

MID-TERM EXAMINATION
(B.Tech CSE/IT/MAE/DMAM/ECE/ECE-AI) (4th Sem)
(February, 2023) OFF LINE mode

Subject Code: BIT-204	Subject: Object Oriented Programming
Time : 1 ½ Hours	Maximum Marks : 30
Note: Q. 1 is compulsory.	

Q1

(3,2,2,3)

- (a) List any 6 key characteristics of OOP.
- (b) What are inline functions? Explain with a small program example.
- (c) Explain the role of scope resolution operator in OOP.
- (d) What is an abstract class? Explain with a small example.

Q2 (Attempt any Two Parts)

[(2,3),5,5]

- (a) What is the output of below program? Give suitable justification of your answer.

```
int main()
{
    int i = 0, x = 0;

    do
    {
        if(i % 5 == 0)
        {
            cout<<x;
            x++;
        }

        ++i;
    }while(i<10);

    cout<<x;

    return 0;
}
```

- (b) Differentiate between call by reference and call by pointers through a program.
- (c) Write a program to add members of two different classes using friend function and constructors.
- (d) Write a program to create a database of student's information system containing the following information: Name, Roll number, Class, Contact address and Telephone number. Construct the database with suitable member functions - add () to add a new student and count() to count total students in the class. Make use of static member function and this pointer in the program.

Q3 (Attempt any Two Parts)

(5,5)

- (a) What is operator overloading? Write a program to directly multiply two objects of a class called "Fraction" having numerator and denominator as data members, i.e., if object 1 = 4/15 and object 2 = 7/3 then output should be : 28/45.
- (b) Write a program to describe the behavior of parameterized constructors during multiple inheritance.
- (c) Write a program to demonstrate who can access private and protected members of a class.

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(OffLine)
(B.Tech IT) (4th Sem)
B.Tech (CSE, IT, MAE, ECE, ECE-AI, DMAM)
(April -May, 2023)

Subject Code: RIT-204	Subject: Object Oriented Programming
Time :3 Hours	Maximum Marks :60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1

(5 x 4 =20)

(a) Explain the concept of following in object oriented programming with brief examples:

- ✓ a) Encapsulation
- ✓ b) Inheritance

(b) Illustrate with suitable program the calling of constructors and destructors in derived classes.

(c) Describe the role of namespaces in OOP with a program as example.

(d) Explain 2 uses of final keyword through java program.

UNIT-I

Q2 a) What is dynamic memory allocation in C++ ? Write a program to demonstrate the usage of new and delete operators. (5,5)

✓ Q3 b) Write a program to find all prime numbers within a given range.
a) Explain instance variable hiding. Demonstrate through program how to overcome instance variable hiding. (5,5)

b) Write a program to find sum of digits of a given number. E.g., if number is 1634, sum is $1+6+3+4 = 14$.

UNIT-II

✓ Q4 Demonstrate through programs: (5,5)

- ✓ a) Virtual Base Class
- ✓ b) Run time polymorphism through Virtual Functions

Q5 Develop a class Matrix for integers in C++. Class must have all possible constructor and destructor functions to create matrix object. Also overload '+', '-', operators for matrix. (10)

UNIT-III

Q6 What is the role of file pointer in C++ ? Write a program to demonstrate different operations that can be performed on a file. (10)

✓ Q7 What is exception handling in OOP ? Write a program to explain use of try, catch and throw in exception handling. (10)

UNIT-IV

Q8 a) Explain any 5 Java Buzzwords.
b) Write a program in java to explain any 2 uses of super keyword. (5,5)

Or

✓ Q9 Write a program to explain in Java: i) Packages ii) Interface
a) Create a class Book in java which describes its Book title and Book price. Create methods to print and initialize the Books description. Create objects of Book class. (5,5)

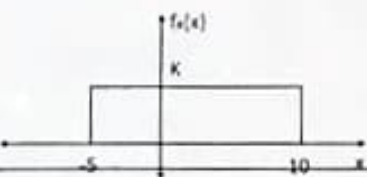

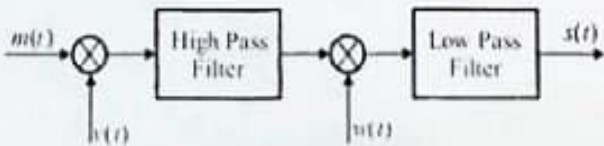
b) Using program, explain multi threading in Java.

