Guru Nanak Institutions Technical Campus

(Autonomous)

(Permanently Affiliated to JNTUH, Approved by AICTE)

(NAAC – A+ & NBA Accredited)

Khanapur, Ibrahimpatnam, Hyderabad – 501 506.

STUDENT HAND BOOK

For

III Year B.Tech. (II-Semester)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SCHOOL OF ENGINEERING & TECHNOLOGY

AY: 2023-24

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS (Autonomous)

Department of Electronics and Communication Engineering

III Year B.Tech. ECE II-Sem   **L T P**

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(18PE0EC2A) Antenna and Propagation

Unit – I	**Antenna Basics Fundamental Concepts:** Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions. **Wire and Loop Antennas:** Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.
Unit –II	**Aperture and Reflector Antennas:** Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas. **Broadband Antennas:** Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.
Unit – III	**Micro strip Antennas:** Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas
Unit – IV	**Antenna Arrays Antenna Arrays:** Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, and synthesis of antenna arrays using Schelkunoff polynomial method, Woodward-Lawson method.
Unit -V	**Basic Concepts of Smart Antennas:** Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming. Different modes of Radio Wave propagation used in current practice.

SUGGESTED BOOKS:

TEXTBOOKS:

1. J.D. Kraus, Antennas, McGraw Hill, 1988.
2. C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.

REFERENCE BOOKS:

1. R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
2. R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.
3. I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980. 4. R.E. Crompton, Adaptive Antennas, John Wiley

CONSOLIDATED UNIT WISE LESSON PLAN: -

Subject: Antennas & Propagation			
Name of the Faculty: K Ramyasree			
Textbooks			
Book 1	J.D. Kraus, Antennas, McGraw Hill, 1988.		
Book 2	C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.		
Reference Books			
Book 3	R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.		
Book 4	R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.		
Book 5	I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980. 4. R.E. Crompton, Adaptive Antennas, John Wiley		
Unit	**Topic**	**Books**	**No of Classes**
I	**Antenna Basics Fundamental Concepts**	1,2,3,4,5	**16**
II	**Aperture and Reflector Antennas**	3,4	**13**
III	**Micro strip Antennas**	4,5	**8**
IV	**Antenna Arrays Antenna Arrays**	1,3	**8**
V	**Basic Concepts of Smart Antennas**	5	**10**
Contact classes for syllabus coverage			55
Tutorial Classes			10
Descriptive Tests			02
Classes for beyond syllabus			03
Remedial Classes/NPTEL			05
Total Number of Classes			75

COURSE INFORMATION SHEET

SUBJECT: ANTENNAS AND PROPAGATION (18PE0EC2A)

PROGRAMME: **Electronics and Communication Engineering**	DEGREE: **BTECH**
COURSE: **B. TECH**	SEMESTER: **II** CREDITS: **3**
COURSE CODE: **18PE0EC2A** REGULATION: **R18**	COURSE TYPE: Professional Elective
COURSE AREA/DOMAIN: **Antennas & Propagation**	CONTACT HOURS: **55**
CORRESPONDING LAB COURSE CODE (IF ANY): **NO**	LAB COURSE NAME: **---**

Unit	Details	Hours
Unit-I	Antenna Basics Fundamental Concepts: Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions. Wire and Loop Antennas: Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.	16
Unit-II	Aperture and Reflector Antennas: Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas. Broadband Antennas: Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.	13
Unit-III	Micro strip Antennas: Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas	8
Unit-IV	Antenna Arrays Antenna Arrays: Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, and synthesis of antenna arrays using Schelkunoff polynomial method, Woodward-Lawson method.	8
Unit-V	Basic Concepts of Smart Antennas: Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming. Different modes of Radio Wave propagation used in current practice.	10
TOTAL HOURS		55
Tutorial Classes		10

Descriptive Tests	02
Classes for beyond syllabus	03
Remedial Classes/NPTEL	05
Total Number of Classes	75

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	J.D. Kraus, Antennas, McGraw Hill, 1988.
T	C.A. Balanis, Antenna Theory - Analysis and Design, John Wiley, 1982.
R	R.E. Collin, Antennas and Radio Wave Propagation, McGraw Hill, 1985.
R	R.C. Johnson and H. Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.
R	I.J. Bahl and P. Bhartia, Micro Strip Antennas, Artech House, 1980. 4. R.E. Crompton, Adaptive Antennas, John Wiley

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS (Autonomous)

Department of ELECTRONICS AND COMMUNICATION Engineering

Lecture Plan with Blooms Taxonomy

Name of the Subject   : Antennas & Propagation
Subject Code   : **18PE0EC2A**
Name of Faculty: K Ramyasree
Class & section: III SEC-2,4
BTL- Blooms Taxonomy Level

Level 0   - Remembering
Level 1   - Understanding
Level 2   - Applying
Level 3   - Analyzing
Level 4   - Evaluating
Level 5   - Creating

Cumm. Periods	Time (Min)	Topics	BTL	Teaching – Learning Method
UNIT I: ANTENNA BASICS FUNDAMENTAL CONCEPTS				
1	50	Pre-Requisites About EMTL	1	Chalk & Talk/PPT
2	50	Introduction to Waves and Electromagnetic Spectrum	1	Chalk & Talk/PPT
3	50	Introduction to Antennas	1	Chalk & Talk/PPT
4	50	Physical Concept of Radiation	2	Chalk & Talk/PPT
5	50	Radiation Pattern	2	Chalk & Talk/PPT
6	50	Near-And Far-Field Regions	2	Chalk & Talk/PPT
7	50	Reciprocity, Directivity and Gain	3	Chalk & Talk/PPT
8	50	Effective Aperture	2	Chalk & Talk/PPT
9	50	Polarization, Input Impedance	3	Chalk & Talk/PPT
10	50	Efficiency, Friis Transmission Equation	3	Chalk & Talk/PPT
11	50	Radiation Integrals and Auxiliary Potential Functions	3	Chalk & Talk/PPT

12	50	Radiation from Wires and Loops- Infinitesimal Dipole	3	Chalk & Talk/PPT
13	50	Finite-Length Dipole	2	Chalk & Talk/PPT
14	50	Linear Elements Near Conductors	2	Chalk & Talk/PPT
15	50	Dipoles for Mobile Communication	2	Chalk & Talk/PPT
16	50	Small Circular Loop	3	Chalk & Talk/PPT
UNIT II: APERTURE AND REFLECTOR ANTENNAS				
17	50	Huygens' Principle	2	Chalk & Talk/PPT
18	50	Radiation from Rectangular and Circular Apertures	3	Chalk & Talk/PPT
19	50	Design Considerations	3	Chalk & Talk/PPT
20	50	Babinet's Principle	2	Chalk & Talk/PPT
21	50	Radiation from Sectoral and Pyramidal Horns	3	Chalk & Talk/PPT
22	50	Design Concepts	4	Chalk & Talk/PPT
23	50	Prime-Focus Parabolic Reflector	3	Chalk & Talk/PPT
24	50	Cassegrain Antennas	3	Chalk & Talk/PPT
25	50	Log-Periodic Antenna	3	Chalk & Talk/PPT
26	50	Yagi-Uda Antennas	4	Chalk & Talk/PPT
27	50	Frequency Independent Antennas	3	Chalk & Talk/PPT
28	50	Broadcast Antennas	4	Chalk & Talk/PPT
29	50	Advantages, Disadvantages, Applications	2	Chalk & Talk/PPT
UNIT III: MICROSTRIP ANTENNAS				
30	50	Basic Characteristics of Micro Strip Antennas	1	Chalk & Talk/PPT
31	50	Feeding Methods	2	Chalk & Talk/PPT
32	50	Methods of Analysis	3	Chalk & Talk/PPT
33	50	Rectangular Patch Antennas	4	Chalk & Talk/PPT

34	50	Circular Patch Antennas	3	Chalk & Talk/PPT
35	50	Designing Parameters	4	Chalk & Talk/PPT
36	50	Parameters of Micro strip Antennas	2	Chalk & Talk/PPT
37	50	Advantages, Disadvantages, Applications	2	Chalk & Talk/PPT
UNIT IV: ANTENNA ARRAYS				
38	50	Antenna Arrays	2	Chalk & Talk/PPT
39	50	Types of antenna Arrays	2	Chalk & Talk/PPT
40	50	Analysis of Uniformly Spaced Arrays with Uniform Excitation Amplitudes	4	Chalk & Talk/PPT
41	50	Analysis of Uniformly Spaced Arrays with Non-Uniform Excitation Amplitudes	4	Chalk & Talk/PPT
42	50	Extension to Planar Arrays	4	Chalk & Talk/PPT
43	50	Synthesis of Antenna Arrays	4	Chalk & Talk/PPT
44	50	Schelkunoff Polynomial Method	3	Chalk & Talk/PPT
45	50	Woodward-Lawson Method	3	Chalk & Talk/PPT
UNIT V: SMART ANTENNAS AND WAVE PROPAGATION				
46	50	Introduction to Smart Antennas	1	Chalk & Talk/PPT
47	50	Concept of Smart Antennas	2	Chalk & Talk/PPT
48	50	Benefits of Smart Antennas	1	Chalk & Talk/PPT
49	50	Beam Forming Basics	3	Chalk & Talk/PPT
50	50	Fixed Weight Beam Forming	3	Chalk & Talk/PPT
51	50	Adaptive Beam Forming	3	Chalk & Talk/PPT
52	50	Modes of Radio Wave Propagation	2	Chalk & Talk/PPT
53	50	Ground Wave Propagation	2	Chalk & Talk/PPT
54	50	Space Wave Propagation	2	Chalk & Talk/PPT
55	50	Sky Wave Propagation	2	Chalk & Talk/PPT

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS (Autonomous)

Department of ELECTRONICS AND COMMUNICATION Engineering

Question Bank with Blooms Taxonomy Level (BTL)

Academic Year: **2022-23**

Subject Name with code: **ANTENNAS AND PROPAGATION (18PE0EC2A)**

Class: **III YEAR /II SEMESTER**

Name of the Faculty Member: **K. RAMYASREE**

Blooms Taxonomy Levels (BTL)
1. Remembering
2. Understandin
3. Applying
4. Analyzing
5. Evaluating
6. Creating

Sl.No.	Questions (Select Questions from University question Bank and mention year in bracket or you may give own standard question with (new) in bracket)	BTL level (Please mention L1 or L2 or etc...)	Course Outcome (Please mention CO1 or CO2 etc…)
	Unit – I		
	Part – A (2 Marks)		
1	Define isotropic source? **(NOV/DEC 2016 - R13)**	1	CO1
2	What is meant by Beam area? **(NOV/DEC 2016 – R13)**	2	CO1
3	Distinguish between far field and near field? **(NOV 2015 – R09)**	2	CO1
4	Define Radiation Intensity of an Antenna **(New)**	2	CO1
5	Define Directivity and Gain of an Antenna and give the relation between them **(New)**	2	CO1
6	Give the Friis transmission equation **(New)**	1	CO1

7	Define a Hertzian dipole? **(New)**	1	CO1
	Part – B (5 Marks)		
1	Show that radiation resistance of λ/2 dipole antenna is 73ohms? **(JUNE/JULY 2014 – R09, NOV/DEC 2017 –R15)**	3	CO1
2	Explain the concept of retarded vector potential? **(NOV 2015 - R09)**	2	CO1
3	Derive the expression for field components of a small loop antenna? **(NOV/DEC 2016 –R13)**	3	CO1
4	Calculate the Effective Aperture of an Antenna **(New)**	3	CO1
5	Draw and explain the concept of Antenna Radiation pattern **(New)**	2	CO1
6	Explain the concept of Polarization and its types **(New)**	3	CO1
	Unit – II		
	Part – A (2 Marks)		
1	Explain the characteristics of yagi-uda antenna? **(NOV 2015 - R09)**	1	CO2
2	What is Reflector antenna? What are its types **(NOV 2016 - R09)**	2	CO2
3	What is Hygens principle? (New)	2	CO2
4	What is Aperture Blocking? **(New)**	2	CO2
5	What is Babinets Principle?	2	CO2
6	What is Aperture antenna?	2	CO2
	Part – B (5 Marks)		
1	What is Yagi-uda antenna? Explain the construction and operation of it with general characteristics? **(NOV/DEC 2016-R13)**	2	CO2
2	Explain design considerations of pyramidal horn? **(JUNE /JULY 2014 –R09, NOV 2015 –R13)**	3	CO2
3	Explain the special features of parabolic reflector antenna and discuss on different types of feeds used with neat diagram? **(NOV. / DEC 2011- R09)**	3	CO2
4	Explain the operation of Cassegrain reflector antenna with its limitation **(New)**	2	CO2
5	Draw and explain the functioning of Log-periodic Antenna **(New)**	2	CO2
6	Explain in detail about various frequency independent antennas and their radiation patterns **(New)**	3	CO2

7	Explain in detail about Broadcast Antennas **(New)**	2	CO2
	Unit – III		
	Part – A (2 Marks)		
1	List out the applications of patch antennas? **(NOV 2015 – R13)**	1	CO3
2	Discuss the features of microstrip antennas? **(NOV 2015 –R13)**	2	CO3
3	List out the limitation of Microstrip antennas **(New)**	2	CO3
4	List out the advantages of Microstrip antennas **(New)**	2	CO3
5	What is patch antenna? what are its types	2	CO3
6	List out various feeding methods used for patch antennas	2	CO3
	Part – B (5 Marks)		
1	With necessary illustrations explain the characteristics of rectangular patch micro strip antenna and mention its possible applications? **(NOV / DEC 2011 – R09)**	3	CO3
2	What are micro strip patch antennas? List the advantages and limitations of it? **(NOV/DEC 2017 – R15)**	3	CO3
3	Give the geometry of Microstrip patch antenna and draw the normalized radiation pattern obtained **(New)**	3	CO3
4	Explain in detail about various feeding methods used in Micro strip patch antennas **(New)**	3	CO3
5	A rectangular microstrip antenna (RMSA) is designed at 1800 MHz on a substrate having εr = 2.33, h = 1.6 mm and tan δ = 0.0012. Calculate width, effective dielectric constant, length, input impedance, gain		
	Unit – IV		
	Part – A (2 Marks)		
1	What is a uniform linear array? **(NOV 2015 – R13)**	1	CO4
2	**Differentiate broadside array and end fire array?** (May 2008 - RR, APR 2011- R09, NOV/DEC 2017- R15)	1	CO4
3	Define array factor? **(DEC 2007-RR, NOV 2017- R15)**	1	CO4

4	What is binomial array? **(New)**	1	CO4
5	List out the advantages of Binomial array **(New)**	1	CO4
6	What are planar arrays? **(New)**	1	CO4
	Part – B (5Marks)		
1	Determine fields due to **(MAY / JUNE 2013 – R09)** A) Array of two-point sources of same amplitude and in phase at distance R? B) Array of two-point sources of same amplitude and opposite phase at distance R?	4	CO4
2	Compare BSA and EFA? **(NOV/DEC 2016 – R13, NOV/DEC 2017 – R15)**	3	CO4
3	What is binomial array antenna? What is the working principle? Mention its advantages & disadvantages? **(MAR 2017 – R13)**	3	CO4
4	Derive an expression for radiation pattern of broad side uniform linear array of 4 elements with $\lambda/2$ spacing, obtain its radiation pattern? **(NOV 2015 – R13)**	3	CO4
5	What are planar arrays? Explain in detail **(New)**	2	CO4
6	Synthesize the antenna array using schelkunoff polynomial method **(New)**	4	CO4
7	Give the equations for antenna array using Woodward lawson method **(New)**	3	CO4
	Unit – V		
	Part – A (2 Marks)		
1	Define wave tilt of ground wave? **(NOV 2015 – R13)**	1	CO5
2	What is Duct propagation? **(MAY 2015 – R16)**	1	CO5
3	**What is sporadic E layer?** (MAY 2015 – R16)	1	CO5
4	What are smart antennas? (New)	1	CO5
5	List out the advantages of smart antennas **(New)**	1	CO5

6	What are the applications of Smart antennas **(New)**	1	CO5
7	What is beam forming? what are its types **(New)**	1	CO5
	Part – B (5 Marks)		
1	Explain the mechanism of ionosphere propagation? **(APRIL / MAY 2011 – R09)**	3	CO5
2	**Explain the terms: (APRIL / MAY 2011- R09, NOV/ DEC 2011-R09, NOV/DEC 2017- R15)** i). Critical Frequency. ii). Maximum usable frequency. iii). Skip Distance	2	CO5
3	Explain the important features of ground wave propagation? **(NOV / DEC 2011 – R09)**	2	CO5
4	What is Skip distance? Obtain the relation between skip distance and MUF? **(JUNE /JULY2014 –R09, NOV 2015- R13)**	3	CO5
5	Explain different beam forming techniques **(New)**	4	CO5
6	Explain in detail about the advantage of adaptive beam forming compared with fixed beam forming **(New)**	2	CO5
7	A high frequency radio link to be established between 2 points at 2500km on earth surface. Considering the ionosphere height to be 200km and its critical frequency 5MHz, calculate MUF for given path **(New)**	3	CO5

SOLUTIONS
PART A
UNIT-I

1. **Define isotropic source?**

An isotropic radiator is a theoretical point source of electromagnetic or sound waves which radiates the same intensity of radiation in all directions. It has no preferred direction of radiation. It radiates uniformly in all directions over a sphere centered on the source.

2. **What is meant by Beam Area?**

BEAM AREA (OR BEAM SOLID ANGLE) Ω_A

In polar two-dimensional coordinates an incremental area dA on the surface of a sphere is the product of the length $r\,d\theta$ in the θ direction (latitude) and $r\sin\theta\,d\phi$ in the ϕ direction (longitude), as shown in Fig. 2–5.

Thus,

$$dA = (r\,d\theta)(r\sin\theta\,d\phi) = r^2\,d\Omega \qquad (1$$

where

$d\Omega = $ solid angle expressed in steradians (sr) or square degrees ($^\circ$)

$d\Omega = $ solid angle subtended by the area dA
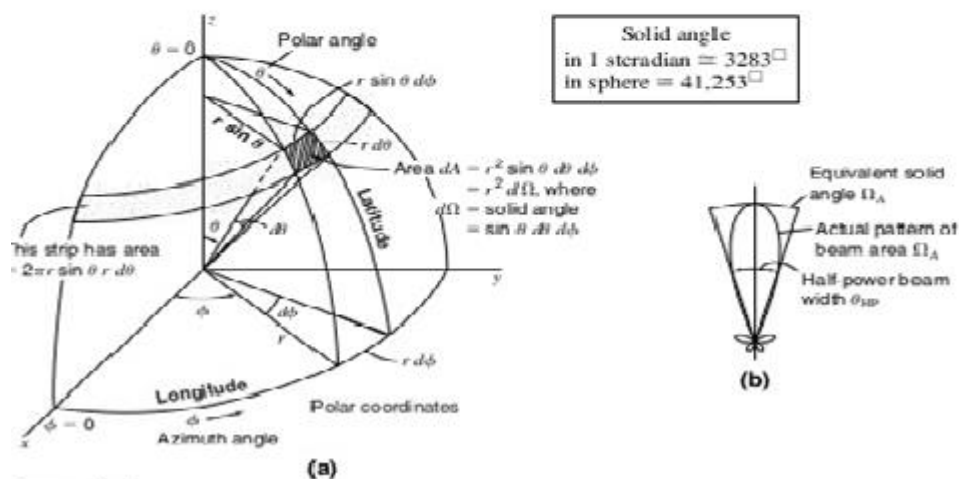
Figure 2–5
Polar coordinates showing incremental solid angle $dA = r^2\,d\Omega$ on the surface of a sphere of radius r where $d\Omega = $ solid angle subtended by the area dA. (b) Antenna power pattern and its equivalent solid angle or beam area Ω_A.

