

RV COLLEGE OF ENGINEERING®
 (An Autonomous Institution affiliated to VTU, Belagavi)

II Semester Master of Technology

COMMON TO ALL

RESEARCH METHODOLOGY

Time: 03 Hours

Maximum Marks: 100

Instructions to candidates:

1. Each unit consists of two questions of 20 marks each.
2. Answer FIVE full questions selecting one from each unit (1 to 5).
3. Use of statistical tables permitted.

UNIT-1

M	BT	CO
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1	a	Distinguish between the terms – ‘Problem’ and ‘Problem Solving’.	05 10 05	2 2 1	1 1 1
	b	Enumerate the categories of ‘Problems’ in research.			
	c	List the steps involved in problem solving process in Research.			
2	a	Elaborate the important factors in developing creative thinking.	10 05 05	2 2 1	1 1 1
	b	Enumerate the four stages of creative problem solving process.			
	c	There are several types of thinking that are employed in problem solving. List any five terms used to indicate the thinking process.			

OR

UNIT-2

3	a	Provide a brief note on the basic terms used in experimental research. (i) Experiment (ii) Factor (iii) Nuisance variable (Noise) (iv) Treatment	10	2	1
	b	“Quasi-experimental designs are used when true experiments are not possible”. In the light of the above statement, list the conditions best suited for these of quasi experimental designs.			
	c	“Action research may be thought of as a field experiment to solve practical problems”. Elaborate.			
4	a	What is meant by ‘Ex post facto’ research? Classify and explain it into three broad categories.	10	2	1
	b	Mention the aim of qualitative research methods. Describe any four methods of qualitative research.			

OR

UNIT-3

5	a	Enumerate the features of primary types of measurement scales. Write a note on Nominal scales and ordinal scales. In the context of validity of measurement instrument, provide a brief note on the following: (i) Content validity (ii) Criterion related validity (iii) Face validity (iv) Construct validity	10	2	2
	b	OR			
6	a	Enumerate the steps involved in sampling process. Provide illustration of an example for each step.	10	3	2
	b	Distinguish between 'Primary data' and 'Secondary data'. Discuss the internal and external sources of secondary data.			

UNIT-4

7	a	A manufacturing unit wants to hold a finished stock inventory of atleast 290 units for 25 items so that the urgent orders can be filled quickly. A check on inventory levels of these items reveal the following number in stock. Are the stocks of these items adequate? Draw a stem and leaf diagram and histogram. 140, 270, 50, 0, 75, 150, 295, 70 500, 40, 0, 80, 140, 170, 170, 240 290, 15, 390, 660, 90, 310, 190, 320 200	10	4	4
	b	Distinguish between the terms: Null hypothesis and Alternate hypothesis.			
	c	List the steps to be performed for a typical testing of hypothesis.			
8	a	OR	08	4	4
	b	The average shelf life of a product is claimed by the manufacturers as 30 months. A random sample of 81 units had a mean of 28.7 months and a standard deviation of 8 months. Perform a hypothesis test using a significance level of 0.05.			
	c	A piston ring manufacturer has to produce them with not more than 3% of rings defective. Large quantities of rings are manufactured and sold by the company. A purchaser samples 300 rings and finds 12 defective. Should he accept the lot or reject it? Perform the hypothesis test using a significance of 0.02 for the manufacturer claim.			
		Provide a brief note on Non-parametric tests.	05	2	4

UNIT-5

9	a	Enumerate the typical format contents of a dissertation report. Also support your answer with an illustration.	15	3	3
	b	Provide a format of publication in a research journal.			
10	a	OR	10	3	3
	b	What is meant by the term - 'Briefing'? Provide the order of contents the briefing should preferably have. Summarize the key criteria to be considered in the evaluation process of a research proposal.			

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU, Belagavi)

II Semester Master of Technology(Computer Science and Engineering)**ADVANCES IN OPERATING SYSTEM****Time: 03 Hours****Maximum Marks: 100****Instructions to candidates:**

1. Each unit consists of two questions of 16 marks each.
2. Answer FIVE full questions selecting one from each unit (1 to 5).
3. Question No.11 lab component (compulsory).