Or

✓ Explain life cycle of a thread in Java.

MID-TERM EXAMINATION
(Course Name: B. Tech. (ECE)) (Semester: 4)
(February, 2023) OFF LINE mode

Subject Code: BEC-208	Subject: Communication Systems
Time : 1 ½ Hours	Maximum Marks : 30
Note: Q. 1 is compulsory.	

Q1	(2.5*4)	
(a) What is an Ergodic random process? Explain the concept of Wide Sense Stationary and Strict Sense Stationary random process.		
(b) Find the ACF (autocorrelation function) of <i>sinusoidal function</i>		
(c) Draw the spectrum obtained in between the blocks of Non-linear device and Bandpass filter in case of Square law Modulator? Also draw the response of the Bandpass filter (i.e., obtained at the end).		
(d) Draw and explain the frequency domain representation of Multitone AM.		
Q2	(5,5)	
(Attempt any Two Parts) UNIT-1		
(a) What are random processes? How do they differ from random variables? What are the statistical averages of random processes?		
(b) Plot and explain probability mass function, CDF and PDF for a random variable which is specifying the number of heads in the experiment of tossing a coin twice.		
(c) For a random variable x, density function is given below:		
<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> (i) Find K (ii) Find (iii) Find (iv) Plot $f_c(x)$ </div>  </div>		
Q3	(5,5)	
(Attempt any Two Parts) UNIT-2		
(a) Draw and explain the frequency domain representation of single tone AM. What is its transmission efficiency (in terms of modulation index)?		
(b) Explain the working of the Switching Modulator in detail.		
<p>(c) In the figure, $M(f)$ is the Fourier transform of the message signal $m(t)$ where $A=120$ Hz and $B=50$ Hz. Given and where $f_c > A$. The cutoff frequencies of both the filters are f_c.</p> <div style="text-align: center;">  </div> <div style="text-align: center; margin-top: 20px;">  </div> <p>What is the bandwidth of the signal at the output of the Low Pass filter (in Hz)?</p>		

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(OffLine)
Course Name: B. Tech ECE., Semester:4
(April -May, 2023)

Subject Code: BEC 208	Subject: Communication System
Time :3 Hours	Maximum Marks :60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1

(2.5*8=20) ^h

- (a) Given that, $f_x(x) = ae^{-bx}$, where x is a continuous random variable. Find the relation between a and b .
- (b) Explain Poisson Distribution and its characteristics.
- (c) Derive the expression for total power in terms of carrier power for Amplitude Modulated signal.
- (d) For an Amplitude Modulated signal, the bandwidth is 20 kHz and the highest frequency component is 800 kHz. What is the carrier frequency used for this AM signal?
- (e) Explain the block diagram of Superheterodyne Receiver.
- (f) $X_s(t) = 3 \cos[2\pi \times 10^6 t + 2 \sin(2\pi \times 10^3 t)]$
Calculate the ratio of maximum frequency deviation to maximum phase deviation.
- (g) Explain Narrowband Noise along with its expression.
- (h) What is White Noise? Explain its characteristics.

UNIT-I ^{2W0}

- Q2 A random process is given by $X(t) = A \cos(\omega_0 t + \theta)$, where A and ω_0 are constants and θ is a random variable, which is uniformly distributed in the interval $(0, 2\pi)$. Find whether the given Random Process is Wide Sense Stationary or not? (10)
- /Q3 What are Cumulative Probability Distribution Function (CDF) and Probability Density Function (PDF)? State the properties of CDF. (10)

UNIT-II

- /Q4 Draw a comparison chart for DSB-FC, DSB-SC, SSB-SC and VSB signals. (10)
- /Q5 Explain the concept of under-modulation, critical-modulation and over-modulation along with the waveforms in time domain. (10)