3. **Distinguish between far field and near field? (NOV-2015- R13)**

Non-radiative 'near-field' behaviors of electromagnetic fields dominate close to the antenna or scattering object, while electromagnetic radiation 'far-field' behaviors dominate at greater distances. Far-field E and B field strength decreases inversely with distance from the source, resulting in an inverse-

square law for the radiated power intensity of <u>electromagnetic radiation</u>. By
contrast, near-field E and B strength decrease more rapidly with distance
inverse-distance squared or cubed), resulting in relative lack of near-field
effects within a few wavelengths of the radiator.

4. Define Radiation Intensity of an Antenna (New)

Radiation Intensity

- The power radiated from an antenna per unit solid angle
- This is a far-field parameter, and it can be obtained by simply
  multiplying the radiation density by the square of the distance

$$U = r^2 W_{rad}$$

5.   Define Directivity and Gain of an Antenna and give the relation between them (New)

Directivity D is a quantitative measure of an antenna's ability to
concentrate energy in a certain direction. Specifically, D is the ratio of the
maximum radiation intensity Umax to the average radiation intensity Uavg

Directivity = $U_{max/UAvg}$ (dimensionless)

Is the ratio of the radiation intensity in a given direction to the radiation
intensity that would be obtained if the power were radiated isotropically

G=KD

6. Give the Friis transmission equation(New)

The Friis Transmission Equation is used to calculate the power received from one
antenna (with gain G1), when transmitted from another antenna (with gain G2),
separated by a distance R, and operating at frequency f or wavelength lambda.

$$P_r = \frac{P_t G_t G_r \lambda^2}{(4\pi R)^2}$$

Where,

P_r = Power at the receiving antenna
P_t = Output power of transmitting antenna
G_t = Gain of the transmitting antenna
G_r = Gain of the receiving antenna
λ = Wavelength
R = Distance between the antennas

7. Define a Hertzian dipole? (New)

A very simple radiating element we can study is the ideal dipole, also known as Hertzian dipole and infinitesimal dipole. It is very short (length $\ll \lambda$), and as such has current uniformly distributed along its length.

UNIT-II

1. Explain the characteristics of yagi-uda antenna? (NOV 2015 - R09)

Yagi-Uda antenna or aerial is a particularly popular form of antenna where directivity and gain are required. Although the Yagi has become particularly popular for television reception; it is also used in many other applications, both domestic and commercial or professional. The gain and directivity of the Yagi antenna enable improved reception by enabling better levels of signal to noise ratio to be achieved, and by reducing interference levels by only picking up signals from a given direction. For transmitting much better use of the available power is made because it is possible to focus the transmitted power on areas where it is needed. Similarly, levels of general interference can be reduced to other users because the signal is not transmitted to areas where it is not needed.

2. What is Reflector antenna? What are its types (NOV 2016 - R09)

When integrated into an **antenna** assembly, the **reflector** serves to modify the radiation pattern of the **antenna**, increasing gain in a given direction. Common integrated **reflector** types are. Parabolic **reflector**, which focuses a beam signal into one point or directs a radiating signal into a beam.

3.   What is Huygens principle? (New)

Huygens' principle, in optics, a statement that all points of a <u>wave front</u> of light in a vacuum or transparent medium may be regarded as new sources of wavelets that expand in every direction at a rate depending on their velocities.

4.   What is Aperture Blocking? (New)

Aperture blockage is normally due to shadowing by feed, sub reflector and/or support members. Deviations in reflector surfaces cause non-uniform aperture distributions, resulting in reduced gains.

5.   What is Babinets Principle? (New)

In physics, Babinet's principle states that the diffraction pattern from an opaque body is identical to that from a hole of the same size and shape except for the overall forward beam intensity.

6.   What is Aperture antenna? (New)

The aperture is defined as the area, oriented perpendicular to the direction of an incoming electromagnetic wave, which would intercept the same amount of power from that wave as is produced by the antenna receiving it.

UNIT-III

1. List out the applications of patch antennas? (NOV 2015 – R13)

Mobile communication used in mobile phones.

Medical applications in the treatment of malignant tumors

Textile antennas Wearable antennas will find use in healthcare, recreation

Defense antennas are used in airplanes and in other military applications.

Microwave integrated circuits used as an active element

2. Discuss the features of microstrip antennas? (NOV 2015 –R13)

Fabricated using micro strip techniques on a printed circuit board (PCB)

Mostly used at microwave frequencies

Antenna is connected to the the Tx/Rx through micro strip transmission lines

Micro strip antenna consists of a patch of metal foil of various shapes

Patch is made up of highly conductive material such as copper

3. List out the Limitations of Microstrip Antennas (New)

Low impedance bandwidth.

Low gain.

Extra radiation occurs from its feeds and junctions

Excitation of surface waves.

Size of micro strip antenna comes in both advantages and disadvantages but there are some applications where the size of microstrip antenna is too large to be used.

4.   List out the advantages of Microstrip antennas (New)

Low profile (can even be "conformal").

Easy to fabricate (use etching and phototlithography).

Easy to feed (coaxial cable, microstrip line, etc.) .

Easy to use in an array or incorporate with other microstrip circuit elements.

Patterns are somewhat hemispherical, with a moderate directivity (about 6-8 dB is typical).

5.   What is patch antenna? what are its types

A patch antenna is a type of radio antenna with a low profile, which can be mounted on a flat surface. It consists of a planar rectangular, circular, triangular, or any geometrical sheet or "patch" of metal, mounted over a larger sheet of metal called a ground plane.

There are three types in microstrip antenna:

Microstrip patch antenna, Microstrip slot/travelling antenna and Printed dipole antenna.

6. List out various feeding methods used for patch antennas

A feedline is used to excite to radiate by direct or indirect contact. There are many different methods of feeding and four most popular methods are microstrip line feed, coaxial probe, aperture coupling and proximity coupling.

UNIT IV

1. What is a uniform linear array? (NOV 2015 – R13)

An antenna composed of a relatively large number of usually identical elements arranged in a single line or in a plane with uniform spacing and usually with a uniform feed system

2. Differentiate broadside array and end fire array?
(May 2008 - RR, APR 2011- R09, NOV/DEC 2017- R15)

An array is said to be End-fire array if the main beam is along the axis of the array. An array is said to be Broadside array if the main beam is perpendicular to the axis of the array.

3. Define array factor? (DEC 2007-RR, NOV 2017- R15)

The array factor is the complex-valued far-field radiation pattern obtained for an array of isotropic radiators located at coordinates, as determined by where are the complex-valued excitation coefficients and is the direction unit vector.

4. What is binomial array? (New)

A binomial array is a non-uniform antenna array for which the elements are equally spaced with unequal amplitude excitation using a specified current excitation known as binomial excitation.

5. List out the advantages of Binomial array (New)

The signal strength increases.

High directivity is obtained.

Minor lobes are reduced much.

High Signal-to-noise ratio is achieved.

High gain is obtained.

Power wastage is reduced.

Better performance is obtained.

6.What are planar arrays? (New)

A planar array provides a large aperture and may be used for directional beam control by varying the relative phase of each element.

UNIT V

1. Define wave tilt of ground wave? (NOV 2015 – R13)

At a point in a perfect dielectric medium close to the surface separating this medium from a medium of finite conductivity, the angle between the major axis of the polarization ellipse of a surface **wave** and the normal to the separating surface is called as wave tilting

2. What is Duct propagation? (MAY 2015 – R16)

A radio wave propagation technique that allows the transmission of UHF and VHF electromagnetic waves through the region near the tropospheric layer of atmosphere is known as duct propagation. Duct propagation allows the propagation of the signals beyond the horizon.

3. What is sporadic E layer? (MAY 2015 – R16)

The term sporadic E (Es) layer refers to extremely anomalous values of ionization confined within layers of very limited thickness (a few km) occurring between 90 and 130 km, whose critical frequency is often higher than the normal E layer.

4.What are smart antennas? (New)

Smart Antennas, also known as multiple antennas, adaptive array antennas, and so on is used to increase the efficiency in digital wireless communication systems. It works by taking the advantage of the diversity effect at the transceiver of the wireless system that is the source and the destination.

5.What are the applications of Smart antennas (New)

Applications	Description
RADAR	Phased array RADAR; air traffic control; synthetic aperture RADAR
SONAR	Source location and classification
Communications	Smart antenna systems; Directional transmission and reception; sector broadcast in satellite communications
Imaging	Ultrasonic; optical; tomographic
Geophysical Exploration	Earth crust mapping; oil exploration
Astrophysical Exploration	High resolution imaging of universe
Biomedical	Neuronal spike discrimination; fetal heart monitoring; tissue hyperthermia; hearing aids

6. What is beam forming? what are its types(New)

Beamforming or spatial filtering is a signal processing technique used in sensor arrays for

Adaptive beamforming is used to detect and estimate the signal of interest

at Beamforming techniques can be broadly divided into two categories:.

Switched/Fixed beam forming

Adaptive beam forming

OBJECTIVE TYPE

UNIT-I

Fill in the blanks

1. Radiation resistance dissipates an amount of power that is equal to **radiated power**
2. An isotropic radiator has the directivity of **unity**
3. The noise temperature of an antenna is equal to its **radiation resistance**
4. With the help of **tuning** method, an electrical length of the parasitic element can be adjusted
5. According to Helmholtz theorem, if the **curl** and **divergence** of the field are known at a point then any   vector can be defined uniquely

Multiple choices

1. The efficiency of an antenna in terms of radiated power and ohmic losses is,

a) $\dfrac{wr}{wr+wl}$

b) $\dfrac{wl}{wr+wl}$

c) $\dfrac{2wr}{wr+wl}$

d) $\dfrac{2wl}{wr+wl}$

2. The variation of radiated power with an elevation angle is called

(a) Electric field pattern

(b)   magnetic field pattern

(c) **Power pattern**

(d)   none

3. The relation between antenna's size and frequency is,

(a) Directly proportional

(b) **Inversely proportional**

(c) Independent of frequency

(d) inversely proportional to the square of the frequency

4. If L $_{eff}$ is an effective length and 'L' is the actual length of antenna, then the relation between effective
length and actual length is,

(a) **L$_{eff}$<L**

(b) L$_{eff}$>L

(c) L$_{eff}$=L

(d) L$_{eff}$=3L

5. When the directivity of an antenna increases then its beam width,

(a) Increases   (b) **Decreases**

(c) Increases by 2 times   (d) No effect

UNIT-II

Fill in the blanks

1. In **parasitic** elements, currents are induced due to the field in other elements.

2. The **yagi-uda** antenna with three elements including one reflector, one driven element and one director is commonly called beam antenna

3. The **E-plane sectorial horn** is obtained when tapering in done is the direction of electric field vector

4. The tapering in a gradual exponential manner **minimizes** the reflections of guided waves

5. The optimum pitch angle for the axial mode of helical antenna is at **14degrees**

Multiple choices

1. Parasitic element is capacitive in nature when,

  (a) **Its length is less than resonant length**   (b) Its length is greater than resonant length

  (c) Its length is twice the resonant length   (d) none

2. Directors in Yagi-uda antenna are------------

  (a) 1   (b) 2

  (c) 3   (d) **one or more**

3. Helical antenna provides------------polarization.

  (a) **Circular**   (b) Rectangular

  (c)Elliptical   (d) None of these

4. The pitch angle of helical antenna is given by,

  (a) $\alpha = \tan^{-1}\dfrac{S}{\Pi D}$ (b) $\alpha = \tan^{-1}\dfrac{\Pi D}{S}$

  (c) $\alpha = \tan^{-1}\dfrac{S}{\Pi}$ (d) none

5. If the flare angle symbol is small, then the area of the wave front is approximately----------------aperture.

(a) Less than   (b) Greater than

(c) **Equal to**   (d) None

UNIT-III

Fill in the blanks

1. **Rectangular patch antenna** is one of the micro strip antennas which has a rectangular patch in it

2. **Flat sheet reflector** is the simplest form of reflector antenna

3. The angle at which two plane reflector are joined is called **included angle**

4. The paraboloid which produces sharp major lobes and smaller minor lobes is called as **microwave dish**

5. The hyperboloid reflector, whose foci coincides with the focus of the paraboloid reflector is called **cassegrain secondary reflector**

Multiple choices

1. Limitation of micro strip antennas

    (a) Low bandwidth and low power handling capacity

    (b) Low efficiency and low size

    (c) Low weight and low gain

    (d) none

2. The RF power is directly fed to radiating patch; such a feed method is known as

    (a) Connecting   (b) **contacting**

    (c) Non- contacting   (d) Non- contacting

3. Sides of the corner reflector are made----the feed to vertex spacing, to get smaller included angles

    (a) Smaller than twice   (b) Larger than twice

    (c) Smaller than thrice   (d) **Larger than thrice**

4. An open end of parabolic reflector is called

    (a) **Aperture**   (b) hollow

    (c) Both (a) and (b)   (d) none

5. Half power beam width of large circular aperture is given by

(a) $115\frac{\lambda}{L}$

(b) $115\,\lambda$

(c) $58\frac{\lambda}{D}$

(d) none

UNIT-IV

Fill in the blanks

1. An array of element for which the radiation is maximum in the direction of normal to the array axis is called **broad side array**

2. Directivity of a broadside array of 5λ length is **10**

3. The binomial array has **zero** side lobe level

4. The product of the pattern of the individual antenna with its array pattern is called **principal of pattern multiplication**

5. In binomial array, the excitation of **central** elements is very strong

Multiple choices

1. An excitation value of the broad-side array is,

(a) **0**

(b) 1

(c) 2

(d) 3

2. For broad-side array, null-to-null beam width is,

(a) $\sqrt{\dfrac{Nd}{2\lambda}}$

(b) $2\sqrt{\dfrac{2\lambda}{Nd}}$

(c) $\sqrt{\dfrac{2\lambda}{Nd}}$

(d) $\dfrac{2\lambda}{Nd}$

3. Null-to-null beam width is,

(a) Less than 3dB band width

(b) **Greater than 3dB band width**

(c) Equal to 3dB band width

(d) not related to 3dB band width

4. Directivity of an end-fire array is,

(a) $\dfrac{L}{\lambda}$

(b) $2\dfrac{L}{\lambda}$

(c) $4\dfrac{L}{\lambda}$
(d) $5\dfrac{L}{\lambda}$

5. A three element binomial array has excitation level as,

(a) 1, 4, 1
(b) 2, 3, 2

(c) 1, 3, 1
(d) **1, 2, 1**

UNIT-V

Fill in the blanks

1. **Sky wave** propagation plays a vital role in long distance radio communication.

2. The relative permittivity of the ionosphere at radio frequencies is **less than unity**

3. The major disadvantage of omnidirectional antenna broadcast that smart antennas try to overcome in a cellular network is **co-channel interference**

4. Switched beam antenna systems break a coverage area into microsectors in order to improve **range and capacity**

5. Smart antenna system is typically implemented as an integrated approach with less hardware redundancy called as **adaptive array antenna**

Multiple choices
1. Short wave radio broadcasting for long distance communication uses
    (a) Ground wave   (b) **Ionosphere wave**   (c) Direct wave   (d) none
2. During day which layer doesn't exists
    (a) D-layer   (b) F_2-layer   (c) **F-layer**   (d) E-layer
3. Refractive index of ionized layer is
    (a) $\sqrt{1+\dfrac{81f2}{N}}$
    (b) $\sqrt{1-\dfrac{81f2}{N}}$
    (c) $\sqrt{1-\dfrac{81N}{f2}}$
    (d) $\sqrt{1-\dfrac{f2}{81N}}$

4. Adaptive array systems cover a cell area with

(a) a finite number of predefined patterns or combining strategies

(b) an infinite number of patterns that are adjusted in real time

(c) dividing the 360°-cell into three 120°-microsectors

(d) dividing the 360°-cell into three 60°-microsectors

5.The smarts of a smart antenna system are chiefly derived from

   (a) the multiple elements of the antenna array

   (b) frequency reuse

(c) the digital signal-processing capability

(d)   frequency discrimination

III Year B.Tech. ECE II-Sem	L	T	P	C
	3	0	0	3

(18PC0EC15) MICROCONTROLLERS AND APPLICATIONS

UNIT 1:
Introduction to Microprocessor

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations

UNIT II:
Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT III:
I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT IV:
ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT V:
Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

Text Books:
1. Douglas V Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
2. Microcontrollers programming by TularamM.Bansod Pratik Tawde.

Reference Books:
3. D A Patterson and J H Hennessy, "Computer Organization and Design Thehardware and software interface. Morgan Kaufman Publishers.

4. Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996.

COURSE INFORMATION SHEET

SUBJECT: MICROCONTROLLERS AND APPLICATIONS

PROGRAMME: **Electronics and Communication Engineering**	DEGREE: **BTECH**
COURSE: Microcontrollers And Applications	SEMESTER: **II** CREDITS: **3**
COURSE CODE: **18PC0EC15** REGULATION: **R18**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **CORE**	CONTACT HOURS: **3 Hours/Week**
CORRESPONDING LAB COURSE CODE (IF ANY): **18PC0EC17**	LAB COURSE NAME: **Microcontrollers And Applications Lab**

UNIT	DETAILS	HOURS
I	**UNIT -I:** **Introduction to Microprocessor** **8086 Architecture:** 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086. **Instruction Set and Assembly Language Programming of 8086**: Instruction formats, Addressing modes, Instruction Set and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations	15
II	**UNIT -II:** **Introduction to Microcontrollers:** Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051	10
III	**UNIT -III:** **I/O And Memory Interface:** LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051. **Serial Communication and Bus Interface:** Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.	12
IV	**UNIT -IV:** **ARM Architecture:** ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction	10

	set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.	
V	**UNIT -V:** **Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.	08
TOTAL HOURS		55
Tutorial Classes		10
Descriptive Tests		02
Classes for beyond syllabus		03
Remedial Classes/NPTL		05
Total Number of Classes		75

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Douglas V Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
T	Microcontrollers programming by TularamM.Bansod Pratik Tawde
R	D A Patterson and J H Hennessy, "Computer Organization and Design Thehardware and software interface. Morgan Kaufman Publishers.
R	Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996.

Subject	MICROCONTROLLERS AND APPLICATIONS(18PC0EC15)
Faculty	A.Vinisha

Text Books (to be acquired by the Students)

Book-1	Douglas V Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
Book-2	Microcontrollers programming by TularamM.Bansod Pratik Tawde

Reference Books

Book-3	D A Patterson and J H Hennessy, "Computer Organization and Design Thehardware and software interface. Morgan Kaufman Publishers.
Book-4	Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996.