UNIT-1

M BT CO

1	a	With an example code and commands to execute the program, demonstrate the CPU Virtualization. Illustrate different categories of API's available for doing different operations on the processes.	08	2	1
	b				
2	a	Illustrate the design goals of the Operating System. Explain the data structure strcutproc used to represent a process in XV6 operating System.	08	2	1
	b				

OR**UNIT-2**

3	a	With a neat figure illustrate Single Queue Multi Processor scheduling and Multiple Queue Multi Processor scheduling. Illustrate the issues of Cache Coherence and Synchronization in Multi-processor architecture.	08	2	1
	b				
4	a	Explain any two schedulers for Linux Multi Processor system. Illustrate different cache events and actions occur on execution of memory access and invalidation commands in Multi-Processor architecture.	08	2	2
	b				

OR**UNIT-3**

5	a	Give thread APIs for thread creation and completion. Explain the following locks for concurrency: (i) Test and set (ii) Compare and Swap	08	3	2
	b				
6	a	Write a program to send a single argument to a thread. Explain the use of Pthread locks for Synchronization.	08	2	2
	b				

OR

UNIT-4

7	a	A process in LINUX is represented by structtask_struct. We know it's a quite large and complex. List and explain its fields by dividing them into number of functional areas.	08	4	3
	b	Illustrate different scheduling information that the LINUX Kernel keeps for a process.			
8	a	Explain different identifiers used in LINUX process that control the access control of resources in LINUX.	08	4	3
	b	Explain different scheduling classes used by LINUX operating system.			

OR

UNIT-5

9	a	Explain any four POSIX APIs with respect to processes.	08	2	2
	b	Illustrate the significance of kernel synchronization.			
10	a	Explain the significance of the kernel wrapper routines.	08	2	2
	b	Differentiate between the following two synchronization mechanisms for accessing single net_device structure: (i) The dev_base_lock lock (ii) The rtnl_lock() function			

LAB COMPONENT

11	a	Write a C program that takes one or more file directory names as command line input and reports the following information (i) File Type (ii) Number of Links (iii) Time of last access (iv) Read, write and execute permission.	10	4	4
	b	Implement multithreaded application using Pthread library to perform I/O operations.			

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU, Belagavi)

**II Semester Master of Technology (Computer Science and Engineering)
DEEP LEARNING****Time: 03 Hours****Maximum Marks: 100****Instructions to candidates:**

1. Each unit consists of two questions of 16 marks each.
2. Answer FIVE full questions selecting one from each unit (1 to 5).
3. Question No.11 lab component (compulsory).

UNIT-1

M BT CO

1	a	Assuming the mapping of linear functions of variable x may be extended to nonlinear functions based on transformation function $\phi(x)$. How do you choose ϕ using deep learning? Write the relevant mathematical equations.	06	3	1
	b	Show that the derivative of bipolar sigmoidal function is $f'(x) = \lambda/2[1 + f(x)][1 - f(x)]$.			
	c	What is regularization? How do you describe L1 and L2 regularization?			
2	a	Explain the principle of the gradient descent algorithm. Accompany your explanation with a diagram.	08	3	1
	b	We have decided to use a neural network to solve this problem. We have two choices: either to train a separate neural network for each of the disease or to train a single neural network with one output neuron for each disease, but with a shared hidden layer. Which method do you prefer? Justify your answer.			
	c	Discuss data augmentation and early stopping with reference to Regularization			

OR

2	a	Explain the principle of the gradient descent algorithm. Accompany your explanation with a diagram.	08	3	1
	b	We have decided to use a neural network to solve this problem. We have two choices: either to train a separate neural network for each of the disease or to train a single neural network with one output neuron for each disease, but with a shared hidden layer. Which method do you prefer? Justify your answer.			
	c	Discuss data augmentation and early stopping with reference to Regularization			

UNIT-2

3	a	If a data block in a convolutional network has dimension $H \times W \times D = 200 \times 200 \times 128$ of stride 1 and we can apply a convolutional filter to it of dimension $H' \times W' \times D = 7 \times 7 \times 128$, what is the dimension of the output data block?	04	4	2
	b	What are the roles of convolution layer and max pool layer in convolutional neural network?			
	c	What are three basic strategies for obtaining convolution kernels without supervised training?			
4	a	What are Priors? How do we consider Convolution and Pooling as an Infinitely Strong Prior?	08	3	2
	b	How Convolutional Neural Network has been designed to capture the properties of Visual Cortex of the human brain?			
	c	With reference to back propagation briefly describe the terms: i) Gradient Descent. ii) Vanishing gradient.			