UNIT-III

- Q6 Derive the expression for Wideband FM signal. Draw its spectrum and find its ideal bandwidth? How is Carson's rule important for Wideband FM signal? (10)
- /Q7 The signal $m(t) = \text{sinc}(2 \times 10^4 t)$ is frequency modulated with $K_f = 10^3 \text{ Hz/V}$. What is the maximum instantaneous frequency of the modulated signal when carrier frequency is 1 MHz? (10)

UNIT-IV

- Q8 Explain the concept of Pre-emphasis and De-emphasis in FM. Also include the circuit diagram explaining its functioning. (10)
- /Q9 Explain the following types of Noise: (10)
- (i) Thermal Noise
- (ii) Shot Noise

MID-TERM EXAMINATION
(B.Tech ECE/ECE-AI) (Semester : IV)
(February, 2023) OFF LINE mode

Subject Code: BEC 206

Subject: Electromagnetic Field Theory

Time : 1 ½ Hours

Maximum Marks : 30 / 2.5

Note: Q. 1 is compulsory.

Q1

(2.5*4)

- 2 (a) Explain Stokes's theorem and evaluate the curl of the vectors $3i + 4j - 5k$ and divergence of $-i + j - 2k$.
- ✓ (b) Verify the statement: "The divergence of curl of any vector is always zero."
- 2 (c) Derive the electric field due to infinite line charge at a perpendicular distance 'a' from the center of the uniformly distributed infinite line charge having line charge density, λ and charge, Q.
- 2 (d) Explain the significance of all Maxwell's equations.

Q2 (Attempt any Two Parts)

(5,5)

- (a) Demonstrate the cylindrical and spherical coordinate system and evaluate their conversion to Cartesian coordinate system.
- ✓ (b) Evaluate the curl of the following vector field:
 - (a) $\mathbf{P} = x^2yz \mathbf{a}_x + xz \mathbf{a}_z$
 - (b) $\mathbf{Q} = \rho \sin \phi \mathbf{a}_\rho + \rho^2 z \mathbf{a}_\phi + z \cos \phi \mathbf{a}_z$
 - (c) $\mathbf{T} = \frac{1}{r^2} \cos \theta \mathbf{a}_r + r \sin \theta \cos \phi \mathbf{a}_\theta + \cos \theta \mathbf{a}_\phi$
- 2.5 (f) Given point P (-2, 6, 3) and vector $\mathbf{A} = y\mathbf{a}_x + (x+z)\mathbf{a}_y$, Evaluate and A in cylindrical coordinate system. Calculate A at P in the Cartesian, Cylindrical coordinate systems.

Q3 (Attempt any Two Parts)

(5,5)

- (a) Demonstrate the electric fields intensity due to continuous charge distributions.
- ✓ (b) Derive dielectric -dielectric boundary conditions for electric field.
- (c) Analyze the electric field of the point charge present at origin to the point $\mathbf{A} = A_\rho \mathbf{a}_\rho + A_\phi \mathbf{a}_\phi + A_z \mathbf{a}_z$ in Cartesian and spherical coordinate system.

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(OffLine)
Course Name: B.Tech, ECE, ECE-AI, Semester: IV
(April -May, 2023)

Subject Code: BEC-206	Subject: Electromagnetic Field Theory
Time :3 Hours	Maximum Marks :60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1

(2.5*8=20)

- (a) What do you mean by displacement current?
- (b) What is surface impedance?
- (c) Define skin depth. Derive its relation with attenuation constant.
- (d) How electromagnetic waves propagate through the transmission lines?
- (e) What are uniform plane waves? Discuss its properties.
- (f) Explain the Poynting vector and average Poynting vector.
- (g) If $E = -(2y^2 - 3yz^2)a_x - (6xy^2 - 3xz^2)a_y + (6xyz)a_z$ is the electric field vector in a source free region, what will be the valid expression for the electrostatic potential? $-(2y^2 - 3yz^2)a_x - (6xy^2 - 3xz^2)a_y + (6xyz)a_z$
- (h) Discuss various wave polarization.

