.01
2	Discuss briefly about an embedded system?	Understand	CO1	BESB06.01
3	Write the advantages of embedded system?	Understand	CO1	BESB06.01
4	Write the disadvantages of embedded system?	Remember	CO1	BESB06.01
5	What are typical functions that a real-time computer system must perform?	Understand	CO1	BESB06.01
6	Where do the temporal requirements come from?	Remember	CO1	BESB06.01
7	What are the describe the temporal characteristics of a controlled object?	Understand	CO1	BESB06.01
8	What are the effects of delay and delay jitter on the quality of control?	Understand	CO1	BESB06.01
9	Compare the error-detection latency in systems with and without jitter.	Remember	CO1	BESB06.02
10	What does signal conditioning mean?	Understand	CO1	BESB06.02
11	What is a critical failure mode? Give examples.	Understand	CO1	BESB06.01
12	What is the difference between availability and reliability?	Understand	CO1	BESB06.01
13	What is the relationship between maintainability and reliability?	Remember	CO1	BESB06.01
14	Why is an end-to-end protocol required at the interface between the computer system and the controlled object?	Understand	CO1	BESB06.02
15	What is the fraction development cost/production cost in embedded systems and in plant automation systems? How does this relation influence the system design?	Understand	CO1	BESB06.02
16	Define the notions of offset, drift, drift rate, precision and accuracy.	Understand	CO1	BESB06.01
17	List the properties that must be part of an architectural model of a real-time system and the properties that can be disregarded in such a model?	Remember	CO1	BESB06.01
18	What are the temporal obligations of clients and servers at a client-server interface in a real-time system?	Understand	CO1	BESB06.02
19	What is the difference between temporal control and logical control?	Understand	CO1	BESB06.02
20	What is known as event- triggered communication systems?	Remember	CO1	BESB06.03

PART – B (LONG ANSWER QUESTIONS)

S.No	QUESTION	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes
1	Estimate the relation (development cost)/(production cost) in an embedded application and in a plant automation system.	Understand	CO1	BESB06.01
2	What is the difference between an instant and an event?	Understand	CO1	BESB06.01
3	Discuss and explain real-time Computer requirements	Remember	CO1	BESB06.01
4	Discuss and explain classification of real time systems	Understand	CO1	BESB06.01
5	What is the difference between temporal order, causal order and a consistent delivery order of messages? Which of the orders implies another?	Understand	CO1	BESB06.01
6	How can clock synchronization assist in finding the primary event of an alarm shower?	Understand	CO1	BESB06.01
7	What is the difference between internal synchronization and external synchronization?	Remember	CO1	BESB06.02

8	Describe the structure of a node? Why is it important to distinguish between the i-state and the h-state of a node in an embedded system?	Understand	CO1	BESB06.02
9	Describe the elements of an interface. What is the difference between functional intent and function? What are the characteristics of world interfaces and message intefaces? Give examples of standardized message interfaces.	Remember	CO1	BESB06.03
10	Compare the requirements of real-time communication systems with those of non real-time communication systems. What are the most significant differences?	Understand	CO1	BESB06.03
11	Discuss & Explain Embedded System.	Remember	CO1	BESB06.03
12	Discuss & Explain clock synchronization with examples.	Understand	CO1	BESB06.03
13	What are the importance of RTOS with examples and real time applications?	Remember	CO1	BESB06.03
14	Explain briefly about the event- triggered communication system.	Understand	CO1	BESB06.04
15	Explain briefly about the time- triggered communication system.	Remember	CO1	BESB06.04
16	What are the differences between event- triggered and time-triggered communication systems?	Understand	CO1	BESB06.04
17	Explain briefly about the Internal and External clock synchronizations.	Remember	CO1	BESB06.02
18	What are the classifications of real time systems and explain briefly?	Understand	CO1	BESB06.02
19	What is safety critical embedded system?	Remember	CO1	BESB06.02
20	Discuss & Explain briefly about the various components of Embedded System.	Understand	CO1	BESB06.03