OR

UNIT-3

5	a	How do you calculate the current state, applying activation and output state? Briefly describe the steps involved in training RNN Most RNNs can be decomposed into three blocks of parameters and associated transformation. Justify.	3+7	3	3
	b			10	3
OR					
6	a	Discuss encoder to decoder sequence to sequence architecture using an example. How is self-loop introduced in Long short Term Memory (LSTM)? Discuss LSTM by means of a block diagram.	10	3	3
	b			3+7	3

UNIT-4

7	a	“A recursive network has a computational graph that generalizes the recurrent network from a chain to a tree”. Justify this statement with an example. Briefly describe undercomplete encoders, sparse autoencoders and denoising autoencoders.	10	4	4
	b			10	3
OR					
8	a	Describe the training process of Denoising Auto Encoder(DAE) List and explain the tasks which form the challenges of unstructured modeling	10	3	4
	b			10	3

UNIT-5

9	a	Describe in words the architecture of Lenet, Alexnet and VGGNet (VGG16) List six examples of hyper parameters. What is reinforcement learning? How does it work?	06	3	4
	b			06	3
	c			08	3
OR					
10	a	Describe in words the architectures of ResNet and DenseNet. Differentiate between Regularization and Optimization Analyze Generative Adversarial Networks.	06	3	4
	b			08	4
	c			06	3

RV COLLEGE OF ENGINEERING®
 (An Autonomous Institution affiliated to VTU, Belagavi)
II Semester M.Tech in Computer Network and Engineering
INTERNET OF THINGS AND EDGE COMPUTING

Time: 03 Hours**Maximum Marks: 100****Instructions to candidates:**

1. Each unit consists of two questions of 20 marks each.
2. Answer FIVE full questions selecting one from each unit (1 to 5).

UNIT-1

M BT CO

1	a	Give proper definitions of Internet of Things(IOT), the definitions should be inline with i) Turning things into computers ii) Things get greater value because of IOT	10	05	02	01
	b	Give any two use cases of IOT		05	02	01
	c	Apply the concepts you learnt in design of IOT systems and for the given scenario(Scenario I –Given at the end of the Question paper) Give general framework for IOT.		02	01	
OR						
2	a	Apply the concepts you learnt in design of IOT systems and for the given scenario(Scenario I –Given at the end of the Question Paper) give Oracle Conceptual Framework for IOT.	10	04	01	
	b	Apply the concepts you learnt in design of IOT systems and for the given scenario(Scenario II-Given at the end of the Question Paper). give CISCO architectural Framework for IOT.		04	01	

UNIT-2

3	a	Differentiate between Universal Resource Identifier(URI) with Universal Resource Locator(URL)	10	05	02	01
	b	With a proper illustration explain the Constrained environment of IOT.		05	02	01
	c	With a neat diagram illustrate the Constrained RESTfull Environment (CoRE) for the web communication in IOT setup that essential involves both the constrained and un constrained environment.		03	01	
OR						
4	a	Illustrate Constrained Application Protocol(COAP) which is for CoRE using ROLL(Routing Over a network of low power and (data)Loss) data network with a neat diagram and also explain how it different from HTTP over the TCP.	10	03	02	
	b	With a neat diagram explain the Message Queuing Telemetry Transport (MQTT) is an open-source protocol for machine-to-machine (M2M)/IOT connectivity. Further illustrate the working of MQTT Broker (also referred simply as MQ).		02	02	

UNIT-3

5 a	<p>Referring to the following figure, Identify-Virtual Objects (VO), Composite Virtual Objects (CVO) and the services. Also with a neat diagram explain the FP7 iCore Access Framework (iCore Contribution) identifying different Cognitive Management Levels.</p> <p>The diagram illustrates the FP7 iCore Access Framework. At the top level are three Application boxes: Application, Application (p-1), and Application (p-2). Below them is a Service Layer containing a Database icon. This leads to a Composite Virtual Object Layer and a Virtual Object Layer. The Virtual Object Layer connects to five business process boxes: Fiber Production, Fiber Drying, Winding, Making Garment, and Retail Store. These processes are grouped under the heading "Heterogeneous Computer Data Communication Networks, Devices, and Systems". Below this group is a row of icons representing various IoT nodes: 5G Router, 5G Router, 5G Router, 5G Router, and 5G Router. At the bottom is a "Physical and Communication Layers" section featuring icons for a factory, a truck, a ship, and an airplane. Arrows indicate the flow from the Application layer through the Service Layer and Virtual Object Layer to the business processes, and from there down to the physical communication layers.</p>			
b	<p>Explain the notion of CapBAC (Capability Based Access Control) with an example that is inline with the IoT@Work Capability Based Access Control System.</p>	10	04	02
	OR	10	02	02
6 a	<p>Security, privacy and trust for IoT for smart city should be considered during the design itself-Justify your answer.</p>	04	02	02
b	<p>Illustrate the possible risks with respect to security of IoT for smart city SMARTIE</p>	08	02	03
c	<p>Explain different attributes towards the dependability of IoT for smart city SMARTIE.</p>	08	02	02