UNIT-I

- Q2 (a) Convert point T (0, -4, 3) from cartesian to cylindrical and spherical coordinates. (10)
- (b) State Stoke's theorem
- Q3 The temperature in an auditorium is given by, $T = x^2 + y^2 - z$. A mosquito at (1, 1, 2) in the auditorium desires to fly in such a direction that it will get warm as soon as possible. In what direction must it fly? (10)

UNIT-II

- Q4 Three point charges are located in the $z = 0$ plane: a charge $+Q$ at point (-1, 0), a charge $+Q$ at point (1, 0), and a charge $-2Q$ at point (0, 1). Determine the electric flux density at (0, 0). (10)
- Q5 Discuss Gauss's law and its various applications with suitable figures. (10)

UNIT-III

- Q6 Derive Maxwell's field equations in differential and integral form and explain their significance. (10)
- Q7 In free space, the magnetic flux density is $B = y^2 a_x + z^2 a_y + x^2 a_z$. (10)
 - (a) Show that B is a magnetic field
 - (b) Find the magnetic flux through $x=1, 0 < y < 1, 1 < z < 4$
 - (c) Calculate J (conduction current density).

UNIT-IV

- Q8 Define impedance matching. Explain the method of impedance matching using stub and also derive an expression to find the location of stub and length of stub. (10)
- Q9 On a distortionless transmission line, the voltage wave is given by $V(l') = 120 e^{0.0025l'} \cos(10^8 t + 2l') + 60 e^{-0.0025l'} \cos(10^8 t - 2l')$ (10)

Where l' is the distance from the load. If $Z_L = 300$ ohms, find (a) α , β and u, (b) Z_0 and $I(l')$

MID-TERM EXAMINATION
(B.Tech ECE) 4th semester
(January, 2023) OFF LINE mode

Subject Code: BEC 204

Subject: Digital System Design

Maximum Marks : 30

Time : 1 ½ Hours

Note: Q. 1 is compulsory. Attempt any two questions from the rest.

Q1

(2.5*4)

- ✓ (a) What is the acronym for VHDL. List at least 5 capabilities of VHDL.
- ✓ (b) What are the various design units in VHDL?
- ✓ (c) Differentiate between Mealy and Moore machines.
- ✓ (d) Write the VHDL code for entity declaration of FULL ADDER and 4x1 MUX

(5,5)

Q2 (Attempt any Two Parts)

- ✓ (a) Explain the process of object declaration? Give examples
- ✓ (b) What are the differences between behavioral and dataflow modeling.
- (C) What are concurrent statements.

(5,5)

Q3 (Attempt any Two Parts)

- (a) What are finite state machines? Give example
- ✓ (b) What are signal drivers in hardware languages?
- ✓ (C) Explain the roles of test benches in VHDL Designs?

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(Offline)
Course Name: B.Tech ECE, Semester:4
(April -May, 2023)

Subject Code: BEC 204	Subject: Digital System Design
Time :3 Hours	Maximum Marks :60
Note:Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1		(2.5*8=20)
(a)	How does an architecture differ from an entity in VHDL.	
(b)	What is the role of library in VHDL?	
(c)	What is a transition matrix and how is it related to a state diagram.	
(d)	In the design of digital circuits, what factors should be considered when choosing between pulse mode and fundamental mode of operation.	
(e)	How can you use FSMs to analyse the behaviors of a composite machine?	
(f)	List the capabilities and limitations of FSM in digital logic design.	
(g)	What is the role of Design for testability in VHDL Designing.	
(h)	Differentiate between PLA AND PAL.	
UNIT-I		
Q2	How is a testbench used in VHDL to verify the functionality of digital circuits. How is it designed and implemented, and what are the key considerations in its use? How does it help to ensure the accuracy and reliability of the digital circuit design?	(10)
Q3	What is the difference between a concurrent assignment and a sequential assignment in VHDL, and when would you use each one.	(10)
UNIT-II		
Q4	What are secondary state assignments in digital circuits. Discuss the various methods used for secondary state assignment.	(10)
Q5	Describe the steps involved in realizing a state table from a verbal description and provide an example to illustrate your explanation.	(10)
UNIT-III		
Q6	Compare and contrast the Mealy and Moore model machines, and explain how they can be used to represent FSMs. Provide examples of where each model is most appropriate to use.	(10)
Q7	What are the race and hazard problems that occur in asynchronous sequential machines and how can they be mitigated through circuit design techniques.	(10)
UNIT-IV		
Q8	What is the role of simulation tools in the EDA process. What are some challenges associated with using EDA tools for large-scale digital circuit designs, and how can these challenges be addressed?	(10)
Q9	What is RTL synthesis in VHDL and how is it different from behavioral synthesis? How do you optimize RTL circuits for performance and area in VHDL?	(10)