PART - C (PROBLEM SOLVING & ANALYTICAL QUESTIONS)

1	In a real-time application the information is represented in many different syntactic forms, e.g., as a 4-20 mA signal on a wire, in the form of an icon on a computer screen or in the from of a particular bit pattern within the computer. How can we arrive at a uniform information representation within a cluster?	Remember	CO1	BESB06.01
2	Calculate the overhead of a trigger task if the WCET of the trigger task is 200 msec and the laxity of an RT transaction is 10 msec. Discuss the advantages and disadvantages of an application-task activation by an interrupt versus that by a trigger task.	Understand	CO1	BESB06.01
3	How is the information organized in an ATM system? Discuss the suitability of ATM systems for the implementation of wide-area real-time systems.	Understand	CO1	BESB06.02
4	What is the difference between functional intent and function Interfaces and standard message interfaces.	Remember	CO1	BESB06.03
5	What are the classifications of real time systems and explain briefly about the safety critical embedded system?	Remember	CO1	BESB06.02

UNIT-II
REAL-TIME OPERATING SYSTEMS
PART – A (SHORT ANSWER QUESTIONS)

1	Why is it not recommended to use standard workstation operating systems for hard real-time applications?	Understand	CO 2	BESB06.05
2	List the time services that are required by a real-time application.	Understand	CO 2	BESB06.05
3	How can the operating system support the detection of transient errors in the value domain	Remember	CO 2	BESB06.05

4	How is data integrity at the reader achieved in the NBW protocol?	Understand	CO 2	BESB06.05
5	What are Inter task interactions?	Understand	CO 2	BESB06.06
6	Discuss process input/output.	Remember	CO 2	BESB06.06
7	Explain Error detection.	Understand	CO 2	BESB06.06
8	Why is it not recommended to use standard workstation operating systems for hard real-time applications?	Understand	CO 2	BESB06.06
9	What are the standard workstation operating systems for hard real-time applications?	Remember	CO 2	BESB06.06
10	Explain the task management of a time-triggered system versus that of an event-triggered operating system.	Remember	CO 2	BESB06.06
11	Discuss critical region of data can be protected either by properly designed static schedules.	Understand	CO 2	BESB06.06
12	Explain semaphore operations.	Understand	CO 2	BESB06.06
13	Explain the task management?	Remember	CO 2	BESB06.06
14	Discuss time-triggered system.	Understand	CO 2	BESB06.06
15	Explain event-triggered operating system.	Understand	CO 2	BESB06.07
16	What is RTOS?	Remember	CO 2	BESB06.07
17	What is meant by real time kernels?	Understand	CO 2	BESB06.07
18	Discuss about non- real time systems.	Understand	CO 2	BESB06.07
19	Explain briefly about the soft real time systems.	Remember	CO 2	BESB06.07
20	What is Inter component communication?	Understand	CO 2	BESB06.07
	PART – B (LONG ANSWER QUESTIONS)			
1	Explain the task management of a time triggered system versus that of an event triggered system.	Understand	CO 2	BESB06.05
	A critical region of data can be protected either by properly designed static schedules or by semaphore operations. Compare these two alternatives from the point of view of performance.	Remember	CO 2	BESB06.05
3	What the difference is between inter process communication based on state messages and inter process communication based on common memory?	Understand	CO 2	BESB06.05
4	Discuss & Explain Real time operating system agreement protocols and error detection.	Remember	CO 2	BESB06.05
5	What are the difficulties in implementing back-pressure flow control at the Communication network interface?	Understand	CO 2	BESB06.05
6	Compare the determination of the WCET of an S-tasks with that of a C task, Considering the WCAO of the operating system.	Remember	CO 2	BESB06.06
7	Identify all system calls that have to be provided at the API of an event triggered Operating system that supports preemptive C-tasks.	Understand	CO 2	BESB06.06
8	Discuss the interdependence between software portability and API complexity.	Remember	CO 2	BESB06.06
9	Explain Inter component communication.	Understand	CO 2	BESB06.06
10	Explain task manager.	Understand	CO 2	BESB06.07
11	Explain dual role of time.	Remember	CO 2	BESB06.07
12	Discuss Inter task interactions with examples.	Understand	CO 2	BESB06.07
13	Discuss and explain simplest application program interface (API) is the API of a time-triggered S-task.	Remember	CO 2	BESB06.07
14	How to The determination of the worst case execution time (WCET) of a C-task is not a local issue of the C-task, but a system issue.	Understand	CO 2	BESB06.07
15	Explain worst-case administrative overhead (WCAO) of every operating system call of a real-time operating system.	Remember	CO 2	BESB06.07
16	Compare API, WCET and WCAO.	Remember	CO 2	BESB06.07