UNIT-4

7 a	<p>Analyze how do Fog and Edge Computing (FEC) nodes support acceleration in two aspects-networking acceleration and computing acceleration.</p>	10	04	03
b	<p>Explain different features Fog and Edge Computing (FEC) that complement the Cloud in IOT.</p>	10	02	03
	OR			
8 a	<p>Differentiate between Vertical Networking and Horizontal Networking of Fog and Edge Computing(FEC)</p>	10	04	03
b	<p>Illustrate how do Fog and Edge Computing (FEC) provide the advantages that helps filling the gap between cloud and things towards providing service continuum.</p>	10	02	03

UNIT-5

9	a	Interpret the concept of network slicing in Software Defined Clouds.	10 10	02 04	04 04			
	b	Define Network Slicing? Explain how this is done in 5G.						
OR								
10	a	Describe the taxonomy of network aware Virtual Machine/Virtualized Network Function (VM/VNF) management in software defined cloud.	10 10	01 02	04 04			
	b	Explain the main tasks of slicing management and Orchestration (MANO) layer.						
Scenario-I								
<u>IoT smart metering solutions and smart meter data visualization</u>								
<p>Traditionally being a part of the electrical infrastructure, a smart meter is an electronic device that allows for remote monitoring and recording of energy consumption. However, in the age of IoT and IoT platforms, standalone smart meters give way to more advanced and multi-purpose smart metering solution. These solutions offer a broader range of remote monitoring and alerting capabilities as well as provide powerful data analytics tools to help companies and individual users optimize their energy, water, gas, or fuel consumption.</p>								
<p>A typical challenge for companies implementing smart meters is how to integrate them with in their infrastructure and set up custom-tailored smart metering use cases. The best way to achieve these goals is by using an IoT platform that offers out-of-the box solutions and templates for smart metering. One of the strongest advantages of an enterprise-grade IoT platform is its data processing capabilities. Not only will you be able to collect data from your diverse smart meters in a centralized way, but also set up custom visualization dashboards, configure user alerts and notifications, and feed the collected data into other applications or data stores.</p>								
<p>Another critical advantage is the cost of smart metering implementation. Using an IoT platform allows you to have all the necessary functionality right away and focus on building particular smart metering use cases instead, saving time and avoiding the risks associated with in-house IoT development.</p>								
<p>Try designing the solutions while considering the following use cases (but not restricted these, you can make use of any expertise and/or imagination about the use case) and answer the questions 1.c, 2.a and 2.b Scenario II</p> <ul style="list-style-type: none"> • Reliable and fault tolerant data collection for your smart water meters, energy monitors, smart energy meters, etc.; • Powerful rule engine to process collected data and produce alarms and valuable insights; • Advanced, customizable data visualization for real-time and historical smart metering monitoring; 								

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II Semester Master of Technology (Common to All)**HEALTH INFORMATICS****Time: 03 Hours****Maximum Marks: 100****Instructions to candidates:**

1. Each unit consists of two questions of 20 marks each.
2. Answer FIVE full questions selecting one from each unit (1 to 5).

UNIT-1

M BT CO

1	a	What is Health Informatics and what are its key players of Health Informatics?	10 10	1 1	1 2
	b	Describe the different types of Health Informatics data.			
OR					
2	a	Design a clinical data warehouse for arthritis disease.	08	5	4
	b	Discuss the types of data analytical tools for Health Informatics.			
12 4 3					

UNIT-2

3	a	Explain the advantages of keeping the health records in database.	10 10	2 3	2 2
	b	Elucidate on the significance of Electronic Health Records and data storage.			
OR					
4	a	Elucidate on the processes of <i>EHR</i> .	10 10	4 3	3 3
	b	Mine the challenges associated with maintaining the <i>EHR</i> .			