MID-TERM EXAMINATION
B. Tech (ECE/ECE-AI) (Semester – 4TH)
(February, 2023) OFF LINE mode

Subject Code: BEC 202	Subject: Linear Integrated Circuits
Time : 1 ½ Hours	Maximum Marks : 30
Note: Q. 1 is compulsory.	

Q1**(2.5*4)**

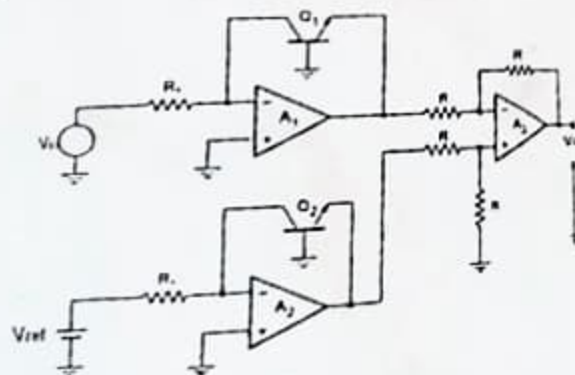
- ✓(a) Describe Differential amplifier with relevant equations.
- (b) Define Slew rate. A square wave of peak to peak amplitude of 500 mV has to be amplified to peak-to-peak amplitude of 3 volts, with a rise time of 4 μ s or less. Can a 741 be used?
- (c) Design a Wien bridge oscillator for an output frequency of 10kHz, 741 IC op-amp with $V_c = \pm 10$ V may be used.
- (d) Design a triangular wave generator with input-output waveforms.

Q2 (Attempt any Two Parts) UNIT-1**(5,5)**

- ✓(a) Design the data sheet of μ A741 IC op-amp analyzing any 5 electrical parameters.
- ✓(b) An inverting amplifier has $R_f = 500\text{k}\Omega$ and $R_i = 5\text{k}\Omega$.
- (i) Determine the amplifier circuit voltage gain, input resistance and output resistance.
- (ii) Also, determine the output voltage and input current if the input voltage is 0.1 V. Assume Op-Amp to be the ideal one.
- (c) Construct an improved current mirror with relevant equations.

Q3 (Attempt any Two Parts) UNIT-2**(5,5)**

- ✓(a) Explain Hartley Oscillator. Find V_{out} in terms of V_{in} and V_{ref} in the figure below.



- (b) The time constant (RC) of an op-amp integrator circuit is 0.1ms. Determine the output response for the following input signals:
- 1V peak sine wave at 5 kHz.
 - Step voltage $V_i = 1$ V for $0 \leq t \leq 0.5$ ms
 - 2V P-P square wave of 5kHz.
 - Draw the input and output waveforms.
- ✓(c) Construct instrumentation amplifier using transducer bridge and find the output voltage (V_o).

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(Offline)
Course Name: B. Tech (ECE/ECE-AI), Semester: 4TH
(April -May, 2023)

Subject Code: BEC 202	Subject: Linear Integrated Circuits
Time : 3 Hours	Maximum Marks : 60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1

(2.5*8=20)

- (a) Write the ideal characteristics of an Ideal Op-Amp. Explain the equivalent circuit of Op-Amp and datasheet.
- (b) Explain the voltage follower circuit with a suitable diagram and input-output waveforms.
- (c) Explain the operation of the Schmitt Trigger circuit.
- (d) Explain anti-log amplifier with waveforms.
- (e) Design current to voltage converter.
- (f) Differentiate between Op-Amp and OTA.
- (g) Explain 555 timer Mono-stable IC circuit.
- (h) Design a second order low pass filter at a high cut-off frequency of 2 kHz using Op-Amp.