17	Explain briefly about the inter process communication/ inter component communication.	Understand	CO 2	BESB06.07
18	Explain briefly embedded systems with examples.	Understand	CO 2	BESB06.07
19	What is known as the non real time system and soft real time system?	Remember	CO 2	BESB06.07
20	Discuss briefly about the event triggered and time triggered operating systems.	Understand	CO 2	BESB06.07

<div align="center">**PART - C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)**</div>

1	Consider a real-time system consisting of 100 concurrent tasks, running on 5 different priority levels. How large is the worst-case number of active task control blocks if the tasks are (a) S-tasks, and (b) C-tasks.	Understand	CO 2	BESB06.06
2	Estimate the worst-case delay of a reader when using the NBW protocol. What are the critical parameters?	Remember	CO 2	BESB06.06
3	Estimate an upper bound for the number of instruction that must be executed to implement a semaphore operation WAIT (including the necessary queue management).	Understand	CO 2	BESB06.06
4	A critical region of data can be protected either by properly designed static schedules or by semaphore operations. Compare these two alternatives from the point of view of performance.	Remember	CO 2	BESB06.07
5	Give brief description about the event triggered and time triggered operating systems.	Understand	CO 2	BESB06.07

<div align="center">**UNIT-III**
SYSTEM DESIGN</div>

<div align="center">**PART - A (SHORT ANSWER QUESTIONS)**</div>

1	Explain the design problem with example	Remember	CO 3	BESB06.08
2	Discuss structuring of a computer system can be distinguished to reduce the system complexity	Remember	CO 3	BESB06.08
3	Explain MARS and TTA	Understand	CO 3	BESB06.08
4	Explain Building Fail-Silent Nodes:	Understand	CO 3	BESB06.08
5	Explain HEDC and COTS	Understand	CO 3	BESB06.08
6	Discuss Time Redundant Task Execution and end of the CRC	Remember	CO 3	BESB06.08
7	The Time –Triggered Architecture	Understand	CO 3	BESB06.08
8	What is the difference between layering and partitioning?	Remember	CO 3	BESB06.08
9	Which one of these structuring techniques supports the design of error-containment regions?	Understand	CO 3	BESB06.08
10	Discuss disadvantages of grand design versus incremental development.	Understand	CO 3	BESB06.08
11	Discuss the advantages of grand design versus incremental development.	Understand	CO 3	BESB06.08
12	Discuss the advantages of introducing structure into a design.	Remember	CO 3	BESB06.08
13	Discuss the disadvantages of introducing structure into a design.	Understand	CO 3	BESB06.08
14	Discuss the most important interfaces.	Understand	CO 3	BESB06.08
15	Discuss the most distributed real-time system architecture.	Remember	CO 3	BESB06.08

<div align="center">**MID TERM-II**</div>

16	Discuss the time-triggered architecture is based on the vision that a node can be built on an inexpensive single chip.	Understand	CO 3	BESB06.08
17	Explain the system architect is then free to use as many nodes as necessary to implement the given application requirements within a clean functional structure.	Remember	CO 3	BESB06.08
18	Explain TTA a hardware node is considered a unit of failure with a single external failure mode: fail-silence.	Understand	CO 3	BESB06.08
19	Explain the distributed real-time database.	Remember	CO 3	BESB06.08
20	Discuss the core of the time-triggered architecture.	Understand	CO 3	BESB06.08