UNIT-3

5	a	Explain the process of implementation of the <i>EHR</i> in the hospitals.	10 10	3 2	3 3
	b	Comment on the medical coding system with suitable example.			
OR					
6	a	Design a medical code for diabetes patient records.	10 10	5 4	4 4
	b	How the risks in any of <i>EHR</i> can be resolved?			

UNIT-4

7	a	What are the organizations involved in Health Informatics?	10 10	2 3	3 3
	b	What are the barriers to implement the Health Informatics in general hospitals?			
OR					
8	a	What are some programs and organizations related to Health Informatics and their career prospects?	10 10	1 2	1 1
	b	What are e-resources available for Health Informatics professionals?			

UNIT-5

9	a	Why is Health Information Privacy and Security are important?	10	1	2
	b	Explain basic security principles in Health Informatics Privacy and Security.			
10	a	How the client/server management is helpful in Privacy and Security of health information?	10	2	3
	b	What are the Health Informatics resources that a Healthcare Enterprise should facilitate?			

OR

RV COLLEGE OF ENGINEERING®
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II Semester Master of Technology
 COMMON TO ALL PROGRAMS

PROFESSIONAL SKILL DEVELOPMENT

Time: 02 Hours**Maximum Marks: 50****Instructions to candidates:**

1. Answer ALL questions from Part A (1 to 10).
2. Answer FIVE full questions from Part B. In part B, question number 2,7 and 8 are compulsory. Answer any one full question from 3 and 4 and one full question from 5 and 6.

PART -A

M BT CO

1	1.1	What is a sentence?	01	1	1
	1.2	_____ are a group of words that together act as grammatical units.	01	1	2
	1.3	How many references are usually given in a resume?	01	2	2
	1.4	Introducing a boy, a girl said, "He is the son of the daughter of the father of my uncle." How is the boy related to the girl?	01	2	2
	1.5	Mention the kind of interview that includes a process in which the employability of the job applicant is evaluated.	01	1	1
	1.6	Mention the type of interviews adapted for computer programmers.	01	2	3
	1.7	What are interpersonal skills?	01	4	3
	1.8	How should you maintain eye contact with the panel members in GD?	01	2	4
	1.9	Mention the methods for encouraging employee development.	01	2	3
	1.10	What are the most important skills a leader should possess?	01	3	4

PART-B

2	a	Describe a real purpose of a Resume.	04	2	2
	b	Has the development of the internet and social media caused a change in the way we communicate? Elaborate.	04	2	2
3	a	Rahul put his timepiece on the table in such a way that at 6 PM hour hand points to North. In which direction the minute hand will point at 9:15 PM? Explain in detail.	04	3	3
	b	Sachin walks 20km towards the North. He turns left and walks 40km. He again turns left and walks 20km. Finally, he moves 20km after turning to the left. How far is he from his starting position? Explain with a diagram.	04	3	3
4	a	A person climbs a hill in a straight path from a point on the ground in the direction of north-east and reaches point A after travelling a distance of 5km. Then from point A he moves to point B in the direction of the northwest. Let the distance AB be 12 km. Now how far is the person away from the starting point O?	04	4	3

OR

b	<p><i>P, Q and R are three towns. The distance between P and Q is 60 km, whereas the distance between P and R is 80km. Q is in the West of P and R is in the South of P. What is the distance between Q and R?</i></p>	04	4	3
5 a	<p><i>Radha moves towards the South-East a distance of 7km, then she moves towards the West and travels a distance of 14km. From here she moves towards North-West a distance of 7km and finally, she moves a distance of 4km towards the east. How far is she now from the starting point? Explain in detail.</i></p>	04	5	3
b	<p><i>The difference between a two digit number and a number obtained by interchanging the positions of its digits is 36. What is the difference between the two digits of that number? Explain in detail.</i></p>	04	5	3
	OR			
6 a	<p><i>Four friends A, B, C and D live in the same locality. The house of B is in the east of A's house but in the North of C's house. The house of C is in the West of D's house. D's house is in which direction of A's house? Explain with a diagram.</i></p>	04	3	4
b	<p><i>If one-third of one-fourth of a number is 15, then three-tenth of that number is what? Explain with suitable steps.</i></p>	04	3	4
7 a	<p><i>Explain the types of mistakes one should avoid while communicating in group discussion.</i></p>	04	2	4
b	<p><i>Describe an instance when your work was criticized.</i></p>	04	2	4
8 a	<p><i>Describe the level of motivation for the team doing good job.</i></p>	04	2	2
b	<p><i>What are the four Basic Leadership Styles? Explain</i></p>	04	2	2