Unit	Topic	Chapters			No of Classes
		Book 1	Book 2	Book 3	
I	8086 Architecture Instruction Set and Assembly Language Programming of 8086	1		1,4,5	15
II	Introduction to Microcontrollers	2		6	10
III	I/O And Memory Interface	2		6	12
IV	ARM Architecture	3,6	7	8	10
V	Advanced ARM Processors	3	7	8	08

Contact classes for syllabus coverage	**55**
Tutorial Classes	**10**
Descriptive Tests	**02**
Classes for beyond syllabus	**03**
Remedial Classes/NPTEL	**05**
Total Number of Classes	**75**

Question Bank with Blooms Taxonomy Level (BTL)

Subject Name with code   :   MICROCONTROLLERS   AND   APPLICATIONS (18PC0EC15)

Class   : III/II/ECE

Name of the Faculty Member : A.Vinisha

Academic Year   : 2022-23 (II semester)

Blooms Taxonomy Levels (BTL)

1. Remembering   2.Understanding   3.Applying

4. Analyzing   5.Evaluating   6.Creating

S.No	Questions	BTL level	Course Outcome
	Unit - I		
	Part – A (2 Marks)		
1	List different types of 8086 hardware interrupts. (R13-2016-oct/nov)	1	CO1
2	List out different segmentations presented in 8086 microprocessor. (R13-2016-may, Jan-2023)	1	CO1
3	Draw the flag register of 8086 microprocessor and explain the function of each flag. (R13-2016-may)(GNITC- May – 2019)	1	CO1
4	Name the fourteen register used in 8086 microprocessor. (R13-2017-may)	1	CO1
5	What is the function of stack & stack register?	2	CO1
6	What is the purpose of using macros? (R13-2017-may)	2	CO1
7	What are instruction formats?(may-2017)	2	CO1
8	List the data transfer instruction set of 8086 microprocessor(GNITC-May – 2019,Jan-2023)	2	CO1

9	List the logical instruction set of 8086 microprocessor. (R13-2018-April)	1	CO1
10	Write a program to find the factorial of four using 8086 microprocessor. (R13-2017-may)	3	CO1
11	What is the data and address bus size in 8086?(GNITC- May – 2019, Jan-2023)	2	CO1
12	Explain memory organization of 8086?(GNITC- May – 2019, Jan-2023)	2	CO1
13	What is offset & physical address? Explain with an example (GNITC May – 2019)	1	CO1
	Part – B (5 Marks)		
1	Explain the internal hardware architecture of 8086 microprocessor with neat diagram. (R13-2016-oct/nov)(GNITC-May – 2019) (GNITC-August – 2021)	2	CO1
2	Explain instruction set of 8086. (R13-2016-oct/nov)(GNITC-May – 2019)	2	CO1
3	Explain segmentation. Discuss the physical address formation in 8086.(R13-2016-oct/nov)(GNITC-May – 2019)	3	CO1
4	Draw the register organization of 8086 microprocessor and explain it. (R13-2016-may) (GNITC-August – 2021)	2	CO1
5	Explain the concept of physical address calculation of 8086 microprocessor. (R13-2016-may, Jan-2023)	2	CO1
6	Explain the signal description of 8086 microprocessor. (R13-2017-may, Jan-2023)	2	CO1
7	What is an interrupt? Explain the various types of interrupts in 8086 microprocessor. (R13-2017-may)(GNITC- May – 2019)	2	CO1
8	Explain 8086 string manipulation instructions.(R09-2015-may)(GNITC-May – 2019,Nov-20)	2	CO1
9	Define queue and explain the need for queue in 8086 microprocessor with respect to pipelining. (R09-2015-nov) (GNITC-August – 2021, Jan-2023)	1,2	CO1

10	Write short note about assembler directives. (R13-2016-oct/nov) SHR ii) ADD iii) DAA iv) CMP v) CBW	1	CO1
11	Write a program for deleting substring 'good' from string 'hyd is a good city' (GNITC-May – 2019)	2	CO1
12	Write in detail about the following instructions with examples: i) CMPSB ii) LODS iii) MOVSW iv) REPZ (GNITC	3	CO1
13	Explain the various addressing modes of 8086 microprocessor with examples. (R13-2016-oct/nov)(GNITC-May – 2019, Jan-2023)	2	CO1
14	Explain the pin Architecture of 8086 microprocessor with a neat sketch. (R13-2017-may)(GNITC-May – 2019,Nov-20, Jan-2023)	2	CO1
15	Write a program for sum of n natural numbers, assume n=6 by using loop(GNITC-May – 2019)	2	CO1
16	Write an ALP to implement sorting for 8086).(GNITC-Nov-20)	3	CO1
17	Define addressing mode and explain different addressing modes used in 8086 microprocessors wit h examples. (GNITC-Nov-20)	2	CO1
	UNIT-2		
	PART-A(2 Marks)		
1	What is the difference between microprocessor and micro controller? (2016-oct/nov)	2	CO2
2	List out the addressing modes of 8086 microprocessor. (2016-oct/nov) (GNITC-May – 2019)	1	CO2
3	Explain the register set of 8051 microcontroller. (2016-may) (GNITC-May – 2019)	2	CO2
4	List out the difference between microprocessor and microcontroller (2016-MAY)	2	CO2
5	Write about PSW used in 8051 microcontroller. . (20170-MAY)	1	CO2
6	Write TCON special function register used in 8051 microcontroller.(2017-may) (GNITC-May – 2019)	1	CO2

7	Explain PUSH & POP instructions in 8051(oct-2016 & April-2018, Jan-2023).	2	CO2
8	Explain the 8051instructions i) DJNZ ii) CJNE iii) RLC(April-2018)	2	CO2
9	List different instruction set groups of 8051(may-2016)	1	CO2
10	Define baud rate of 8051. (2016-oct/nov)	1	CO2
11	Mention the interrupt priority in 8051. (2016—oct/nov)	1	CO2
12	Draw the T0 and T1 registers of 8051 microcontroller. (2016-may)	2	CO2
13	Explain the hardware interrupts of 8051 microcontroller with examples. (2016-may)	2	CO2
14	What are the different types of interrupts are used in 8051 microcontroller. (2017-may)	1	CO2
15	Draw the timer/counter control logic diagram in 8051 microcontroller. (2017-may)	1	CO2
16	How does effect of the SBUF SFR in serial communications of 8051?(April-2018, Jan-2023)	2	CO2
17	What is the importance of jump instructions in ALP for 8051(april-2018)	2	CO2
18	Draw The IE And IP Registers Of 8051 Microcontroller(GNITC MAY-2019) (GNITC-August – 2021)	1	CO2
	PART-B(5 Marks)		
1	Draw the internal architecture of 8051 microcontroller and explain its operation. (GNITC-May – 2019,Nov-20) (GNITC-August – 2021, Jan-2023)	2	CO2
2	Explain 8051 Instruction set. (GNITC-August – 2021)	2	CO2
3	Explain 8051 Timer/counter Operations(Jan-2023)	2,4	CO2
4	Explain 8051 serial communication	2	CO2
5	Explain how interrupts are handled in 8051(GNITC-Nov-20)	2	CO2

6	Explain the register organization of 8051(GNITC-May – 2019, Jan-2023)	2	CO2
7	Draw the SCON & PCON register frames format of 8051 microcontroller and explain (GNITC-May – 2019)	2	CO2
8	Draw the IE and IP Registers Of 8051 Microcontroller (GNITC-May – 2019)	2	CO2
9	Interface external 8 K memory to 8051 microcontroller. Draw the necessary diagram (GNITC-May – 2019, Jan-2023)	4	CO2
10.	Draw and explain the TMOD and TCON registers of 8051. (GNITC-Nov-20, Jan-2023)	2	CO2
11.	Write notes on 8051 serial port programming. (GNITC-Nov-20)	2	CO2
	UNIT-3		
	PART-A(2 Marks)		
1	Write the advantage and disadvantage of parallel communication over serial communication. (R13-2016-oct/nov) (GNITC-May – 2019, Jan-2023)	1	CO3
2	List out the important features of the A/D converter. (R13-2016-oct/nov, Jan-2023)	1	CO3
3	Explain serial data transfer scheme. (R13-2016-may)	2	CO3
4	Write short notes on I2C BUS. (R13-2016-may)	1	CO3
5	Write short notes on SPI BUS.(R13-2017-may)	1	CO3
6	Write short notes on DAC. (R13-2017-may) (GNITC-May – 2019)	1	CO3
	PART-B(5 Marks)		
1	Explain I2C bus configuration (R13-2016-oct/nov) (R13-2016-oct/nov)	2	CO3
2	Explain how to interface (a) ADC and (b) DAC to 8051. (R13-2016-oct/nov, Jan-2023)	2,4	CO3

3	Explain how to interface LCD to 8051. (R13-2016-may) (GNITC-August – 2021, Jan-2023)	4	CO3
4	Draw the interacting diagram of A/D convertor with 8051 and explain its operation.(R13-2016-may) (GNITC-May – 2019,Nov-20, Jan-2023)	2	CO3
5	Explain the concept of keyboard and interfacing along with block diagram. (R13-2016-may)(GNITC-May – 2019)	2	CO3
6	Write short notes on i) USB ii) UART (GNITC-May – 2019)	2	CO3
7	Explain how to interface RAM/ROM to 8051 microcontroller (R13-2016-may, Jan-2023)	2	CO3
8	Describe the interfacing of D/A converter with a neat sketch. (R13-2017-may) (GNITC-May – 2019) (GNITC-August – 2021)	2,4	CO3
9	Explain SPI bus configuration (R13-2017-may)	2	CO3
10	Explain RS 232C serial bus interface with neat diagram. (GNITC-May – 2019,Nov-20)	2	CO3
11	Interface DAC 0800 with 8051 running at 8MHz and write an ALP to generate triangular wave of 1 KHz frequency with Vmax of 5V. (GNITC-Nov-20)	4	CO3
12	Interface external 8K memory to 8051 micrcontroller. Draw the necessary diagram. (GNITC-Nov-20)	4	CO3
	UNIT-4		
	PART-A (2 Marks)		
1	Difference between RISC and CISC processor.	2	CO4
2	List various advanced features of ARM processor.(Jan-2023)	1	CO4
3	List and explain various operating modes of ARM processor.	1	CO4
4	Define Interrupt vector table.	2	CO4
5	Give list of interrupt vector table.	1	CO4
6	Explain in short Instruction set of ARM processor	2	CO4

7	Define and Explain ARM assembly language program.	2	CO4
8	Give list of arithmetic instruction of ARM.	1	CO4
9	Draw the CPSR and flags(GNITC-MAY-2019) (GNITC-August – 2021, Jan-2023)	1	CO4
	PART-B(5 Marks)		
1	Draw & explain ARM Architecture.(Jan-2023)	2	CO4
2	Explain ARM instruction set.	2	CO4
3	Explain exceptions & interrupt vector table. (GNITC-August – 2021)	2	CO4
4	Explain Thumb instructions(GNITC-MAY-2019,Nov-20, Jan-2023)	2	CO4
5	Explain about ARM 7 processor with neat Block Diagram (GNITC-MAY-2019,Nov-20) (GNITC-August – 2021, Jan-2023)	2	CO4
6	Explain about program status register in ARM Processor. (GNITC-MAY-2019)	2	CO4
7.	Explain Register organization of ARM(GNITC-August – 2021)	2	CO4
	UNIT-5		
	PART-A(2 Marks)		
1	List and give details of different profiles of ARM cortex	1	CO5
2	Write short notes on cortex processor.(Jan-2023)	2	CO5
3	Explain software instructions & program status register instructions	2	CO5
4	Write about OMAP processor(Jan-2023)	1	CO5
5	Explain how the constants are loaded in immediate mode in ARM	1	CO5
6	Explain about ARM addressing Modes (Jan-2023)	2	CO5
7	Write the applications of OMAP processor? (GNITC-MAY-2019, Jan-2023)	1	CO5

8	What is wakeup interrupt controller? (GNITC-MAY-2019)	1	CO5
9	List the features of OMAP processor? (GNITC-MAY-2019) (GNITC-August – 2021)	1	CO5
10	Explain the Block diagram of OMAP processor. (GNITC-MAY-2019,)	1	CO5
	PART-B(5 Marks)		
1	Give the distinguishing features of ARM Cortex M3 and explain.	2	CO5
2	Explain CORTEX processor Architecture. (GNITC-August – 2021, Jan-2023)	2	CO5
3	Explain OMAP processor Architecture. (GNITC-Nov-20) (GNITC-August – 2021, Jan-2023)	2	CO5
4	What are major addresses ranges in cortex processor? Explain the block diagram of cortex processor. (GNITC-MAY-2019)	2	CO5
5	Describe the evolution and main trends of the microcontroller market until the appearance of ARM Cortex core micro controllers. What were the main microcontroller families and what new features they had? (GNITC-August – 2021, Jan-2023)	2	CO5
6	What are the applications of cortex processor? (GNITC-MAY-2019, Jan-2023)	2	CO5
7	Give the distinguish features of ARM cortexM3 processor and explain. (GNITC-Nov-20, Jan-2023)	3	CO5

PART-A

SOLUTIONS

1. List different types of 8086 hardware interrupts.   (R13-2016-oct/nov &April-2018)

Ans: Interrupt is the method of creating a temporary halt during program execution and allows peripheral devices to access the microprocessor. The microprocessor responds to that interrupt with an ISR (Interrupt Service Routine), which is a short program to instruct the microprocessor on how to handle the interrupt.

The following image shows the types of interrupts we have in a 8086 microprocessor −
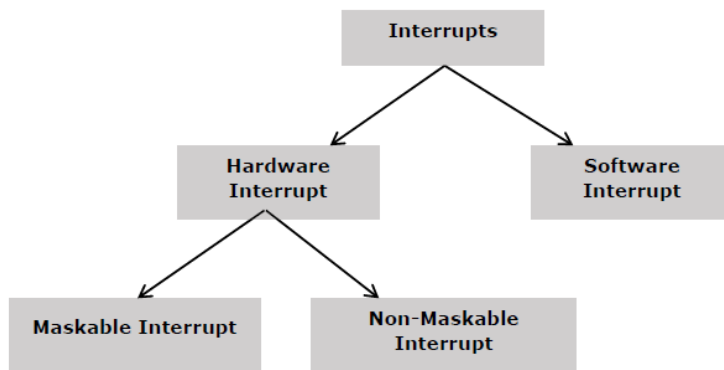
Hardware Interrupts

Hardware interrupt is caused by any peripheral device by sending a signal through a specified pin to the microprocessor.

The 8086 has two hardware interrupt pins, i.e. NMI and INTR. NMI is a non-maskable interrupt and INTR is a maskable interrupt having lower priority. One more interrupt pin associated is INTA called interrupt acknowledge.

NMI

It is a single non-maskable interrupt pin (NMI) having higher priority than the maskable interrupt request pin (INTR)and it is of type 2 interrupt.

When this interrupt is activated, these actions take place

Completes the current instruction that is in progress.

Pushes the Flag register values on to the stack.

Pushes the CS (code segment) value and IP (instruction pointer) value of the return address on to the stack.

IP is loaded from the contents of the word location 00008H.

CS is loaded from the contents of the next word location 0000AH.

Interrupt flag and trap flag are reset to 0.

INTR

The INTR is a maskable interrupt because the microprocessor will be interrupted only if interrupts are enabled using set interrupt flag instruction. It should not be enabled using clear interrupt Flag instruction.

The INTR interrupt is activated by an I/O port. If the interrupt is enabled and NMI is disabled, then the microprocessor first completes the current execution and sends '0' on INTA pin twice. The first '0' means INTA informs the external device to get ready and during the second '0' the microprocessor receives the 8 bit, say X, from the programmable interrupt controller.

These actions are taken by the microprocessor −

First completes the current instruction.

Activates INTA output and receives the interrupt type, say X.

Flag register value, CS value of the return address and IP value of the return address are pushed on to the stack.

IP value is loaded from the contents of word location $X \times 4$

CS is loaded from the contents of the next word location.

Interrupt flag and trap flag is reset to 0

2. List out different segmentations presented in 8086 microprocessor. (R13-2016-may)

Ans: In 80x86 processors, unlike the 8085, has the memory divided into various sections called as segments. (Note that the following will be valid in 80286 and above for Real mode memory addressing only.)

The first is the code segment where you store the program.

Second is data segment where the data is stored.

Third is extra segment which is mostly used for string operations.

Last one is the stack segment which is used to push/pop (save and retrieve) your data or used to store addresses for RET when CALL is executed.

3. Draw the flag register of 8086 microprocessor and explain the function of each flag. (R13-2016-may) GNITC- May – 2019

Ans: Flag Register
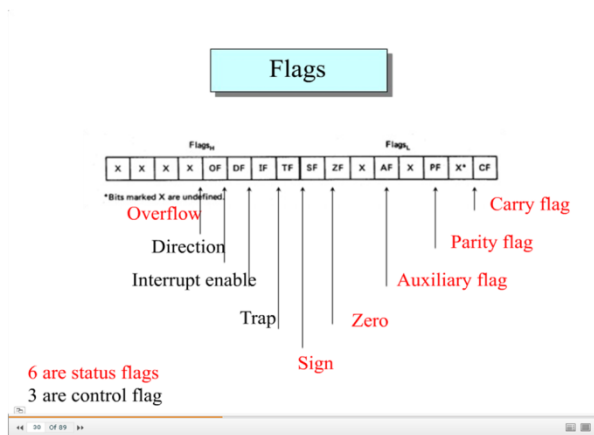
It is a 16-bit register that behaves like a flip-flop, i.e. it changes its status according to the result stored in the accumulator. It has 9 flags and they are divided into 2 groups − Conditional Flags and Control Flags.

Conditional Flags

It represents the result of the last arithmetic or logical instruction executed. Following is the list of conditional flags −

Carry flag − This flag indicates an overflow condition for arithmetic operations.

Auxiliary flag − When an operation is performed at ALU, it results in a carry/barrow from lower nibble (i.e. D0 – D3) to upper nibble (i.e. D4 – D7), then this flag is set, i.e. carry given by D3 bit to D4 is AF flag. The processor uses this flag to perform binary to BCD conversion.

Parity flag − This flag is used to indicate the parity of the result, i.e. when the lower order 8-bits of the result contains even number of 1's, then the Parity Flag is set. For odd number of 1's, the Parity Flag is reset.

Zero flag − This flag is set to 1 when the result of arithmetic or logical operation is zero else it is set to 0.

Sign flag − This flag holds the sign of the result, i.e. when the result of the operation is negative, then the sign flag is set to 1 else set to 0.

Overflow flag − This flag represents the result when the system capacity is exceeded.

Control Flags

Control flags controls the operations of the execution unit. Following is the list of control flags −

Trap flag − It is used for single step control and allows the user to execute one instruction at a time for debugging. If it is set, then the program can be run in a single step mode.

Interrupt flag − It is an interrupt enable/disable flag, i.e. used to allow/prohibit the interruption of a program. It is set to 1 for interrupt enabled condition and set to 0 for interrupt disabled condition.

Direction flag − It is used in string operation. As the name suggests when it is set then string bytes are accessed from the higher memory address to the lower memory address and vice-a-versa.

4. Name the fourteen register used in 8086 microprocessor. (R13-2017-may)

Ans: Registers of 8086 can be classified as general purpose registers(GPR s) and special function registers (SFR s)..
Or in specific to 8086--
1. General registers (AX, BX, CX, DX)
2. Index and pointer registers (DI, SI, BP, SP)
3. Flag register
4. Segment registers (CS, DS, SS, and ES)

4. List the advantages of memory segmentation.(oct-2016)

Ans: Advantages of memory segmentation:

Segmentation provides a powerful memory management mechanism.

It allows programmers to partition their programs into modules that operate independently of one another.

Segments allow two processes to easily share data.

It allows to extend the address ability of a processor i.e. segmentation allows the use of 16 bit registers to give an addressing capability of 1 MB. Without segmentation, it would require 20 bit registers.

Segmentation makes it possible to separate the memory areas for stack, code and data.

It is possible to increase the memory size of code data or stack segments beyond 64 KB by allotting more than one segment for each area.

5. What is the function of stack & stack register?

Ans: A stack is a useful feature that is included in the CPU of most computers. It is an ordered set of elements, only one of which can be accessed at a time. A stack is a storage device that follows the LIFO scheme (Last In First Out) to store information, i.e. the item that is stored last is the first item to be retrieved as shown in figure 1.1.
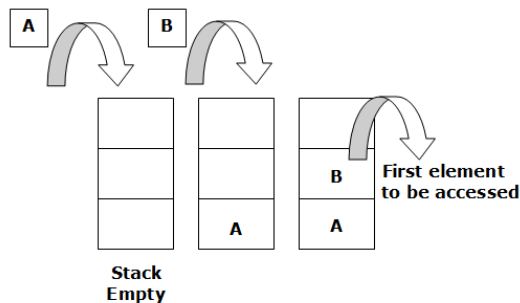
Figure 1.1: LIFO implementation of stack

For example, consider a stack of plates; the plate kept on the top is the plate that is first taken off as shown in figure 1.2.

Figure 1.2: Stack of plates
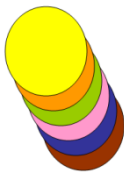
Source: Self

Stacks are the important tools that can be well used in processing the program codes. The computers that provide the hardware support for stacks can execute applications more efficiently than the machines that do not implement the stacks.

1.2.1 Stack Pointer

To perform any operation on the stack, the address of the top of the stack should be known. There is a special register that holds this address of stack and is called Stack Pointer Register (SP), as its value always points at the top item in the stack as shown in figure 1.3.