		PART- B (LONG ANSWER QUESTIONS)			
1		What is the difference between layering and partitioning? Which one of these structuring techniques supports the design of error-containment regions?	Understand	CO 3	BESB06.08
2		Discuss the advantages and disadvantages of grand design versus incremental development.	Remember	CO 3	BESB06.08
3		What is the minimum performance criterion, and why is it important in the design of fault-tolerant systems?	Understand	CO 3	BESB06.08
4		Discuss the advantages and disadvantages of introducing structure into a design.	Remember	CO 3	BESB06.08
5		Discuss the most important interfaces in a distributed real-time system architecture.	Understand	CO 3	BESB06.08
		MID TERM-II			
6		Establish a checklist for evaluation in design from the point of view of functional coherence, testability, dependability, and physical installation.	Remember	CO 3	BESB06.08
7		Compare the fundamental design decisions in the three real-time architecture projects SPRING, MAFT, and FTPP.	Understand	CO 3	BESB06.08
8		Sketch the interaction matrix for the seven nodes of the rolling mill problem.	Remember	CO 3	BESB06.08
9		Discuss & Explain Wide Area Real time Systems	Understand	CO 3	BESB06.08
10		Explain Software support with WCET and WCAO	Remember	CO 3	BESB06.08
11		The Real-Time Database, The Hardware Building Blocks	Understand	CO 3	BESB06.08
12		Discuss and explain the time triggered Architecture	Remember	CO 3	BESB06.08
13		Discuss the High Error Detection Coverage Mode (HEDC).	Remember	CO 3	BESB06.08
14		Explain real-time database contains a temporally valid "snapshot" of the current state of the cluster and the cluster environment.	Understand	CO 3	BESB06.08
15		Explain the primary and secondary architectures in detail.	Remember	CO 3	BESB06.08
16		What is embedded system architectural patterns? Explain about the Centralized, Adhoc and hierarchical patterns.	Understand	CO 3	BESB06.08
17		Explain briefly about the system design and the design problems.	Remember	CO 3	BESB06.08
18		Discuss about the time- triggered architecture.	Remember	CO 3	BESB06.08
19		Explain distributed real-time database and discuss about the core of the time-triggered architecture.	Understand	CO 3	BESB06.08
20		Discuss the most important interfaces and the most distributed real time system architecture.	Remember	CO 3	BESB06.08
		PART – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)			
1		Make a list of the project standards that should be available at the begin of a project. Discuss the different types of constraints that restrict a design. Why is it important to explore these constraints before starting a design project?	Remember	CO 3	BESB06.08
2		The cluster compiler generates the message schedules and tries to make the realtime images parametric by selecting appropriate update frequencies. At the end it produces the MEDL for each node.	Remember	CO 3	BESB06.08
3		Explain real-time database contains a temporally valid "snapshot" of the current state of the cluster and the cluster environment. Explain the primary and secondary architectures in detail.	Understand	CO 3	BESB06.08
4		Establish a checklist for evaluation in design from the point of view of functional coherence, testability, dependability, and physical installation.	Remember	CO 3	BESB06.08
5		Compare the fundamental design decisions in the three real-time architecture projects SPRING, MAFT, and FTPP. Sketch the interaction matrix for the seven nodes of the rolling mill problem.	Understand	CO 3	BESB06.08