UNIT-I

- Q2 Explain the equivalent and internal circuit with the block diagram of 741 IC Op-Amp. (10)
- Q3 Describe the working of the current mirror and improved current mirror circuit and prove the derivations. (10)

UNIT-II

- Q4 Draw and explain the circuit of an inverting integrator using ideal op-amp. Calculate the output voltage after (i) 0.55ms (ii) 15ms of the application of a step input voltage of 50 mV. Take $R=50\Omega$, $C=0.1\mu F$ and the supply voltage of the op-Amp is $\pm 15V$. (10)
- Q5 Explain phase shift oscillator with relevant equations for each loop. Also, Design the oscillator for an output frequency of 1kHz, 741 IC Op-Amp with $V_{CC} \pm 10V$ may be used for it. (10)

UNIT-III

- Q6 Explain OTA as voltage amplifier and programmable resistor with relevant equations and diagrams. (10)
- Q7 Explain the monolithic power amplifiers. Explain the LM380 audio amplifier IC and its applications. (10)

UNIT-IV

- Q8 Analyze the wide bandpass filter circuit and obtain the transfer function, quality factor, bandwidth, and centre frequency. (10)
- Q9 What is Basic Phase locked loop (PLL)? Explain its operating principle with block diagram describing each block. Discuss any two applications of PLL. (10)

MID-TERM EXAMINATION
(B.Tech, CSE, MAE, DMAM, ECE, IT, CES-AI, ECE-AI) (Semester : IV)
(February, 2023) OFF LINE mode

Subject Code: HMC 202	Subject: Disaster Management
Time : 1 ½ Hours	Maximum Marks : 30
Note: Q. 1 is compulsory.	

Q1

(2.5*4)

- ☒ (a) Define resilience and vulnerability.
- ☒ (b) How to prevent a Hazard from changing into a disaster?
- ☒ (c) What is the impact of volcanic eruptions on environment?
- ☒ (d) Explain the impact of development projects in some recent disasters of India.

Q2

(Attempt any Two Parts)

(5,5)

- ☒ (a) Explain the various approaches and the significance of rehabilitation in the disaster management.
- ☒ (b) What are the causes of floods and explain the different methods of flood control measures.
- ☒ (c) Explain the cause and effect of Bhopal Gas tragedy.

Q3

(Attempt any Two Parts)

(5,5)

- ☒ (a) Describe the different type of natural and man induced disasters.
- ☒ (b) Explain the cause and effect of Joshimath disaster.
- ☒ (c) Explain briefly the Disaster Management Act, 2005.

END TERM EXAMINATION
(CBCS)(SUBJECTIVE TYPE)
Course Name: B.Tech CSE/IT/ECE/MAE/DMAM/CSE-AI/ECE-AI (Semester -IV)
(April-May 2023)

Subject Code: HMC 202	Subject: Disaster Management
Time : 3 Hours	Maximum Marks :60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1

(2.5*8=20)

- (a) Define hazard and vulnerability.
- (b) List the relief, recovery and rehabilitation measures for earthquakes.
- (c) What do you mean by 'Natural Disaster'? Mention about different types of Natural Disasters.
- (d) List different types of flood.
- (e) Describe the role of GPS in disaster management.
- (f) What is IRNSS? Explain with the help of an example.
- (g) Write a short note on demonstration of Fire Drill.
- (h) Write application of drones in disaster management.

UNIT-I

- Q2 What is Risk? How it is related to hazard? Discuss with some examples. (10)
Mention about the strategies to be adopted for Risk reduction?

- Q3 What do you understand by preparedness, mitigation, prevention under pre - disaster management stage? Discuss in detail. (10)

UNIT-II

- Q4 Write Short Notes on:(within 50 words) (10)
i) Tsunami of South India (2004)
ii) Bhuj earth quake and lesson learnt from it.

- Q5 What do you mean by Tsunami? What are its causes? Explain all steps of disaster management for Tsunami? (10)

UNIT-III

- Q6 What is the use of ICT and mobile technology for disaster management. (10)

- Q7 What is Remote Sensing? Discuss the use of GIS for disaster management. (10)

UNIT-IV

- Q8 What do you mean by disaster management? Explain the role of NDMA for disaster management? (10)

- Q9 What do you understand by search and rescue operation? (10)
Discuss the institutional framework under disaster management act- 2005.