The stack pointers may point to any address value starting from the origin of a stack till the limit of the stack as specified by the processor's limit register,,However, the stack pointer cannot access the address beyond the origin of the stack and the (stack starting + limit) address. For example, if the starting address of stack is 1000 and its limit is 2000, then the stack pointer can point to address value starting from 1000 till (1000 + 2000) 3000.

6. What is the purpose of using macros?   (R13-2017-may)

MACROS
Macros provide several powerful mechanisms useful for the development of generic programs.

A Macro is a group of instructions with a name. When a macro is invoked, the associated set of instructions is inserted in place in to the source, replacing the macro name. This"macro expansion" is done by a Macro Preprocessor and it happens before assembly. Thus the actual Assembler sees the "expanded" source!

We could consider the macro as shorthand for a piece of text; somewhat like a new pseudo code instruction.

Macros and Procedures:
Macros are similar to procedures in some respects, yet are quite different in many other respects.

Procedure:

Only one copy exists in memory. Thus memory consumed is less. "Called" when required;

Execution time overhead is present because of the call and return instructions.

Macro:

When a macro is "invoked", the corresponding text is "inserted" in to the source. Thus multiple copies exist in the memory leading to greater space requirements.

However, there is no execution overhead because there are no additional call and return instructions. The code is in-place. These concepts are illustrated in the following figure:

MACRO Definition:
A macro has a name. The body of the macro is defined between a pair of directives, MACRO and ENDM. Two macros are defined in the example given below.

Examples of Macro Definitions:

Definition of a Macro named PUSHA2C
PUSHA2C MACRO;
PUSH AX;
PUSH BX;
PUSH CX;
ENDM;

7. What are instruction formats?(may-2017)

Ans: An instruction format defines the layout of the bits of an instruction, in terms of its constituent's parts. An instruction format must include an opcode and, implicitly or explicitly, zero or more operands. Each explit operand is referenced using one of the addressing mode that is available for that machine. The format must, implicitly or explictly, indicate the addressing mode of each operand. For most instruction sets, more than one instruction format is used.
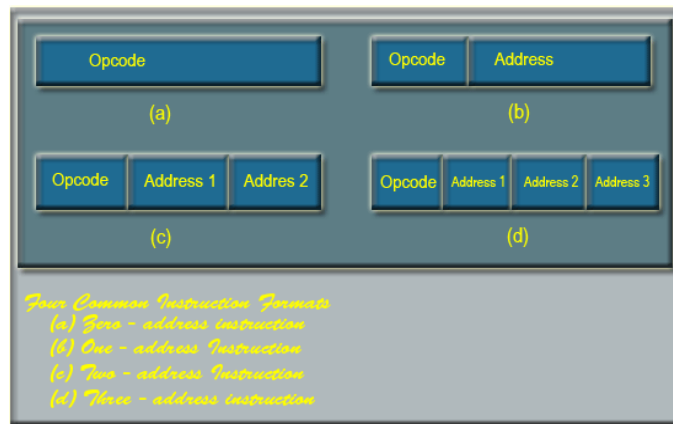
8. List the data transfer instruction set of 8086 microprocessor. (R13-2016-may)

Ans: Data Transfer Instructions

These instructions are used to transfer the data from the source operand to the destination operand. Following are the list of instructions under this group –

Instruction to transfer a word

MOV − Used to copy the byte or word from the provided source to the provided destination.

PPUSH − Used to put a word at the top of the stack.

POP − Used to get a word from the top of the stack to the provided location.

PUSHA − Used to put all the registers into the stack.

POPA − Used to get words from the stack to all registers.

XCHG − Used to exchange the data from two locations.

XLAT − Used to translate a byte in AL using a table in the memory.

Instructions for input and output port transfer

IN − Used to read a byte or word from the provided port to the accumulator.

OUT − Used to send out a byte or word from the accumulator to the provided port.

Instructions to transfer the address

LEA − Used to load the address of operand into the provided register.

LDS − Used to load DS register and other provided register from the memory

LES − Used to load ES register and other provided register from the memory.

Instructions to transfer flag registers

LAHF − Used to load AH with the low byte of the flag register.

SAHF − Used to store AH register to low byte of the flag register.

PUSHF − Used to copy the flag register at the top of the stack.

POPF − Used to copy a word at the top of the stack to the flag register.

9. List the logical instruction set of 8086 microprocessor. (R13-2018-April)

Ans:

The processor instruction set provides the instructions AND, OR, XOR, TEST, and NOT Boolean logic, which tests, sets, and clears the bits according to the need of the program.

The format for these instructions −

Sr.No.	Instruction	Format
1	AND	AND operand1, operand2
2	OR	OR operand1, operand2

3	XOR	XOR operand1, operand2
4	TEST	TEST operand1, operand2
5	NOT	NOT operand1

10. Write a program to find the factorial of four using 8086 microprocessor.   (R13-2017-may)

DATA SEGMENT

A DB 4

DATA ENDS

CODE SEGMENT

    ASSUME DS: DATA, CS: CODE

START:

    MOV AX, DATA

    MOV DS, AX

    MOV AH, 00

    MOV AL, A

 L1: DEC A

    MUL A

    MOV CL, A

    CMP CL, 01

    JNZ L1

    MOV AH, 4CH

    INT 21H

CODE ENDS

END START

11. What is the data and address bus size in 8086? (GNITC-May – 2019)

All internal registers, as well as internal and external data buses, are 16 bits wide, which firmly established the "16-bit microprocessor" identity of the 8086. A 20-bit external address bus provides a 1 MB physical address space

12. Explain memory organization of 8086?(GNITC- May – 2019)

There are 20 address lines in the 8086 microprocessor. This gives us 220 different memory locations. Hence the total size is 220 Bytes (as each memory location is Byte Addressable, i.e. one byte of data can be stored at every single location), which is equal to 1MB.

Even the memory is byte-addressable, yet the 8086 microprocessor an easily handle up to 16 bits of data at a time through its 16 data lines. So, to organize the memory efficiently, the entire memory in 8086 is divided into two memory banks: odd bank and the even bank.
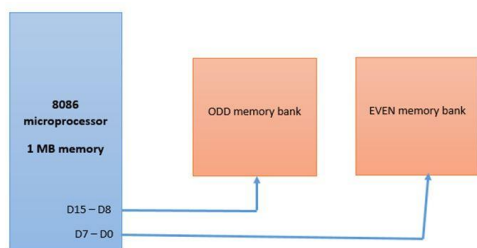
The way in which data is read or written is decided by the value of BHE, and the last address bit, that is the A0 line. It is done in the following way:

BHE'	A0	Operation performed on memory
0	0	16 bits of data will be read or written into the memory
0	1	8 bits of data will be read/written into the odd memory bank
1	0	8 bits of data will be read/written into the even memory bank
1	1	No operation is performed

To read or write 8 bits of data, it would require only 1 CPU cycle, no matter the data is stored in any of the memory banks, but to read or write 16 bits of data, the BIU of the 8086 may require either 1 or 2 memory cycles depending upon whether the lower byte of word is located at even or odd memory address.

13. What is offset & physical address? Explain with an example (GNITC May – 2019)

The offset address in an 8086 is the logical address that the program "thinks about" when it addresses a location in memory. The Execution Unit (EU or CPU) is responsible for generating the offset address.

The 20-bit address is known as an absolute address, since it is a direct reference into the 1 MB memory space of the 8088 computer. The problem with the 8088 computer is that there are only 16-bit registers, so that something extra must be done to generate a 20-bit address. Part of the 8088 CPU is dedicated to generating 20-bit absolute addresses. The input to the address generator is two 16-bit numbers: one representing a segment and one representing an offset. The segment input will be from one of the segment registers: CS, DS, SS, ES. The other input will be from a base, index, or control register, or will be an immediate value. To generate the 20-bit address, the CPU shifts the segment 4 bits (1 hex digit) to the left and adds the offset to it.

A common combination for segment and offset is the CS and IP registers: together they indicate the address of the next instruction. As an example, suppose the CS register contains ABCDh and the IP register contains 0046h.
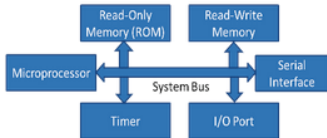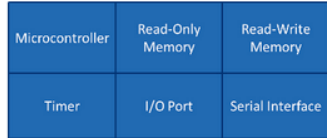
Shift the CS register to the left by 1 hex digit: ABCD0h

Add the IP register to the new CS value: ABCD0h + 0046h

The absolute address is ABD16h.

UNIT-2

1. What is the difference between microprocessor and micro controller?(R13-2016-oct/nov& April-2018)

Microprocessor	Micro Controller
Microprocessor is heart of Computer system.	Micro Controller is a heart of embedded system.
It is just a processor. Memory and I/O components have to be connected externally	Micro controller has external processor along with internal memory and i/O components
Since memory and I/O has to be connected externally, the circuit becomes large.	Since memory and I/O are present internally, the circuit is small.
Cannot be used in compact systems and hence inefficient	Can be used in compact systems and hence it is an efficient technique
Cost of the entire system increases	Cost of the entire system is low
Due to external components, the entire power consumption is high. Hence it is not suitable to used with devices running on stored power like batteries.	Since external components are low, total power consumption is less and can be used with devices running on stored power like batteries.
Most of the microprocessors do not have power saving features.	Most of the micro controllers have power saving modes like idle mode and power saving mode. This helps to reduce power consumption even further.
Since memory and I/O components are all external, each instruction will need external operation, hence it is relatively slower.	Since components are internal, most of the operations are internal instruction, hence speed is fast.
Microprocessor have less number of registers, hence more operations are memory based.	Micro controller have more number of registers, hence the programs are easier to write.
Microprocessors are based on von Neumann model/architecture where program and data are stored in same memory module	Micro controllers are based on Harvard architecture where program memory and Data memory are separate
Mainly used in personal computers	Used mainly in washing machine, MP3 players

List out the addressing modes of 8086 microprocessor.(R13-2016-oct/nov)

The 8086 microprocessor accesses the data in different ways such as from different registers, from memory locations or from I/O ports are called its addressing modes. These addressing modes are categorized according to the accessing method. These are as follows.
1. Register Addressing Modes (Accessing data from registers)
2. Immediate Addressing Modes (Accessing immediate data and storing in the register as an operand)

3. Memory Addressing Modes (Accessing data from memory)

4. Direct Addressing Modes (Accessing direct data from I/O port)

Again some instruction are classified according to their behavior or condition, these are as follows.

5. Relative addressing modes (Related with some condition)

6. Implied or Implicit addressing mode (No operands)

Explain the register set of 8051 microcontroller.(R13-2016-may)

The 8051 microcontroller contains mainly two types of registers:

General purpose registers (Byte addressable registers)

Special function registers (Bit addressable registers)

The 8051 consists of 256 bytes of RAM memory, which is divided into two ways, such as 128 bytes for general purpose and 128 bytes for special function registers (SFR) memory. The memory which is used for general purpose is called as RAM memory, and the memory used for SFR contains all the peripheral related registers like Accumulator, 'B' register, Timers or Counters, and interrupt related registers.

General Purpose Registers

General Purpose Memory

The general purpose memory is called as the RAM memory of the 8051 microcontroller, which is divided into 3 areas such as banks, bit-addressable area, and scratch-pad area. The banks contain different general purpose registers such as R0-R7, and all such registers are byte-addressable registers that store or remove only 1-byte of data.

Banks and Registers

The B0, B1, B2, and B3 stand for banks and each bank contains eight general purpose registers ranging from 'R0' to 'R7'. All these registers are byte-addressable registers. Data transfer between general purpose registers to general purpose registers is not possible. These banks are selected by the Program Status Word (PSW) register.

PSW (Program Status Word) Register

The PSW register is a bit and byte-addressable register. This register reflects the status of the operation that is carried out in the controller. The PSW register determines bank selection by a RS1 and RS0, as shown below. The physical address of the PSW starts from D0h and the individual bits are accessed with D0h to D7h.

4. List out the difference between microprocessor and microcontroller.(R13-2016-may)

Same as 1st answer

5. Write about PSW used in 8051 microcontroller.(R13-2017-may)

PSW (program status word) register

The program status word (PSW) register is an 8-bit register. It is also referred to as the flag register. Although the PSW register is 8 bits wide, only 6 bits of it are used by the 8051. The

two unused bits are user-definable flags. Four of the flags are called conditional flags, meaning that they indicate some conditions that result after an instruction is executed. These four are CY (carry), AC (auxiliary carry), P (parity), and OV (overflow).

 the bits PSW.3 and PSW.4 are designated as RSO and RSI, respectively, and are used to change the bank registers. They are explained in the next section. The PSW.5 and PSW.l bits are general-purpose status flag bits and can be used by the programmer for any purpose. In other words, they are user definable. See Figure 2-4 for the bits of the PSW register.

CY	AC	F0	RS1	RS0	OV	–	P

CY	PSW.7	Carry flag.
AC	PSW.6	Auxiliary carry flag.
F0	PSW.5	Available to the user for general purpose.
RS1	PSW.4	Register Bank selector bit 1.
RS0	PSW.3	Register Bank selector bit 0.
OV	PSW.2	Overflow flag.
--	PSW.1	User-definable bit.
P	PSW.0	Parity flag. Set/cleared by hardware each instuction cycle to indicate an odd/even number of 1 bits in the accumulator.

RS1	RS0	Register Bank	Address
0	0	0	00H - 07H
0	1	1	08H - 0FH
1	0	2	10H - 17H
1	1	3	18H - 1FH

6. Write TCON special function register used in 8051 microcontroller.(R13-2017-may)

TCON is an 8-bit register. Its bits are used for generating interrupts internal

or external. The most important bits of the timer TR and TF are also in it.

TR (timer run) and TF (timer overflow) bits which we use in almost all over

timer applications are in it.

Microcontroller TCON register(Bit addressable)

TCON – Timer/counter Control Register

| TF1	TR1	TF0	TR0	IE1	IT1	IE0	IT0

• TF1-TCON.7-Timer1 overflow flag
• TR1-TCON.6-Timer1 run control bit

- TF0-TCON.5-Timer0 overflow flag
- TR0-TCON.4-Timer0 run control bit
- IE1-TCON.3-External interrupt 1 edge flag
- IT1-TCON.2-Interrupt 1 type control bit
- IE0-TCON.1-External interrupt 0 edge flag
- IT0-TCON.0-Interrupt 0 type control bit

Explain PUSH & POP instructions in 8051(oct-2016 & April-2018)

Ans: PUSH operation

The 'PUSH' is used for taking the values from any register and storing in the starting address of the stack pointer, i.e., 00h by using 'PUSH' operation. And, for the next 'PUSH', it increments +1, and stores the value in the next address of the stack pointer, i.e., 01h.
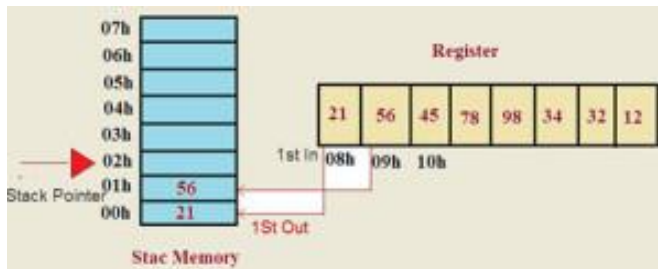
PUSH operation of Stack

PUSH operation means (First in First out)

Example: WAP in assembly language for PUSH operation

```
0000h
MOV                    08h,                   #21h
MOV                    09h,                   #56h
PUSH                                          00h
PUSH                                          01h
END
```

POP Operation

It is used for placing the values from the stack pointer's maximum address to any other register's address. If we use this 'POP' again, then it decrements by 1, and the value stored in any register is given as 'POP'.
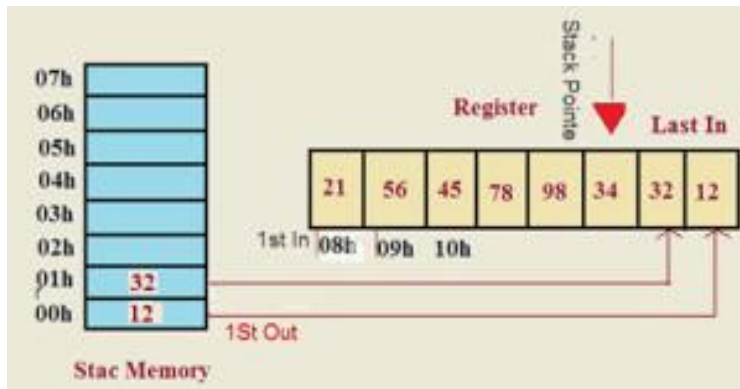
POP Operation in Stack

8. explain the 8051instructions i) DJNZ ii) CJNE iii) RLC(April-2018)

Ans: DJNZ: The DJNZ instruction decrements the byte indicated by the first operand and, if the resulting value is not zero, branches to the address specified in the second operand.

CJNE: The CJNE instruction compares the first two operands and branches to the specified destination if their values are not equal. If the values are the same, execution continues with the next instruction.

RLC: The RLC instruction rotates the eight bits in the accumulator and the one bit in the carry flag left one bit position. Bit 7 of the accumulator is rotated into the carry flag while the original value of the carry flag is rotated into bit 0 of the accumulator. Bit 0 of the accumulator is rotated into bit 1, bit 1 into bit 2, and so on. No other flags are affected by this operation.

9. List different instruction set groups of 8051(may-2016)

Ans: Based on the operation they perform, all the instructions in the 8051 Microcontroller Instruction Set are divided into five groups. They are:

Data Transfer Instructions

Arithmetic Instructions

Logical Instructions

Boolean or Bit Manipulation Instructions

Program Branching Instructions

10. Define baud rate of 8051. (R13-2016-oct/nov)

Baud rate in 8051

The 8051 transfers and receives data serially at many different baud rates. The baud rate in 8051 is completely programmable. This is done with help of timer 1.

8051 divides the crystal frequency by 12 to get machine cycle frequency. In case of XTAL = 11.0592 Mhz. so machine cycle here becomes 921.6 Khz. Now the 8051 UART circuitry divides the machine cycle frequency of 921.6 Khz by 32 once more before it is used by timer 1 to set the baud rate.

So 921.6 KHz divided by 32 gives 28,800 hz. This is the value of frequency upon which we will perform operation to get variable baud rate. When timer 1 is used to set baud rate it must be programmed in mode 2 8 bit auto reload.

Timer 1 TH1 register values for various baud rates

Baud rate	TH1(decimal)	TH1(hex)
9600	-3	FD
4800	-6	FA
2400	-12	F4
1200	-24	E8

As 28,800/3 = 9600 where -3 is loaded into TH1.

28800/12 = 2400 where -12 is loaded into TH1.

28800/24 = 1200 where -24 = E8 is loaded into TH1.

11. Mention the interrupt priority in 8051. (R13-2016-oct/nov)

IP (Interrupt Priority) Register

We can change the priority levels of the interrupts by changing the corresponding bit in the Interrupt Priority (IP) register as shown in the following figure.

A low priority interrupt can only be interrupted by the high priority interrupt, but not interrupted by another low priority interrupt.

If two interrupts of different priority levels are received simultaneously, the request of higher priority level is served.

If the requests of the same priority levels are received simultaneously, then the internal polling sequence determines which request is to be serviced.

-	-	PT2	PS	PT1	PX1	PT0	PX0
bit7	bit6	bit5	bit4	bit3	bit2	bit1

-    IP.6   Reserved for future use.

-    IP.5   Reserved for future use.

PS   IP.4   It defines the serial port interrupt priority level.

PT1   IP.3   It defines the timer interrupt of 1 priority.

PX1   IP.2   It defines the external interrupt priority level.

PT0   IP.1   It defines the timer0 interrupt priority level.

PX0   IP.0   It defines the external interrupt of 0 priority level.