	UNIT-IV INTRODUCTION TO CAN			
	PART- A (SHORT ANSWER QUESTIONS)			
1	What is CAN? Architecture of CAN.	Understand	CO 4	BESB06.09
2	What is CANBUS?	Remember	CO 4	BESB06.09
3	Discuss an automotive serial bus system developed to satisfy what type of requirements.	Understand	CO 4	BESB06.09
4	Who uses CANBUS?	Remember	CO 4	BESB06.10
5	What is the history of CANBUS?	Understand	CO 4	BESB06.10
6	What is the CANBUS Timeline?	Remember	CO 4	BESB06.10
7	Difference between CANBUS and the OSI Model.	Understand	CO 4	BESB06.10
8	What is the CANBUS Physical Layer?	Remember	CO 4	BESB06.10
9	Discuss about the Transmission Characteristics.	Understand	CO 4	BESB06.10
10	What is Message Oriented Transmission Protocol?	Remember	CO 4	BESB06.10
11	What is Message Format?	Understand	CO 4	BESB06.11
12	What is Bus Arbitration?	Remember	CO 4	BESB06.11
13	Explain briefly about the Bus Arbitration Flowchart.	Understand	CO 4	BESB06.11
14	List out CAN standard ISO 11898.	Remember	CO 4	BESB06.11
15	Explain Error detection capabilities.	Understand	CO 4	BESB06.11
16	Discuss and Explain Network layered Model.	Understand	CO 4	BESB06.11
17	Explain CAN bus for vehicle driven control system.	Remember	CO 4	BESB06.11
18	Sketch the 2-wire Bus.	Understand	CO 4	BESB06.11
19	What is OSI model?	Remember	CO 4	BESB06.12
20	Give examples of message transmission.	Understand	CO 4	BESB0612
	PART – B (LONG ANSWER QUESTIONS)			
1	Discuss & Explain CAN bus for vehicle driven control system and Can Motor Control.	Understand	CO 4	BESB06.09
2	Explain Layered Structure of a CAN node OSI Reference model.	Remember	CO 4	BESB06.09
3	Identify which one is Synchronous and Asynchronous ISO-11898-1 and ISO-11898-2.	Understand	CO 4	BESB06.09
4	Discuss & Explain Controller Area Network with CAN and without CAN.	Remember	CO 4	BESB06.09
5	How CAN Bus do Communicate? Need for CAN.	Understand	CO 4	BESB06.09
6	Explain Device Profiles.	Remember	CO 4	BESB06.10
7	Discuss & Explain Electronic Data Sheets.	Understand	CO 4	BESB06.10
8	Explain the CAN open Standards.	Remember	CO 4	BESB06.10
9	What is the Object Dictionary?	Understand	CO 4	BESB06.10
10	List the Standard Data Types and the Object Dictionary locations.	Remember	CO 4	BESB06.10
11	Explain Communication Entries, Mandatory Entries.	Understand	CO 4	BESB06.10
12	How to read the CAN open Specification.	Understand	CO 4	BESB06.10
13	Discuss the Device Configuration Files (DCF).	Remember	CO 4	BESB06.11
14	Discuss EDS Format and Editing EDS.	Understand	CO 4	BESB06.11
15	Explain Accessing the CAN open Object Dictionary.	Remember	CO 4	BESB06.11
16	Explain briefly about the electronic data sheet format and editing with example.	Understand	CO 4	BESB06.11
17	What is device configuration files format and usage?	Remember	CO 4	BESB06.12
18	Explain Bus arbitration with flowchart in detail.	Understand	CO 4	BESB06.12
19	Explain in detail about the characteristics of CANBUS.	Understand	CO 4	BESB06.12
20	Explain briefly about the message oriented transmission protocol. Give example of message transmission.	Remember	CO 4	BESB06.12

1	Identify which one is Synchronous and Asynchronous ISO-11898-1 and ISO-11898-2.	Understand	CO 4	BESB06.09
2	Explain ISO-11898-1 and ISO-11898-2 are synchronous or Asynchronous and verify its relevant applications with data.	Remember	CO 4	BESB06.10
3	Explain briefly about the electronic data sheet format and editing with example.	Understand	CO 4	BESB06.11
4	What is device configuration files format and usage? Explain Bus arbitration with flowchart in detail.	Understand	CO 4	BESB06.11
5	Explain message transmission with example and briefly explain about the message oriented transmission protocol.	Remember	CO 4	BESB06.12

UNIT- V
CAN STANDARDS

PART - A (SHORT ANSWER QUESTIONS)