12. Draw the T0 and T1 registers of 8051 microcontroller. (R13-2016-may)

TMOD register

As we know there are 2 timer registers in 8051. Timer 0 and timer 1. Both of these registers use the same register called TMOD to set various timer operation modes.

TMOD is an 8 bit register, in which lower 4 bits are for Timer 0 and upper 4 bits are for Timer 1.

See table below. MSB ---- LSB

GATE	C/T	M1	M0	GATE	C/T	M1	M0
TIMER 1				TIMER 0			

GATE	Gating control when set. The timer/counter is enabled only while the INTx pin is high and TRx control pin is set. When cleared, the timer is enabled whenever TRx control pin is set.
C/T	Timer or counter; 0 or clear for timer operation.(connected to input from internal system clock). 1 or set for counter operation(connected to input from Tx input pin).
M1	Mode bit 1
M0	Mode bit 0

M0 and M1 select the timer mode in TMOD. 4 modes as mode 0, mode 1, mode 2, mode 3. See table.

M1	M0	MODE	OPERATING MODE
0	0	MODE 0	13 bit timer mode 8-bit timer/counter THx with TLx as 5 bit prescaler
0	1	MODE 1	16 bit timer mode. 16 bit timer/counter THx and TLx are cascaded with no prescaler.
1	0	MODE 2	8 bit auto reload. 8 bit auto reload timer/counter THx holds a value that's to be reloaded in TLx each time it overflows.
1	1	MODE 3	Split timer mode

C/T (clock/timer) in TMOD

This bit in TMOD register is used to know whether it is used as a delay generator or as an event counter.

C/T = 0, then it is used as a timer for time delay generation. The clock source for the time delay is the crystal frequency of 8051. Timer gets pulses from the crystal.

C/T = 1, then it is used as a counter and gets its pulses from outside the 8051. That is from pins T0 and T1 belonging to port 3. In case of timer 0, when C/T = 1 pin 3.4 provides the clock pulse and counter counts up for each clock pulse coming from that pin. Similarly for timer 1, when C/T = 1 pin 3.5 provides the clock pulse and counter counts up for each clock pulse coming from that pin.

13. Explain the hardware interrupts of 8051 microcontroller with examples. (R13-2016-may)

The 8051 has two external hardware interrupts. Piri 12 (P3.2) and pin 13 (P3.3) of the 8051, designated as INTO and INT1, are used as external hardware interrupts. Upon activation of these pins, the 8051 gets interrupted in whatever it is doing and jumps to the vector table to perform the interrupt service routine

PROGRAMMING EXTERNAL HARDWARE INTERRUPTS

The 8051 has two external hardware interrupts. Piri 12 (P3.2) and pin 13 (P3.3) of the 8051, designated as INTO and INT1, are used as external hardware interrupts. Upon activation of these pins, the 8051 gets interrupted in whatever it is doing and jumps to the vector table to perform the interrupt service routine. In this section we study these two external hardware interrupts of the 8051 with some examples.
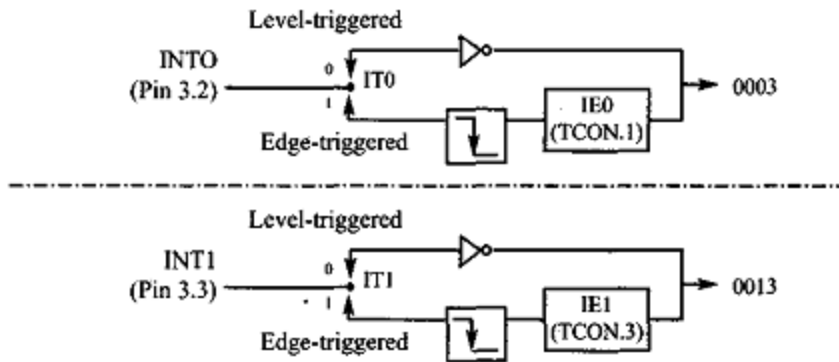
Activation of INTO and INT1

External interrupts INTO and INT1

There are only two external hardware interrupts in the 8051: INTO and INT1. They are located on pins P3.2 and P3.3 of port 3, respectively. The interrupt vector table locations 0003H and 0013H are set aside for INTO and INT1, respectively. As mentioned in Section 11.1, they are enabled and disabled using the IE register. How are they activated? There are two types of activation for the external hardware interrupts: (1) level triggered, and (2) edge triggered. Let's look at each one. First, we see how the level-triggered interrupt works.

Level-triggered interrupt

In the level-triggered mode, INTO and INT1 pins are normally high (just like all I/O port pins) and if a low-level signal is applied to them, it triggers the interrupt. Then the microcontroller stops whatever it is doing and jumps to the interrupt vector table to service that interrupt. This is called a level-triggered or level-activated interrupt and is the default mode upon reset of the 8051. The low-level signal at the INT pin must be removed before the execution of the last instruction of the interrupt service routine, RETI; otherwise, another interrupt will be generated. In other words, if the low-level interrupt signal is not removed before the ISR is finished it is interpreted as another interrupt and the 8051 jumps to the vector table to execute the ISR again.

14. What are the different types of interrupts are used in 8051 microcontroller. (R13-2017-may)

There are five interrupt sources for the 8051, which means that they can recognize 5 different events that can interrupt regular program execution. Each interrupt can be enabled or disabled by setting bits of the IE register. Likewise, the whole interrupt system can be disabled by clearing the EA bit of the same register. Refer to figure below.

Now, it is necessary to explain a few details referring to external interrupts- INT0 and INT1. If the IT0 and IT1 bits of the TCON register are set, an interrupt will be generated on high to low transition, i.e. on the falling pulse edge (only in that moment). If these bits are cleared, an interrupt will be continuously executed as far as the pins are held low.
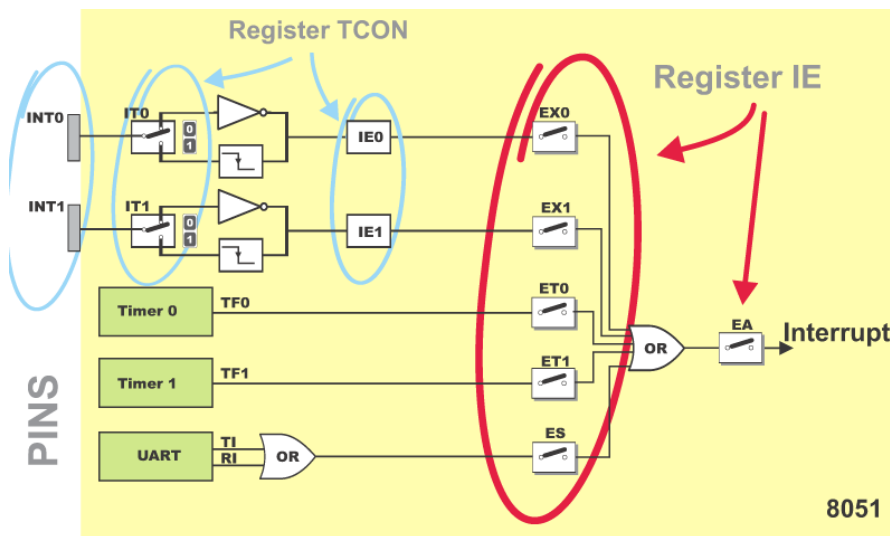
IE Register (Interrupt Enable)

	0	X	0	0	0	0	0	0	Value after Reset
IE	EA		ET2	ES	ET1	EX1	ET0	EX0	Bit name
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	

EA – global interrupt enable/disable:

0 – disables all interrupt requests.

1 – enables all individual interrupt requests.

ES – enables or disables serial interrupt:

0 – UART system cannot generate an interrupt.

1 – UART system enables an interrupt.

ET1 – bit enables or disables Timer 1 interrupt:

0 – Timer 1 cannot generate an interrupt.

1 – Timer 1 enables an interrupt.

EX1 – bit enables or disables external 1 interrupt:

0 – change of the pin INT0 logic state cannot generate an interrupt.

1 – Enables an external interrupt on the pin INT0 state change.

ET0 – bit enables or disables timer 0 interrupt:

0 – Timer 0 cannot generate an interrupt.

1 – Enables timer 0 interrupt.

EX0 – bit enables or disables external 0 interrupt:

0 – change of the INT1 pin logic state cannot generate an interrupt.

1 – Enables an external interrupt on the pin INT1 state change.

15. Draw the timer/counter control logic diagram in 8051 microcontroller. (R13-2017-may)

Timers / Counters

8051 has two 16-bit programmable UP timers/counters. They can be configured to operate either as timers or as event counters. The names of the two counters are T0 and T1 respectively. The timer content is available in four 8-bit special function registers, viz, TL0,TH0,TL1 and TH1 respectively.

In the "timer" function mode, the counter is incremented in every machine cycle. Thus, one can think of it as counting machine cycles. Hence the clock rate is 1/12 th of the oscillator frequency.

In the "counter" function mode, the register is incremented in response to a 1 to 0 transition at its corresponding external input pin (T0 or T1). It requires 2 machine cycles to detect a high to low transition. Hence maximum count rate is 1/24 th of oscillator frequency.

The operation of the timers/counters is controlled by two special function registers, TMOD and TCON respectively.

Timer Mode control (TMOD) Special Function Register:

TMOD register is not bit addressable.

TMOD

Address: 89 H

Gate	C/T̄	M1	M0	Gate	C/T̄	M1	M0
Timer-1				Timer-0			

Various bits of TMOD are described as follows -

Gate: This is an OR Gate enabled bit which controls the effect of $\overline{INT1/0}$ on START/STOP of Timer. It is set to one ('1') by the program to enable the interrupt to start/stop the timer. If TR1/0 in TCON is set and signal on $\overline{INT1/0}$ pin is high then the timer starts counting using either internal clock (timer mode) or external pulses (counter mode).

$C/\overline{T}$: It is used for the selection of Counter/Timer mode.

Mode Select Bits:

M1	M0	Mode
0	0	Mode 0
0	1	Mode 1
1	0	Mode 2
1	1	Mode 3

M1 and M0 are mode select bits.

Timer/ Counter control logic:
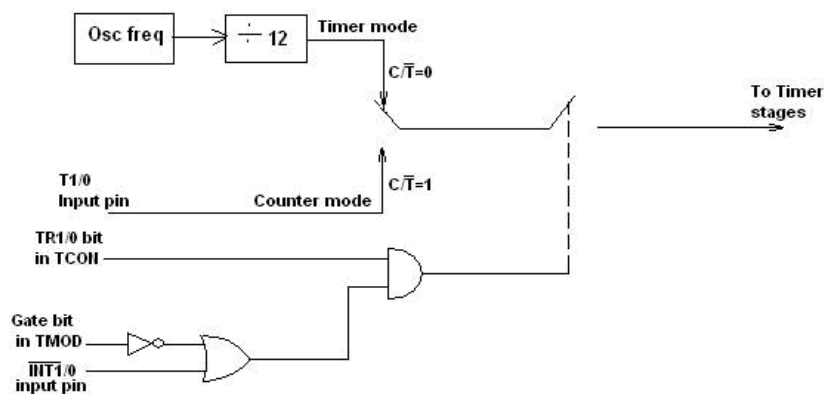
Timer/Counter Control Logic

Timer control (TCON) Special function register:

TCON is bit addressable. The address of TCON is 88H. It is partly related to Timer and partly to interrupt.
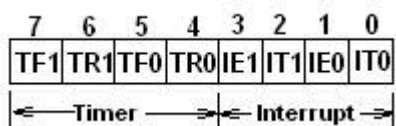
TCON Register

16. How does effect of the SBUF SFR in serial communications of 8051?(April-2018)

Ans: The serial port of 8051 is full duplex, i.e., it can transmit and receive simultaneously. The register SBUF is used to hold the data. The special function register SBUF is physically two registers. One is, write-only and is used to hold data to be transmitted out of the 8051 via TXD. The other is, read-only and holds the received data from external sources via RXD. Both mutually exclusive registers have the same address 099H

17. What is the importance of jump instructions in ALP for 8051

Ans: In the 8051 there are two unconditional jumps: LJMP (long jump) and SJMP (shortjump). Each is discussed below. LJMP is an unconditional long jump. It is a 3-byteinstruction in which the first byte is the opcode, and the second and third bytes represent the 16-bit address of the target location.

UNIT-3

1. Write the advantage and disadvantage of parallel communication over serial communication. (R13-2016-oct/nov)

Basis for Comparison	Serial Transmission	Parallel Transmission
Meaning	Data flows in bi-direction, bit by bit	Multiple lines are used to send data i.e. 8 bits or 1 byte at a time
Cost	Economical	Expensive
Bits transferred at 1 clock pulse	1 bit	8 bits or 1 byte

Basis for Comparison	Serial Transmission	Parallel Transmission
Speed	Slow	Fast
Applications	Used for long distance communication. Eg, Computer to computer	Short distance. Eg, computer to printer

The main advantages of parallel transmission over serial transmission are:

it is easier to program;

And data is sent faster.

Although parallel transmission can transfer data faster, it requires more transmission channels than serial transmission. This means that data bits can be out of sync, depending on transfer distance and how fast each bit loads. A simple of example of where this can be seen is with a voice over IP (VOIP) call when distortion or interference is noticeable. It can also be seen when there is skipping or interference on a video stream.

2. List out the important features of the A/D converter.   (R13-2016-oct/nov & April-2018)

An Analog to Digital Converter (ADC) is a very useful feature that converts an analog voltage on a pin to a digital number. By converting from the analog world to the digital world, we can begin to use electronics to interface to the analog world around us.

A/D Converter features:

Digital Audio:

Digital audio workstations, sound recording, pulse-code modulation

Digital signal processing:

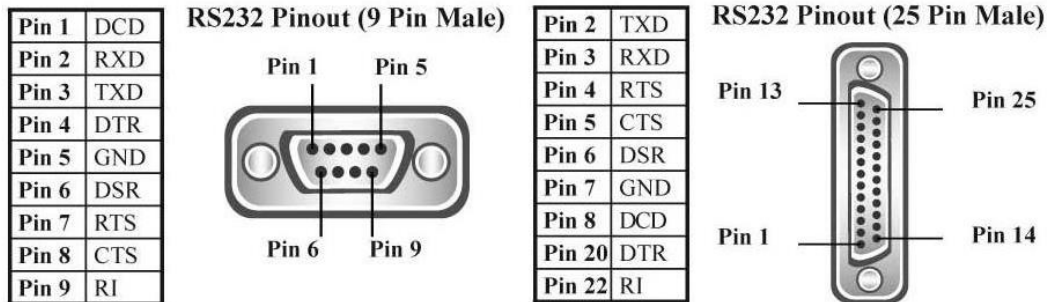TV tuner cards, microcontrollers, digital storage oscilloscopes

Scientific instruments:

Digital imaging systems, radar systems, temperature sensors

3. Give the serial communication standards. (R13-2017-may & oct-2016 & April-2018)

In serial I/O, data can be transmitted as either current or voltage. When data is transmitted as voltage, the commonly used standard is known as RS-232C. This standard was developed by Electronic Industries Association (EIA), USA and adopted by IEEE. RS-232 standard proposes a maximum of 25 signals for the bus used for serial data transfer.

Serial data transmission standards including RS232, RS422, RS423, and RS485 were widely used for many data links, proving effective connectivity for the day. Although not nearly as widely used today, they can still be found in some areas.

Pin 1	DCD
Pin 2	RXD
Pin 3	TXD
Pin 4	DTR
Pin 5	GND
Pin 6	DSR
Pin 7	RTS
Pin 8	CTS
Pin 9	RI

RS232 Pinout (9 Pin Male)

Pin 1   Pin 5

Pin 6   Pin 9

Pin 2	TXD
Pin 3	RXD
Pin 4	RTS
Pin 5	CTS
Pin 6	DSR
Pin 7	GND
Pin 8	DCD
Pin 20	DTR
Pin 22	RI

RS232 Pinout (25 Pin Male)

Pin 13   Pin 25

Pin 1   Pin 14

4. Write short notes on I2C BUS. (R13-2016-may)

Transmitting and receiving the information between two or more than two devices require a communication path called as a bus system. A I2C bus is a bidirectional two-wired serial bus which is used to transport the data between integrated circuits. The I2C stands for "Inter Integrated Circuit". It was first introduced by the Philips semiconductors in 1982. The I2C bus consists of three data transfer speeds such as standard, fast-mode and high-speed-mode. The I2C bus supports 7-bit and 10-bit address space device and its operation differ with low voltages.

I2C Protocol

SDL Line

SCL Line

I2c Bus Protocol

Master

SDL

SCL

Microcontroller
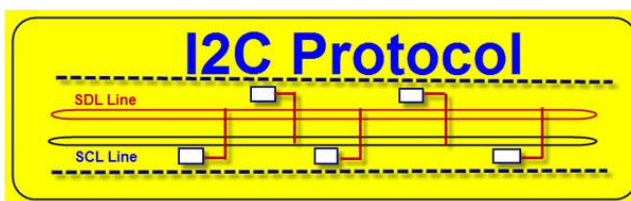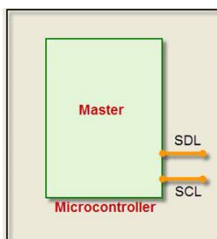
I2C Signal Lines

The I2C is a serial bus protocol consisting of two signal lines such as SCL and SDL lines which are used to communicate with the devices. The SCL stands for a 'serial clock line' and this signal is always driven by the 'master device'. The SDL stands for the 'serial data line', and this signal is driven by either the master or the I2C peripherals. Both these SCL and SDL lines are in open-drain state when there is no transfer between I2C peripherals

The open-drain is the concept for FET transistor wherein the drain terminal of the transistor is open state. The SDL and SCL pins of the master device are designed with the transistors in open state, so data transfer is possible only when these transistors are conducted. Hence, these lines or drain terminals are connected thorough pull-up resistors to VCC for conduction mode.

I2C Interfaces

Many slave devices are interfaced to the microcontroller with the help of the I2C bus through I2C level shifter IC for transferring the information between them. The I2C protocol used to connect a maximum of 128 devices that are all connected to communicate with the SCL and SDL lines of the master unit as well as the slave devices. It supports Multimaster communication, which means two masters are used to communicate the external devices.

I2C Data Transfer Rates

The I2C protocol operates three modes such as: fast mode, high-speed mode and standard mode wherein the standard mode data speed ranges 0Hz to 100Hz, and the fast mode data can transfer with 0Hz to 400 KHz speed and the high speed mode with 10 KHz to 100KHz. The 9-bit data is sent for each transfer wherein 8-bits are sent by the transmitter MSB to LSB, and the 9th bit is an acknowledgement bit sent by the receiver.
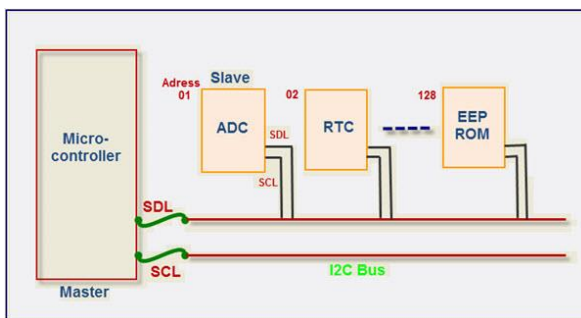
I2C Data Transfer Rates

I2C Communication

The I2C bus protocol is most commonly used in master and slave communication wherein the master is called "microcontroller", and the slave is called other devices such as ADC, EEPROM, DAC and similar devices in the embedded system. The number of slave devices is connected to the master device with the help of the I2C bus, wherein each slave consists of

a unique address to communicate it. The following steps are used to communicate the master device to the slave:

Step1: First, the master device issues a start condition to inform all the slave devices so that they listen on the serial data line.

Step2: The master device sends the address of the target slave device which is compared with all the slave devices' addresses as connected to the SCL and SDL lines. If anyone addresses matches, that device is selected, and the remaining all devices are disconnected from the SCL and SDL lines.