1	What is identifiers and Objects?	Understand	CO 5	BESB06.13
2	What are the types of identifiers?	Understand	CO 5	BESB06.13
3	What are the types of objects?	Remember	CO 5	BESB06.13
4	Define object dictionary?	Understand	CO 5	BESB06.13
5	What is the history of CANBUS	Remember	CO 5	BESB06.13
6	What is the CANBUS Timeline	Understand	CO 5	BESB06.13
7	What is guard time?	Remember	CO 5	BESB06.13
8	What is the CANBUS Physical Layer	Understand	CO 5	BESB06.13
9	What is meant by Data types?	Remember	CO 5	BESB06.13
10	What is a standard data type?	Understand	CO 5	BESB06.13
11	What is meant by CRC calculation?	Understand	CO 5	BESB06.14
12	What is NMT?	Understand	CO 5	BESB06.14
13	What is emergency communication?	Understand	CO 5	BESB06.14
14	Define SDO communication?	Remember	CO 5	BESB06.14
15	Explain Error detection capabilities	Understand	CO 5	BESB06.14
16	What is object dictionary?	Understand	CO 5	BESB06.15
17	Write an example for object dictionary.	Understand	CO 5	BESB06.15
18	Define life time factor.	Understand	CO 5	BESB06.15
19	What is error register?	Remember	CO 5	BESB06.15
20	Explain identity object.	Understand	CO 5	BESB06.15

PART – B (LONG ANSWER QUESTIONS)

1	Discuss & Explain CAN bus for vehicle driven control system and Can Motor Control	Understand	CO 5	BESB06.13
2	Explain Layered Structure of a CAN node OSI Reference model	Remember	CO 5	BESB06.13
3	Identify which one is Synchronous and Asynchronous ISO-11898-1 and ISO-11898-2	Understand	CO 5	BESB06.13
4	Discuss & Explain Controller Area Network with CAN and without CAN	Remember	CO 5	BESB06.13
5	How CAN Bus do Communicate? Need for CAN	Understand	CO 5	BESB06.13
6	Discuss & Explain CAN bus for vehicle driven control system and Can Motor Control	Remember	CO 5	BESB06.13
7	Explain Layered Structure of a CAN node OSI Reference model	Understand	CO 5	BESB06.13

8	Identify which one is Synchronous and Asynchronous ISO-11898-1 and ISO-11898-2	Remember	CO 5	BESB06.13
9	Discuss & Explain Controller Area Network with CAN and without CAN	Understand	CO 5	BESB06.13
10	What is the Object Dictionary? and Object Dictionary Organization and Contents	Remember	CO 5	BESB06.14
12	Explain Communication Entries ,Mandatory Entries and Manufacturer Specific Entries with examples	Understand	CO 5	BESB06.14
13	How to Reading the CAN open Specification and Specification Headings	Remember	CO 5	BESB06.14
14	Give detailed explanation about the NMT slave state diagram.	Understand	CO 5	BESB06.14
15	Explain briefly about the network management communication.	Remember	CO 5	BESB06.14
16	Give detailed explanation about the SDO communication.	Understand	CO 5	BESB06.14
17	Explain about the Heart beat or Node guarding with neat diagram	Understand	CO 5	BESB06.15
18	What is meant by Emergencies (EMCY)? Give detailed explanation.	Remember	CO 5	BESB06.15
19	Explain briefly about the various layers of OSI model.	Understand	CO 5	BESB06.15
20	Explain object dictionary with examples.	Remember	CO 5	BESB06.15
PART – C (PROBLEM SOLVING &ANALYTICAL QUESTIONS)				
1	Check & Verify Default Message IDs for SDO Communication block diagram	Understand	CO 5	BESB06.13
2	Discuss Handling Process Data with Process Data Objects (PDO)	Remember	CO 5	BESB06.13
3	Sketch NMT slave state diagram and explain about the network management communication.	Remember	CO 5	BESB06.14
4	List the Standard Data Types, their descriptions and the Object Dictionary locations where they are defined, with examples	Understand	CO 5	BESB06.15
5	Explain Communication Entries ,Mandatory Entries and manufacturer Specific Entries with examples	Remember	CO 5	BESB06.15

Prepared by:
Dr. S. Vinoth, Associate Professor   **HOD, ECE**