Step3: The slave device with a matched address received from the master, responds with an acknowledgement to the master thereafter communication is established between both the master and slave devices on the data bus.

Step4: Both the master and slave receive and transmit the data depending on whether the communication is read or write.

Step5: Then, the master can transmit 8-bit of data to the receiver which replies with a 1-bit acknowledgement.

I2C Tutorial

Transmitting and receiving the information step by step serially with respect to the clock pulses is called I2C protocol. It is an inter-system and short-distance protocol, which means, it is used within the circuit board to communicate the master and slave devices.

I2C Protocol Basics

In general, the I2C bus system consists of two wires that are used easily to expand the input and output peripheral features such as ADC, EEROM and RTC, and other basic components to make a system whose complexity is very less.

Example: Since 8051 microcontroller has no inbuilt ADC – so, if we want to interface any analog sensors to the 8051 microcontroller – we have to use ADC devices such as ADC0804-1 channel ADC, ADC0808- 8 channel ADC, etc. By using these ADCs, we can interface the analog sensors to the microcontroller.

Without using the protocol to expand the I/O features of any microcontroller or processor, we can go to 8255 ICit 8-pin device. The 8051 microcontroller is a 40-pin microcontroller; by using the 8255 IC, we can expand the 3-I/O ports with 8-pins in each port. By using all the devices such as RTC, ADC, EEPROM, Timers, etc. – for expanding the peripheral circuitry – complexity, cost, power consumption and product size are also increased.

To overcome this problem, the protocol concept comes into the picture for reducing the hardware complexity and power consumption. We can expand more number of features, such as I/0 peripherals, ADCs, T/C and memory devices upto 128 devices by using this I2C protocol.

Terminology Used in I2C Protocols

Transmitter: The device that sends data to the bus is called transmitter.

Receiver: The device that receives data from the bus is called a receiver.

Master: The device that initiates transfers to generate a clock signals and terminate a transfer is called a master.

Slave: The device addressed by a master is called a slave.

Multimaster: More than one master can attempt to control the bus at the same time without corrupting the message is called a Multimaster.

Arbitration: Procedure to ensure that, if more than one master simultaneously tries to control the bus – only one is allowed to do so; the winning message is not corrupted.

Synchronization: Procedure to synchronize the clock singles of two or more devices is called synchronization.

I2C Basic Commands Sequence

Start Bit Condition

Stop Bit Condition

Acknowledgement Condition

Master to slave Write operation

Read Operation Slave to Master

Start and Stop Bit Condition

When the master (microcontroller) wishes to talk to a slave device (for example ADC), it begins communication by issuing a start condition on the I2C bus, and then issues a stop condition. The I2C start and stop logic levels are shown in the figure.

The I2C start condition defines as a high to low transition of the SDA line while the SCL line is high. AN I2C stop condition occurs when the SDA line toggles from low to high while the SCL line is high.

The I2C master always generates the S and P conditions. Once the I2C master initiates a START condition, the I2c bus is considered as being in busy state.

5. Write short notes on SPI BUS.(R13-2017-may)

SPI BUS
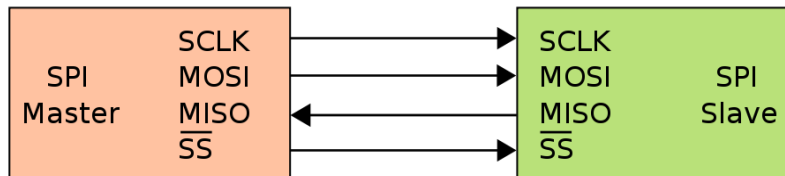
The Serial Peripheral Interface (SPI) is a synchronous serial communication interface specification used for short distance communication, primarily in embedded systems.

SPI devices communicate in full duplex mode using a master-slave architecture with a single master. The master device originates the frame for reading and writing. Multiple slave devices are supported through selection with individual slave select(SS) lines.

Sometimes SPI is called a four-wire serial bus, contrasting with three-, two-, and one-wire serial buses. The SPI may be accurately described as a synchronous serial interface, but it is different from the Synchronous Serial Interface (SSI) protocol, which is also a four-wire synchronous serial communication protocol. SSI Protocol employs differential signaling and provides only a single simplex communication channel.

The SPI bus specifies four logic signals:

SCLK: Serial Clock (output from master)

MOSI: Master Output Slave Input, or Master Out Slave In (data output from master)

MISO: Master Input Slave Output, or Master In Slave Out (data output from slave)

SS: Slave Select (often active low, output from master)

The SPI bus can operate with a single master device and with one or more slave devices.

If a single slave device is used, the SS pin may be fixed to logic low if the slave permits it. Some slaves require a falling edge of the chip select signal to initiate an action. An example is the Maxim MAX1242 ADC, which starts conversion on a high→low transition. With multiple slave devices, an independent SS signal is required from the master for each slave device.

Most slave devices have tri-state outputs so their MISO signal becomes high impedance (logically disconnected) when the device is not selected. Devices without tri-state outputs cannot share SPI bus segments with other devices; only one such slave could talk to the master.

Data transmission
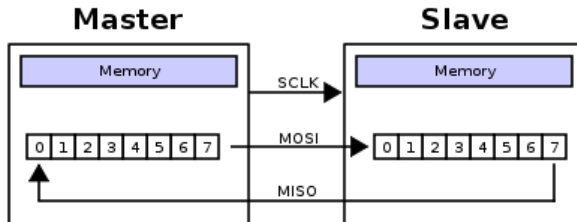
A typical hardware setup using two shift registers to form an inter-chip circular buffer

To begin communication, the bus master configures the clock, using a frequency supported by the slave device, typically up to a few MHz. The master then selects the slave device with a logic level 0 on the select line. If a waiting period is required, such as for an analog-to-digital conversion, the master must wait for at least that period of time before issuing clock cycles.

During each SPI clock cycle, a full duplex data transmission occurs. The master sends a bit on the MOSI line and the slave reads it, while the slave sends a bit on the MISO line and the master reads it. This sequence is maintained even when only one-directional data transfer is intended.

Transmissions normally involve two shift registers of some given word size, such as eight bits, one in the master and one in the slave; they are connected in a virtual ring topology. Data is usually shifted out with the most-significant bit first. On the clock edge, both master and slave shift out a bit and output it on the transmission line to the counterpart. On the next clock edge, at each receiver the bit is sampled from the transmission line and set as a new least-significant bit of the shift register. After the register bits have been shifted out and in, the master and slave have exchanged register values. If more data needs to be exchanged, the shift registers are reloaded and the process repeats. Transmission may continue for any number of clock cycles. When complete, the master stops toggling the clock signal, and typically deselects the slave.

Transmissions often consist of 8-bit words. However, other word sizes are also common, for example, 16-bit words for touch screen controllers or audio codecs, such as the TSC2101 by Texas Instruments, or 12-bit words for many digital-to-analog or analog-to-digital converters.

Every slave on the bus that has not been activated using its chip select line must disregard the input clock and MOSI signals, and must not drive MISO.

UNIT-4

1. Difference between RISC and CISC processor.

The architecture of the Central Processing Unit (CPU) operates the capacity to function from "Instruction Set Architecture" to where it was designed. The architectural design of the CPU is reduced instruction set computing (RISC) and Complex instruction set computing (CISC). CISC has the capacity to perform multi-step operations or addressing modes within one instruction set. It is the CPU design where one instruction works several low-level acts. For instance, memory storage, loading from memory, and an arithmetic operation. Reduced instruction set computing is a Central Processing Unit design strategy based on the vision that basic instruction set gives a great performance when combined with a microprocessor architecture which has the capacity to perform the instructions by using some microprocessor cycles per instruction. This article discusses the difference between the RISC and CISC architecture. The hardware part of the Intel is named as Complex Instruction Set Computer (CISC), and Apple hardware is Reduced Instruction Set Computer (RISC).
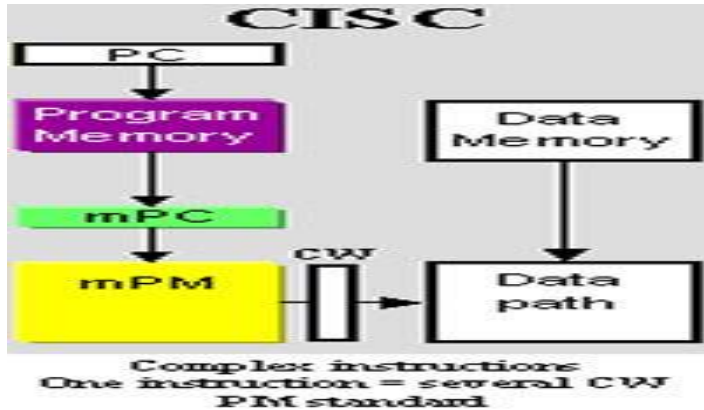
RISC Architecture: The term RISC stands for ''Reduced Instruction Set Computer''. It is a CPU design plan based on simple orders and acts fast.
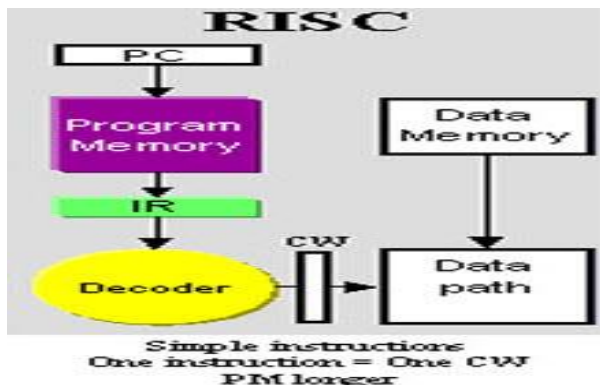
RISC Architecture

CISC Architecture

The term CISC stands for ''Complex Instruction Set Computer''. It is a CPU design plan based on single commands, which are skilled in executing multi-step operations.

CISC Architecture

2. List various advanced features of ARM processor.

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical CISC x86 processors in most personal computers. This approach reduces costs heat and power use. These are desirable traits for light, portable, battery-powered devices including smart phones, laptops, tablet and notepad computers, and other embedded systems. A simpler design facilitates more efficient multi-core CPUs and higher core counts at lower cost, providing improved energy efficiency for servers. ARM Holdings develops the instruction set and architecture for ARM-based products, but does not manufacture products. The company periodically releases updates to its cores. Current cores from ARM Holdings support a 32-bit address space and 32-bit arithmetic; the ARMv8-Aarchitecture, adds support for a 64-bit address space and 64-bit arithmetic. Instructions for ARM Holdings' cores have 32 bits wide fixed-length instructions, but later versions of the architecture support a variable-length instruction set that provides both 32 and 16 bits wide instructions for improved code density. Some cores can also provide hardware execution of Java byte codes

3. List and explain various operating modes of ARM processor.

  The ARM7TDMI processor has seven modes of operation:

User mode is the usual ARM program execution state, and is used for executing most application programs.

Fast Interrupt (FIQ) mode supports a data transfer or channel process.

Interrupt (IRQ) mode is used for general-purpose interrupt handling.

Supervisor mode is a protected mode for the operating system.

Abort mode is entered after a data or instruction Prefetch Abort.

System mode is a privileged user mode for the operating system.

4. Define Interrupt vector table.

The main purpose of any microcontroller is to accept input from input devices and accordingly drive the output. Hence, there will be several devices connected to a microcontroller at a time. Also, there are many internal components in a microcontroller like timers, counters etc. that require attention of the processor. Since all the devices can't obtain the attention of the processor at all times, the concept of "Interrupts" comes in to picture. An Interrupt, as the name suggests, interrupts the microcontroller from whatever it is doing and draws its attention to perform a special task. The following image depicts the procedure involved in Interrupts.
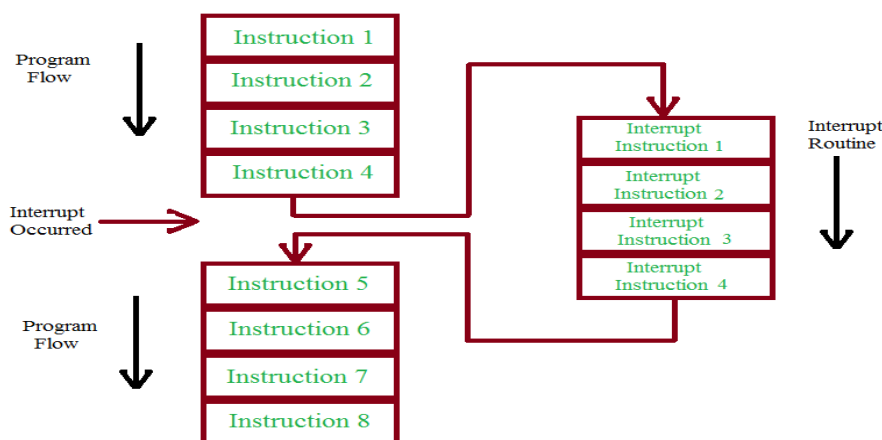
5. Give list of interrupt vector table.

The following is the list and description of registers that are associated with Interrupts in LPC214x series MCUs. The registers mentioned here are few important of the total available VIC Registers and are also in best order to start learning about VIC.

Software Interrupt Register (VICSoftInt): Software Interrupt Register is used to manually generate the interrupts using software i.e. code before the masking by external source. When a bit is set with 1 in the VICSoftInt register, the corresponding interrupt is triggered even without any external source.

Software Interrupt Clear Register (VICSoftIntClear): Software Interrupt Clear Register is used to clear the bits set by Software Interrupt Register. When a bit is set to 1 in this register,

the corresponding bit in the Software Interrupt Register is cleared and hence releasing the forced interrupt.

Interrupt Enable Register (VICIntEnable): Interrupt Enable Register is used to enable the interrupts that can later contribute to either FIQ or IRQ. When a bit is set to 1, the corresponding interrupt is enabled. As this is a read / write register, when this register is read, "1" indicates that the external interrupt request or software interrupts are enabled.

Interrupt Enable Clear Register (VICIntEnClear): Interrupt Enable Clear Register is used to clear the bits set by the Interrupt Enable Clear Register i.e. it is used to disable the interrupts. When a bit is set with "1", the register allows the software to clear the corresponding bit in the Interrupt Enable Register and thus disabling the interrupt for that particular request.

Interrupt Select Register (VICIntSelect): Interrupt Select Register is used to classify each of the 32 interrupts as either FIQ or IRQ. When a bit in this register is set to "0", then the corresponding interrupt (as shown in the above table) will be made as an IRQ. Similarly, when a bit is set to "1", the corresponding interrupt is made as FIQ.

IRQ Status Register (VICIRQStatus): Interrupt Status Register is used to read out the status of the interrupts that enabled and declared as IRQ. Both Vectored and Non – Vectored IRQ are read out. When a bit is read as "1", then the corresponding Interrupt is enabled and defined as IRQ.

FIQ Status Register (VICFIQStatus): This register is similar to IRQ Status Register (VICIRQStatus) except it reads the status of interrupts that are enabled and defined as FIQ.

Vector Control Registers (VICVectCntl0 – VICVectCntl15): Vector Control Registers are used to assign slots to different interrupt sources that are classified as IRQ. There are 16 Vector Control Registers and each register controls one of the 16 Vectored IRQ slots. VICVectCntl0 (Slot 0) has the highest priority while VICVectCntl15 (Slot 15) has the least priority. The first 5 bits in the Vector Control Registers (Bit 0 – Bit 4) contains the number of the interrupt request. The 5th bit (Bit 5) is used to enable the Vectored IRQ Slot. The following tables are be used to show the interrupt source and their corresponding Source Number in Decimal format.

6. Explain in short Instruction set of ARM processor

ARM provides by way of memory and registers, and the sort of instructions to manipulate them .All ARM instructions are 32 bits long. Here is a typical one:

10101011100101010010100111101011

Fortunately, we don't have to write ARM programs using such codes. Instead we use assembly language. We saw at the end of Chapter One a few typical ARM mnemonics.

Usually, mnemonics are followed by one or more operands which are used to completely describe the instruction.

An example mnemonic is ADD, for 'add two registers'. This alone doesn't tell the assembler which registers to add and where to put the result. If the left and right hand side of the addition are R1 and R2 respectively, and the result is to go in R0, the operand part would be written R0,R1,R2. Thus the complete add instruction, in assembler format, would be:

ADD R0, R1, R2 ;R0 = R1 + R2

Most ARM mnemonics consist of three letters, e.g. SUB, MOV, STR, STM. Certain 'optional extras' may be added to slightly alter the affect of the instruction, leading to mnemonics such as ADCNES and SWINE. The mnemonics and operand formats for all of the ARM's instructions are described in detail in the sections below. At this stage, we don't explain how to create programs, assemble and run them. There are two main ways of assembling ARM programs - using the assembler built-in to BBC BASIC, or using a dedicated assembler. The former method is more convenient for testing short programs, the latter for developing large scale projects. Chapter Four covers the use of the BASIC assembler.

7. Define and Explain ARM assembly language program.

Assembly language is just a thin syntax layer on top of the machine code which is composed of instructions that are encoded in binary representations (machine code), which is what our computer understands. So why don't we just write machine code instead? Well, that would be a pain in the ass. For this reason, we will write assembly, ARM assembly, which is much easier for humans to understand. Our computer can't run assembly code itself, because it needs machine code. The tool we will use to assemble the assembly code into machine code is a GNU Assembler from the GNU Binutils project named as which works with source files having the *.s extension. Therefore, Assembly language is the lowest level used by humans to program a computer. The operands of an instruction come after the mnemonic(s). Here is an example:

MOV R2, R1

8. Give list of arithmetic instruction of ARM.

ADD – Add

Rd := Rn + Operand2

ADC – Add with Carry

Rd := Rn + Operand2 + Carry

SUB – Subtract

Rd := Rn − Operand2

SBC – Subtract with Carry

Rd := Rn − Operand2 − NOT(Carry)

RSB – Reverse Subtract

Rd := Operand2 − Rn

RSC – Reverse Subtract with Carry

Rd := Operand2 − Rn − NOT(Carry)

Examples of arithmetic instructions.

ADD r0, r1, r2

R0 = R1 + R2

SUB r5, r3, #10

R5 = R3 − 10

RSB r2, r5, #0xFF00

R2 = 0xFF00 − R5

9. Draw the CPSR and flags (GNITC-MAY-2019)

The Current Program Status Register is a 32-bit wide register used in the ARM architecture to record various pieces of information regarding the state of the program being executed by the processor and the state of the processor

CPSR (Current Program Status Register)

- The ARM core uses the *cpsr* to monitor and control internal operations.

- The *cpsr* is a dedicated 32-bit register and resides in the register file.

- The *cpsr* is divided into **four fields, each 8 bits wide**: **flags**, status, extension, and control. In current designs the extension and status fields are reserved for future use. The control field contains the processor mode, state, and interrupt mask bits. The flags field contains the condition flags.
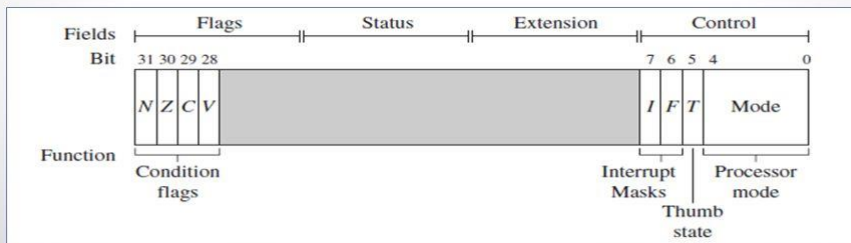
Fig 3: A generic program status register (*psr*).

UNIT-5

1. List and give details of different profiles of ARM cortex.

ARM architecture profiles

The ARM architecture profiles are:

1. Application profile

Application profiles implement a traditional ARM architecture with multiple modes and support a virtual memory system architecture based on an MMU. These profiles support both ARM and Thumb instruction sets.

2. Real-time profile

Real-time profiles implement a traditional ARM architecture with multiple modes and support a protected memory system architecture based on an MPU.

3. Microcontroller profile

Microcontroller profiles implement a programmers' model designed for fast interrupt processing, with hardware stacking of registers and support for writing interrupt handlers in

high-level languages. The processor is designed for integration into an FPGA and is ideal for use in very low power applications.

2. Write short notes on cortex processor.

The ARM Cortex-A9 MP Core is a 32-bit processor core licensed by ARM Holdings implementing the ARMv7-A architecture. It is a multicore processor providing up to 4 cache-coherent cores

Key features of the Cortex-A9 core are.

Out-of-order speculative issue superscalar execution 8-stage pipeline giving 2.50 DMIPS/MHz/core.

NEON SIMD instruction set extension performing up to 16 operations per instruction (optional).

High performance VFPv3 floating point unit doubling the performance of previous ARM FPUs (optional).

Thumb-2 instruction set encoding reduces the size of programs with little impact on performance.

TrustZone security extensions.

Jazelle DBX support for Java execution.

Jazelle RCT for JIT compilation.

Program Trace Macrocell and CoreSight Design Kit for non-intrusive tracing of instruction execution.

L2 cache controller (0–4 MB).

Multi-core processing.

3. Write about OMAP processor

The OMAP (Open Multimedia Applications Platform) family, developed by Texas Instruments, is a series of image/video processors. They are proprietary system on chips (SoCs) for portable and mobile multimedia applications. OMAP devices generally include a general-purpose ARM architecture processor core plus one or more specialized co-processors.

Earlier OMAP variants commonly featured a variant of the Texas Instruments TMS320 series digital signal processor. The platform was created after December 12, 2002, as STMicroelectronics and Texas Instruments jointly announced an initiative for Open Mobile Application Processor Interfaces (OMAPI) intended to be used with 2.5 and 3G mobile phones, that were going to be produced during 2003. (This was later merged into a larger initiative and renamed the MIPI Alliance.)

The OMAP was Texas Instruments' implementation of this standard. (The STMicroelectronics implementation was named Nomadic.) OMAP did enjoy some success in the smart phone and tablet market until 2011 when it lost ground to Qualcomm Snapdragon. On September 26, 2012, Texas Instruments announced they would wind down their operations in smart phone and tablet oriented chips and instead focus on embedded platforms. On November 14, 2012, Texas Instruments announced they would cut 1,700 jobs due to their shift from mobile to embedded platforms. The last OMAP5 chips were released in Q2 2013.

4 Explain about register indirect addressing mode in ARM.

Register Indirect Addressing Mode

Register indirect addressing means that the location of an operand is held in a register. It is also called indexed addressing or base addressing. Register indirect addressing mode requires three read operations to access an operand. It is very important because the content of the register containing the pointer to the operand can be modified at runtime. Therefore, the address is a variable that allows the access to the data structure like arrays.

Read the instruction to find the pointer register

Read the pointer register to find the operand address

Read memory at the operand address to find the operand

Some examples of using register indirect addressing mode:

LDR   R2, [R0]   ; Load R2 with the word pointed by R0

STR   R2, [R3]   ; Store the word in R2 in the location pointed by R3

Register Indirect Addressing with an Offset

ARM supports a memory-addressing mode where the effective address of an operand is computed by adding the content of a register and a literal offset coded into load/store instruction. For example,

Instruction   Effective Address

LDR R0, [R1, #20]   R1 + 20   ; loads R0 with the word pointed at by R1+20

----

5. Explain about ARM addressing Modes

There are different ways to specify the address of the operands for any given operations such as load, add or branch. The different ways of determining the address of the operands are called addressing modes. In this lab, we are going to explore different addressing modes of ARM processor and learn how all instructions can fit into a single word (32 bits).

Name	Alternative Name	ARM Examples
Register to register	Register direct	MOV R0, R1
Absolute	Direct	LDR R0, MEM
Literal	Immediate	MOV R0, #15
		ADD R1, R2, #12
Indexed, base	Register indirect	LDR R0, [R1]
Pre-indexed, base with displacement	Register indirect with offset	LDR R0, [R1, #4]

Pre-indexed, autoindexing	Register indirect pre-incrementing	LDR R0, [R1, #4]!
Post-indexing, autoindexed	Register indirect post-increment	LDR R0, [R1], #4
Double Reg indirect	Register indirect Register indexed	LDR R0, [R1, R2]
Double Reg indirect with scaling	Register indirect indexed with scaling	LDR R0, [R1, r2, LSL #2]
Program counter relative		LDR R0, [PC, #offset]

6. Write the applications of OMAP processor? (GNITC-MAY-2019)

OMAP FAMILY

The OMAP family consists of three product groups classified by performance and intended applications:

1) Integrated modem and applications processors
2) Basic multimedia applications processors
3) High-performance applications processors

7. What is wakeup interrupt controller? (GNITC-MAY-2019)

The Wakeup Interrupt Controller (WIC) is a peripheral that can detect an interrupt and wake the processor from deep sleep mode. The WIC is enabled only when the system is in deep

sleep mode. The WIC is not programmable, and does not have any registers or user interface. It operates entirely from hardware signals

Multiple Choice Questions

Unit-1

1. A microprocessor is a _____ chip integrating all the functions of a CPU of a computer.

A. multiple   B. single   C. double   D. triple

ANSWER: B

2. Microprocessor is a/an _____ circuit that functions as the CPU of the compute

A. electronic   B. mechanic   C. integrating   D. processing

ANSWER: A

3. Microprocessor is the _____ of the computer and it perform all the computational tasks

A. main   B. heart   C. important   D. simple

ANSWER: B

4. The purpose of the microprocessor is to control _____

A. memory   B. switches   C. processing   D. tasks

ANSWER: A

5. The first digital electronic computer was built in the year_____

A. 1950   B. 1960   C. 1940   D. 1930

ANSWER: C

6. In 1960's texas institute invented _____

A. integrated circuits   B. microprocessor   C. vacuum tubes   D. transistors

ANSWER: A

7. The intel 8086 microprocessor is a _____ processor

A. 8 bit   B. 16 bit   C. 32 bit   D. 4 bit

ANSWER: B

8. The microprocessor can read/write 16 bit data from or to _____

A. memory   B. I /O device   C. processor   D. register

ANSWER: A

9. In 8086 microprocessor , the address bus is _____ bit wide

A. 12 bit   B. 10 bit   C. 16 bit   D. 20 bit

ANSWER: D

10. The work of EU is _____

A. encoding   B. decoding   C. processing   D. calculations

ANSWER: B

11. The 16 bit flag of 8086 microprocessor is responsible to indicate _____

A. the condition of result of ALU operation   B. the condition of memory

C. the result of addition   D. the result of subtraction

ANSWER: A

12. The CF is known as _____

A. carry flag   B. condition flag   C. common flag   D. single flag

.ANSWER: A

13. The SF is called as _____

A. service flag   B. sign flag   C. single flag   D. condition flag

ANSWER: B

14. The OF is called as _____

A. overflow flag   B. overdue flag   C. one flag   D. over flag

ANSWER: A

15. The IF is called as _____

A. initial flag   B. indicate flag   C. interrupt flag   D. inter flag

ANSWER: C

16. The register AX is formed by grouping _____

A. AH & AL   B. BH & BL   C. CH & CL   D. DH & DL

ANSWER: A

17. The SP is indicated by _____

A. single pointer   B. stack pointer   C. source pointer   D. destination pointer

ANSWER: B

18. The BP is indicated by _____

A. base pointer   B. binary pointer   C. bit pointer   D. digital pointer

ANSWER: A

19. The SS is called as _____

A. single stack   B. stack segment   C. sequence stack   .D. random stack

ANSWER: B

20. The index register are used to hold _____

A. memory register   B. offset address   C. segment memory   D. offset memory

ANSWER: A

UNIT-2

8051 micro controller has how many ports

a) 3   b) 1

c) 2   d) 4

Which of the registers 8051 support indirect addressing

a) R6-R7   b) R0-R7

c) R0-R1   d) R0-R6

Which of the register of 8051 is 16 bit

a) A   b) PSW

c) DPTR   d) SP

Which of the opcode is for 8 bit displacement

a) LMJP   b) SJMP

c) CALL   d) AJMP

8051 has number of register banks

a) 3   b) 1

c) 2   d) 4

8051 is of -----pin package

a) 40   b) 50

c) 20   d) 30

ALE of 8051 stands for

a) Address latch enable   b) Addition latch enable

c) Address low enable   d) Addition low enable

Internal data memory of 8051 is of

a) 256 B   b) 64 B

c) 216 B   d) 250 B

External data memory of 8051 is of

a) 34 KB   b) 64 KB

c) 16 KB   d) 23 KB

Internal program memory of 8051 is of

a) 4 KB   b) 64 KB

c) 16 KB   d) 50 KB

External program memory of 8051 is of

a) 34 KB   b) 64 KB

c) 16 KB   d) 23 KB

Direct addressing mode is used for accessing

a) Internal memory   b) External memory

c) RAM   d) ROM

8051 has number of user defined flags

a) 126   b) 124

c) 122   d) 128

8051 has the crystal oscillator with frequency of

a) 12 MHz   b) 10 MHz

c) 11 MHz   d) 13 MHz

Which port of 8051 has special functions

a) Port 3   b) Port 1

c) Port2   d) Port 4

16. Which of the following is an external interrupt?
a) INT0(active low)   b) INT2(active low)   c) Timer0 interrupt   d) Timer1 interrupt

Answer: a
Explanation: INT0(active low) and INT1(active low) are two external interrupt inputs
provided by 8051.

17. The interrupts, INT0(active low) and INT1(active low) are processed internally by flags
a) IE0 and IE1   b) IE0 and IF1   c) IF0 and IE1   d) IF0 and IF1

Answer: a
Explanation: The interrupts, INT0(active low) and INT1(active low) are processed
internally by the flags IE0 and IE1.

18. The flags IE0 and IE1, are automatically cleared after the control is transferred to
respective vector, if the interrupt is
a) level-sensitive   b) edge-sensitive   c) in serial port   d) in parallel port

Answer: b
Explanation: If the interrupts are programmed as edge sensitive, the flags IE0 and IE1 are
automatically cleared after the control is transferred to respective vector.

19. If the external interrupt sources control the flags IE0 and IE1, then the interrupt
programmed is
a) level-sensitive   b) edge-sensitive   c) in serial port   d) in parallel port

Answer: a
Explanation: If the interrupts are programmed as level sensitive, then the flags IE0 and IE1
are controlled by external interrupt sources themselves.

20. The pulses at T0 or T1 pin are counted in
a) timer mode b) counter mode   c) idle mode   d) power down mode

Answer: b

Explanation: In counter mode, the pulses are counted at T0 or T1 pin.

21. In timer mode, the oscillator clock is divided by a prescalar

a) (1/8)   b) (1/4)   c) (1/16)   d) (1/32)

Answer: d

Explanation: In timer mode, the oscillator clock is divided by a prescalar (1/32) and then given to the timer.

22. The serial port interrupt is generated if

a) RI is set   b) RI and TI are set   c) either RI or TI is set   d) RI and TI are reset

Answer: c

Explanation: The serial port interrupt is generated if atleast one of the two bits, RI and TI is set.

23. In serial port interrupt, after the control is transferred to the interrupt service routine, the flag that is cleared is

a) RI   b) TI   c) RI and TI   d) none

Answer: d

Explanation: In serial port interrupt, after the control is transferred to the interrupt service routine, neither of the flags is cleared.

24. The atleast number of machine cycles for which the external interrupts that are programmed level-sensitive should remain high is

a) 1   b) 2   c) 3   d) 0

Answer: b

Explanation: The external interrupts, programmed level-sensitive should remain high for atleast 2 machine cycles.

25. If the external interrupts are programmed edge sensitive, then they should remain high for atleast

a) 0 machine cycle   b) 2 machine cycles   c) 1 machine cycle   d) 3 machine cycles

Answer: c

Explanation: If the external interrupts are programmed edge sensitive, then they should remain high for atleast one machine cycle and low for atleast one machine cycle, for being sensed.

26. The timer generates an interrupt, if the count value reaches to
a) 00FFH   b) FF00H   c) 0FFFH   d) FFFFH

Answer: d

Explanation: the timer is an up-counter and generates an interrupt when the count has reached FFFFH.

27. The external interrupt that has the lowest priority among the following is
a) TF0   b) TF1   c) IE1   d) NONE

Answer: c

Explanation: The order of given interrupts from high to low priority is TF0, IE1 and TF1.

28. Among the five interrupts generated by 8051, the lowest priority is given to the interrupt
a) IE0   b) TF1   c) TF0   d) RI

Answer: d

Explanation: the interrupt, RI=TI (serial port) is given the lowest priority among all the interrupts.

29. Among the five interrupts generated by 8051, the highest priority is given to the interrupt
a) IE0   b) TF1   c) TF0   d) IE1

Answer: a

Explanation: the interrupt, IE0(External INT0) is given the highest priority among all the interrupts.

30. All the interrupts are enabled using a special function register called
a) interrupt priority register   b) interrupt register
c) interrupt function register   d) interrupt enable register

Answer: d

Explanation: All the interrupts are enabled using a special function register called interrupt enable register (IE) and their priorities are programmed using another special function register called interrupt priority register(IP).

31. The number of bytes stored on the stack during one operation of PUSH or POP is
a) 1   b) 2   c) 3   d) 4

Answer: a
Explanation: As 8051 stack operations are 8-bit wide i.e. in an operation using PUSH or POP instruction, one byte of data is stored on a stack or retrieved from the stack. For implementing 16-bit operations, two 8-bit operations are cascaded.

32. The step involved in PUSH operation is
a) increment stack by 2 and store 8-bit content to address pointed to by SP
b) decrement stack by 1 and store 16-bit content to address pointed to by SP
c) increment stack by 1 and store 8-bit content to address pointed to by SP
d) store 8-bit content to address pointed to by SP and then increment stack by 1

Answer: c
33. The step involved in POP operation is
a) decrement stack by 2 and store 8-bit content to address pointed to by SP
b) store 16-bit content to address pointed to by SP and decrement stack by 1
c) decrement stack by 1 and store content of top of stack to address pointed to by SP
d) store content of top of stack to address pointed to by SP and then decrement stack by 1

Answer: d
Explanation: The POP instruction follows two steps..

34. The 8051 stack is
a) auto-decrement during PUSH operations   b) auto-increment during POP operations
c) auto-decrement during POP operations   d) auto-increment during PUSH operations

Answer: d
Explanation: The 8051 stack is opposite to that in 8085 or 8086 i.e. in 8085 it is auto-decrement while in 8051 it is auto-increment during PUSH operations.

UNIT-3

1. This set of Microprocessor Multiple Choice Questions & Answers (MCQs) focuses on "Serial Communication Unit".

1. The serial communication is
a) cheaper communication
b) requires less number of conductors
c) slow process of communication
d) all of the mentioned

Answer: d

Explanation: The serial communication requires less number of conductors and thus it is cheaper. It is slow as the bits are transmitted one by one along with start, stop and parity bits.

2. The serial communication is used for
a) short distance communication
b) long distance communication
c) short and long distance communication
d) communication for a certain range of distance
   Answer: b

Explanation: Serial communication is more popular for communication over longer distances as it requires less number of conductors.

3. The mcs 51 architecture supports
a) serial transmission and reception
b) simultaneous transmission and reception
c) transmission and reception of data using serial communication interface
d) all of the mentioned

Answer: d

Explanation: The mcs 51 architecture supports simultaneous transmission and reception of binary data byte by byte i.e. full duplex mode of communication. It supports serial transmission and reception of data using standard serial communication interface and baud rates.

4. The number of bits transmitted or received per second is defined as
a) transmission rate
b) reception rate
c) transceiver rate
d) baud rate
   Answer: d

Explanation: Here, baud rate can be defined as the number of bits transmitted or received per second.

5. The task of converting the byte into serial form and transmitting it bit by bit along with start, stop and parity bits is carried out by
a) reception unit
b) serial communication unit
c) transmission unit
d) all of the mentioned
   Answer: c

Explanation: the serial communication unit consists of transmission unit and reception unit. The task of converting the byte into serial form and transmitting it bit by bit along with start, stop and parity bits is carried out by transmission unit.

6. The transmission unit does not require assistance from processor if once a byte for transmission is written to
a) SCON register
b) SBUF register
c) SFR address
d) Any of the mentioned

Answer: b
Explanation: once a byte for transmission is written to the serial buffer(SBUF) register, the transmission unit does not require assistance from a processor.

7. The common unit shared by the receiver unit and transmission unit of serial communication unit is
a) SCON(Serial Port Control) Register
b) SBUF(Serial Buffer) register
c) 8-bit serial data interface
d) All of the mentioned

Answer: d
Explanation: The transmission unit and receiver unit both are controlled by using a common SCON(Serial Port Control) Register. Also both units share a common serial buffer(SBUF) register which is a common 8-bit serial data interface.

8. During serial reception, the buffer that receives serial bits and converts to a byte is
a) receive buffer 0
b) receive buffer 1
c) receive buffer 2
d) none

Answer: b
Explanation: During serial reception, the receive buffer 1 receives serial bits and converts to a byte, it then transfers the received parallel byte in receive buffer 2.

9. If SM0=1, SM1=0, then the transceiver selected is
a) 8-bit synchronous
b) 9-bit synchronous

c) 8-bit asynchronous
d) 9-bit asynchronous

Answer: d : Explanation: If SM0=1, SM1=0, then the 9-bit asynchronous transceiver is selected.

10.If the microcontroller is expected to communicate in a multiprocessor system, then the required condition is
a) SM0 is set   b) SM1 is set   c) SM2 is set   d) REN is set

11. Spi stands for_____

12. I2C stands for_____

13. UART stands for_____

14. RS-232C stands for_____

15.USB stands for_____

UNIT-4

1. ARM stands for _____
a) Advanced Rate Machines
b) Advanced RISC Machines
c) Artificial Running Machines
d) Aviary Running Machines

2. The main importance of ARM micro-processors is providing operation with _____
a) Low cost and low power consumption
b) Higher degree of multi-tasking
c) Lower error or glitches
d) Efficient memory management

3. ARM processors where basically designed for _____
a) Main frame systems
b) Distributed systems
c) Mobile systems
d) Super computers

4. The ARM processors don't support Byte addressability.
a) True
b) False

5. The address space in ARM is _____
a) 224
b) 264
c) 216
d) 232

6. The address system supported by ARM systems is/are _____
a) Little Endian
b) Big Endian
c) X-Little Endian
d) Both Little & Big Endian

7. Memory can be accessed in ARM systems by _____ instructions.
i) Store
ii) MOVE
iii) Load
iv) arithmetic
v) logical
a) i,ii,iii
b) i,ii
c) i,iv,v
d) iii,iv,v

8. RISC stands for _____
a) Restricted Instruction Sequencing Computer
b) Restricted Instruction Sequential Compiler
c) Reduced Instruction Set Computer
d) Reduced Induction Set Computer

9. In the ARM, PC is implemented using _____
a) Caches
b) Heaps
c) General purpose register

d) Stack

10. The additional duplicate register used in ARM machines are called as _____
a) Copied-registers
b) Banked registers
c) EXtra registers
d) Extential registers

11. The banked registers are used for _____
a) Switching between supervisor and interrupt mode
b) Extended storing
c) Same as other general purpose registers
d) None of the mentioned

12. Each instruction in ARM machines is encoded into _____ Word.
a) 2 byte
b) 3 byte
c) 4 byte
d) 8 byte

13. All instructions in ARM are conditionally executed.
a) True
b) False

14. The addressing mode where the EA of the operand is the contents of Rn is _____
a) Pre-indexed mode
b) Pre-indexed with write back mode
c) Post-indexed mode
d) None of the mentioned

15. The effective address of the instruction written in Post-indexed mode, MOVE[Rn]+Rm is _____
a) EA = [Rn].
b) EA = [Rn + Rm].
c) EA = [Rn] + Rm
d) EA = [Rm] + Rn

UNIT-5

1. _____ symbol is used to signify write back mode.
a) #
b) ^
c) &
d) !

2. The instructions which are used to load or store multiple operands are called as _____
a) Banked instructions
b) Lump transfer instructions
c) Block transfer instructions
d) DMA instructions

3. The Instruction, LDM R10!, {R0,R1,R6,R7} _____
a) Loads the contents of R10 into R1, R0, R6 and R7
b) Creates a copy of the contents of R10 in the other registers except for the above mentioned ones
c) Loads the contents of the registers R1, R0, R6 and R7 to R10
d) Writes the contents of R10 into the above mentioned registers and clears R10

4. The instruction, MLA R0,R1,R2,R3 performs _____
a) R0<-[R1]+[R2]+[R3].
b) R3<-[R0]+[R1]+[R2].
c) R0<-[R1]*[R2]+[R3].
d) R3<-[R0]*[R1]+[R2].

5. The ability to shift or rotate in the same instruction along with other operation is performed with the help of _____
a) Switching circuit
b) Barrel switcher circuit
c) Integrated Switching circuit
d) Multiplexer circuit

6. _____ instruction is used to get the 1's complement of the operand.
a) COMP
b) BIC
c) ~CMP

d) MVN

7. The offset used in the conditional branching is _____ bit.
a) 24
b) 32
c) 16
d) 8

8. The BEQ instructions is used _____
a) To check the equality condition between the operands and then branch
b) To check if the Operand is greater than the condition value and then branch
c) To check if the flag Z is set to 1 and then causes branch
d) None of the mentioned

9. The condition to check whether the branch should happen or not is given by _____
a) The lower order 8 bits of the instruction
b) The higher order 4 bits of the instruction
c) The lower order 4 bits of the instruction
d) The higher order 8 bits of the instruction

10. Which of the two instructions sets the condition flag upon execution?
i) ADDS R0,R1,R2
ii) ADD R0,R1,R2
a) i
b) ii
c) Both i and ii
d) Insufficient data

11. _____ directive is used to indicate the beginning of the program instruction or data.
a) EQU
b) START
c) AREA
d) SPACE

12. _____ directive specifies the start of the execution.
a) START

b) ENTRY
c) MAIN
d) ORIGIN

13. _____ directives are used to initialize operands.
a) INT
b) DATAWORD
c) RESERVE
d) DCD

14. _____ directive is used to name the register used for execution of an instruction.
a) ASSIGN
b) RN
c) NAME
d) DECLARE

15. The pseudo instruction used to load an address into the register is _____
a) LOAD
b) ADR
c) ASSIGN
d) PSLOAD

Guru Nanak Institutions Technical Campus (Autonomous)
School of Engineering & Technology

DIGITAL SIGNAL PROCESSING (18PC0EC16)

Syllabus:

UNIT	DETAILS
I	**INTRODUCTION TO DISCRETE TIME SIGNALS AND SYSTEMS:** Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals; Discrete systems attributes, Application of DSP, Z-Transform, Analysis of LSI systems, frequency Analysis, Inverse Systems
II	**DISCRETE FOURIER TRANSFORM AND FAST FOURIER TRANSFORM** **Discrete Fourier Transforms**: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of Convolution Over-Lap Add Method, Over-Lap Save Method. **FastFourierTransforms(FFT)** – Radix-2, Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.
III	**FIR Digital Filters** Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Digital filters: Fourier Method, Window method, Park-McClellan's method.
IV	**IIR Filters** Design of IIR analog filters – Butterworth and Chebyshev, Elliptic Approximations, Design of IIR Digital Filters from Analog Filters by using Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformation: Low pass, Band pass, Band stop and High pass filters. Comparison of FIR and IIR filters.
V	**Finite Word length Effects and Multirate Signal Processing** Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multirate signal processing, Decimation, Interpolation, Sampling Rate Conversion

<u>**COURSE INFORMATION SHEET**</u>

Programme: Electronics and Communication Engineering	Degree: B. Tech
Course: Digital Signal Processing	Semester: III - II Sem Credits: 4
Course Code: 18PC0EC16 Regulation: R18	Course Type: Core
Course Area/Domain: Signal Processing	Contact Hours: 3+1(Tutorial) Hours/Week
Corresponding Lab Course Code: 18PC0EC18	DSP Lab

UNIT	DETAILS	HOURS
I	**Introduction to Discrete time signals and Systems** Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals; Discrete systems attributes, Application of DSP, Z-Transform, Analysis of LSI systems, frequency Analysis, Inverse Systems	**10**
II	**Discrete Fourier Transform and Fast Fourier Transform** Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of Over-Lap Add Method, Over-Lap Save Method. Fast Fourier Transforms: Fast Fourier Transforms (FFT) – Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.	**11**
III	**FIR Digital Filters** Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Digital filters: Fourier Method, Window method, Park-McClellan's method.	**10**

IV	**IIR Filters** Design of IIR analog filters – Butterworth and Chebyshev, Elliptic Approximations, Design of IIR Digital Filters from Analog Filters by using Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformation: Low pass, Band pass, Band stop and High pass filters. Comparison of FIR and IIR filters.	**10**
V	**Finite Word length Effects and Multirate Signal Processing** Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multirate signal processing, Decimation, Interpolation, Sampling Rate Conversion.	**08**
Total Hours		49
Tutorial Classes*		12
Special Descriptive Tests		02
Classes for beyond syllabus*		03
Remedial Classes/NPTL		04
Total Number of Classes*		**70**

2 Marks:

1)   What are the applications of digital signal processing? (2 marks) (March 2017)

2)   Explain region of convergence and its properties. (3 marks) (March 2017)

3)   Define decimation and interpolation. (2 marks) (November 2016)

4)   State linear and static system with example. (3 marks) (November 2016)

5)   Write four advantages of digital signal processing over analog signal

Processing? (2 marks) (May 2016)

6)   Show that the frequency response of a discrete system is a periodic function of frequency.

(3 marks) (May 2016)

7)   Show that $\delta(n) = u(n) - u(n-1)$. (2marks)   (April 2018)

8)   Find the z-transform of $f(n) = n^2 u(n)$ (3marks)   (April 2018)

9)   Define energy and power signals.   (May 2019)

10)   Define Z-transform and state any three properties of ROC. (May 2019)

5 Marks:

1) With neat block diagram explain Digital signal Process and list out the advantages and draw
backs.   (May 2019)

2)   Determine the impulse response h(n) for the system described by the second order

difference equation y (n) – 4 y (n-1) + 4 y (n-2) = x (n-1)   (March 2017)

3)   Find the system function and impulse response of the system described by the difference

equation $y(n) = x(n) + 2x(n-1) - 4x(n-2) + x(n-3)$.   (May 2019)

4)   Find the magnitude and phase response for the system characterized by the difference

equation y (n) = x (n) + x (n-1) + x (n-2)   (March 2017)

5)   Check the following filter for time invariant, causal and linear

i)   y (n) = (n-1) x^2 (n+1)

ii)   y(n) = n^2 x (n-2)   (March

2017)

6)   Draw the structures of cascade and parallel realizations of

$$H(z) = \frac{(1-z^{-1})}{\left(1-\frac{1}{2}z^{-2}\right)(1-\frac{1}{8}z^{-1})}$$

7) If y(n) = 12x(n-1) + 11x(n-2), Find whether given system is time variant or not?.

(November 2016)

8) Find the frequency response of 1st order system y(n) = x(n) + ay(n-1).

(November 2016)

9) y(n)-3y(n-1) – 4y(n-2) = 0 determine zero-input response of the system; Given y(-2) =0 and y(-1) =5   (November 2016)

10) Obtain the cascade and parallel form realization for the system

$y(n) = -0.1\ y(n-1) + 0.2\ y(n-2) + 3x(n) + 3.6x(n-1) + 0.6\ x(n-2)$. (November 2016)

11)   Test the following systems for linearity, Time invariance, causality and stability

y(n) = sin(2npif/F)x(n)   (May 2016)

12)   A digital system is characterized by the following difference equation:

Y(n) = x(n)+ay(n-1). Assuming that the system is relaxed initially, determined its impulse response.   (May 2016)

13)   By taking an example compute DFT by using overlap save method.
(May 2016)

14) A causal system is represented by the following difference equation:

y(n)+(1/4)y(n-1) = x(n)+(1/2)x(n-1). Find the system transfer function H(z), unit sample response, magnitude and phase function of the system.   Determine direct form I and II for the second order filter given by:

Y(n)=2bcosw$_o$y(n-1)-b^{2}y(n-2)+x(n)-bcosw$_o$y(n-1)   (May 2015)

15) Determine the range of values of 'n' for which an LTI system represented below is stable,

   $h[n] = a^n$ for n≥0

        = 0 otherwise   (June 2014)

16) Write whether an LTI system with an impulse response represented below is stable or not? Justify.

$h[n] = 3^n\ u[-n-1]$ (June 2014)

17) Write whether an LTI system with an impulse response represented below is causal or not? Justify.

h[n] =u[n+2]-u[n-2]   (June 2014, Nov. 2020)

18)   Write a short note on Time and Frequency domain input-output relationships of an LTI system.

(Dec 2013)

19)   An LTI system is characterized by its impulse response h(n) = (½)^n u(n). Determine the spectrum and energy density spectrum of the output signal when the system is excited by the signal x(n) = (¼)^n u(n).   (Dec 2013)

20) a) An LTI system is characterized by an impulse response

$$h(n) = \left(\frac{3}{4}\right)^n u(n)$$

Find the step response of the system. Also, evaluate the output of the system at n=±5.

(April 2018)

21) Consider a discrete time system characterized by the following input-output relationship $(n) = x(n-2) - 2x(n-17)$. Determine whether the system is memory less, time-invariant, linear, causal and stable.   (April 2018)

22) Given the difference equation $y(n) + b^2 y(n-2) = 0$ for n≥0 and |b|<1. With initial conditions y(-1)=0 and y(-2)=-1, show that

$y(n) = b^{n+2} \cos\left(\frac{n\pi}{2}\right)$ (April 2018)

23) Find the z-transform of the sequence f(n) defined below: (April 2018)

$$f(n) = \begin{cases} 3^n & n < 0 \\ \left(\frac{1}{3}\right)^n & n = 0,2,4 \dots \\ \left(\frac{1}{2}\right)^n & n = 1,3,5 \dots \end{cases}$$

24) Discuss direct form-I and direct form-II IIR realization structures in detail with necessary flow graphs.   (Nov. 2020)

25) Define an LSI system and show that the output of an LSI system is given by the

convolution of input sequence and impulse response of the system. (August 2021)

26) Derive an expression for a parsevals relation for discrete time periodic signals. (August 2021)

UNIT-II

2 marks:

1) What is zero padding? What are its uses? (2 marks) (March 2017, May 2019)

2) State and prove time shifting property of DFT. (3 marks) (March 2017)

3) If x(n)= $cos\frac{\Pi}{3}n$, find spectra of the signal? (2 marks) (November 2016)

4) How many multiplications and additions are required to compute N-point DFT using radix – 2 FFT? (3 marks) (November 2016)

5) Give the relation between DTFT and Z- Transform. (2 marks) (May 2016)

6) Distinguish between linear convolution and circular convolution. (3 marks) (May 2016)

7) State and prove the any three properties of DFT.(2marks)(April2018)

8) What is the basic operation of DIF algorithm? (3marks)(April2018)

9) Define twiddle factor and give its values for N=4. (May 2019)

5 Marks

1) Determine the 8 point DFT of the sequence

X(n) = $\begin{cases} 1; & -4 \le n \le 4 \\ 0; & otherwise \end{cases}$

(March 2017, Nov. 2020)

2) Compare overlap-save method and overlap-add method. (March 2017)

3) Compute the DFT of the sequence x[n] = {1, 2, 3, 4, 4, 3, 2, 1} using DIF FFT algorithm. (May 2019)

4) How the computational speed of FFT algorithm has been improved over DFT. (May 2019)

5) Perform Linear convolution of the two sequences x(n) = {1, 2, 3, -1, -2, -3, 4, 5, 6,2,1,3,5} and h(n) = {2, 1, -1} using Over-lap save method. (May 2019)

6) Compute 4-point DFT of a sequence x (n) = { 0,1,2,3} using DIT algorithm

(March 2017, Nov 2020)

7) Find the IDFT of the sequence using DIF algorithm X (k) = {10, -2-j2, -2, -2+j2}
(March 2017)

8) Explain all properties of DTFT. (Nov 2016)

9) Find the DFT of a sequence x(n)= {1,1,0,0} and find the IDFT of Y(k)={1,0,1,0}

(Nov 2016)

10) Explain Radix – 2. Decimation in time FFT algorithm with example. (Nov 2016)

11) Compute the circular convolution of the sequences

$X_1(n)$ = {1,2,0,1} and

$X_2(n)$ = {2,2,1,1} using DFT approach and concentric circles method.

(May 2016)

12) What is FFT? Calculate the number of multiplications needed in the calculation of DFT using FFT algorithm with 32 point sequence. (May 2016)

13) Prove the following properties
$x^*(n) \rightarrow X^*((-K))_N R_N(K)$
$x*((-n))_N R_N(n) \rightarrow X_{ep}(k) = \frac{1}{2}[X(K)_N+X^*(-K)_N]R_N(K)$ (May 2016)

14) Compute FFT for the sequence
x(n) = {1,0,1,1,0,1,1,1} (May 2016)

15) State and prove the following properties of DFT:
(a)Linearity
(b) Frequency shifting (May 2015)

16) Explain the following
(a)Overlap Add Method (August 2021)
(b) Overlap Save Method (May 2015)

17) Develop the DIF FFT algorithm for N=8. Using the resulting signal flow graph

compute the 8-point DFT of the sequence x(n) = sin (pi/2 n), 0≤n≤7.   (May 2015)

18)   If $x_2(n) = x_1(-n)$ without performing FFT find $X_2(k)$ using $X_1(k)$.   (May 2015)

19)   Perform Linear convolution of the $x_1[n]$ and $x_2[n]$ sequences using Over-lap add method

$x_1[n] = \{3,-1,0,1,2,3,0,1,1,2\}$ and $x_2[n] = \{1, 1, 1\}$ (June 2014)

20)   Obtain the relationship between DTFT and DFS.   (June 2014)

21)   Compute the DFT of the sequence $x[n] = \{1,2,3,4,3,4,1,2\}$ using DIT FFT algorithm. Write the signal involved.   (June 2014)

22)   Compute IDFT of $X(k) = \{4,-1,0,-1\}$ using FFT techniques.   (June 2014)

23)   Discuss the procedure of computing linear convolution using Over-lap add method.
                                                    (Dec 2013)

24)   Perform Linear convolution of the two sequences x(n) = {1, 2, 3, -1, -2, -3, 4, 5, 6} and h(n) = {2, 1, -1} using Over-lap add method.   (Dec 2013)

25)   Give the general procedure of computing FFT using DIF algorithm and develop the basic butterfly structure and necessary equations.   (Dec 2013)

26)   How the computational speed of FFT algorithm has been improved over DFT.
(Dec 2013)

27)   Find the IDFT of the sequence X(k) given below
X(K)={1,0,0,j,0,-j,0,0}   (April 2018)

28)   Obtain the 10 point DFT of the sequence $x(n) = \delta(n) + 2\delta(n-5)$ (April 2018)

Find the IDFT of the sequence X(k)={20,-5.828-j2.414,0,-0.712-j0.414,0,-0.172+j0.414,0,-5.828+j2.414} using DIT-FFT algorithm.   (April 2018)

29)   Using FFT and IFFT, determine the output of system if input x(n)={2,2,4} and impulse response h(n)={1,1}   (April 2018)

30)   Compute circular convolution for X(n)= {1,2,1,1} and h(n)={1,1,2,2}   (August 2021)

31) Compute DFT for the sequence X(n)= {1,0,1,1,0,1,1,1} using DITFFT (August 2021)

32) What is FFT? Calculate the number of multiplications needed in the calculation of DFT using FFT algorithm with 32 point sequence. (August 2021)

33) Compare DIT FFT and DIF FFT algorithms. (August 2021)

34) Explain any three properties of Z transform. (August 2021)

35) Explain any three properties of DFT. (August 2021)

UNIT-III

2 Marks

1. What is Gibbs phenomenon? (March 2017)

2. Explain the procedure for designing FIR filters using windows. (March 2017)

3. What is warping effect? What is its effect on magnitude and phase response? (March 2017, May 2019, August 2021)

4. Give the equation for Hamming window and Blackman window. (November 2016)

5. What is dead band of a filter? (November 2016)

6. Define impulse response. (May 2016)

7. Define sampling and Nyquist rate (May 2016)

8. Explain the effects of truncating an infinite Fourier series into a finite series. (April2018)

9. What is the condition for the impulse response of FIR filter to satisfy for constant group and phase delay and for constant group delay? (April2018)

10. Write the characteristics of window in FIR filters. (May

2019)

11.   Determine the frequency response of FIR filters defined by

y(n) = 0.5x(n)+x(n-1)+0.5x(n-2).   (May
2019)

5 Marks:

1)   Explain the type -1 FIR filter design procedure using frequency sampling method.

(March 2017, Nov. 2020)

2)   List the features of Blackman window spectrum.   (March 2017)

3)   Explain the design procedure of linear phase FIR filter using Fourier series method.
(March 2017)

4)   Realize the system function $\frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$ by linear phase FIR structure. (Nov 2016)

5)   Explain in detail designing of digital IIR filters using impulse invariant method. (May
2019)

6)   Explain linear phase characteristics of FIR filters.   (May 2019, Nov.2020)

7)   Explain the designing of FIR filters using windows.   (Nov 2016)

8)   Draw and explain frequency response of FIR digital filter.   (May 2016)

9)   List the designing steps of FIR filters using fourier method.   (May
2016)

10)   Design a high pass filter using hamming window with a cut-off frequency of 1.2
radians/second and N=9.   (May 2016)

11)   Design a low pass digital FIR filter using Kaiser Window satisfying the specifications
given below.

   Pass band cut-off frequency = 100 Hz.
   Stop band cut-off frequency = 200 Hz
   Pass band ripple = 0.1dB
   Stop band attenuation =20 dB
   Sampling frequency = 1000 Hz.   (May 2016)

12) Determine the transfer function H(z) of an FIR filter to implement h(n) = $\delta(n) + 2\delta(n-1) + \delta(n-2)$ using frequency sampling techniques.   (May 2015)

13) Give the comparison between FIR and IIR filters with examples. (May 2015,May 2019)

14) Compare FIR and IIR filters.   (June   2014,   August 2021)

15) Design a high pass FIR filter whose cut-off frequency is 1.4 rad/sec and N=5 using Hamming window.   (June 2014)

16) Compare various windowing techniques with respect to side lobes and beam width.

(Dec 2013, Nov 2020)

17) Design an FIR Digital High pass filter using Hanning window whose cutoff freq is 1.2 rad/s and length of window N=9.   (Dec 2013)

18) The desired frequency response of a low pass filter is given   (April 2018)

$$H_d(e^{j\omega}) = \begin{cases} e^{-j\omega} & \frac{-3\pi}{4} \leq \omega \leq \frac{3\pi}{4} \\ 0 & \frac{3\pi}{4} \leq \omega \leq \pi \end{cases}$$

Find $H(e^{j\omega})$ for M=7 using a rectangular window.

19) Explain the type II frequency sampling method of designing an FIR digital filter.

(April 2018)

18) Design a band pass filter which approximates the ideal filter with cutoff frequencies at

0.2 rad/sec and 0.3 rad/sec. The filter order is M=7. Use the Hanning window function.

(April 2018)

20) Design an ideal band pass filter with a frequency response.

(April 2018)

$$H_d(e^{j\omega})=\begin{cases} 1 & \frac{\pi}{4} \le |\omega| \le \frac{3\pi}{4} \\ 0 & otherwise \end{cases}$$

21)   Design an ideal high pass filter using Hanning window with a frequency response.

$$H_d(e^{jw}) = 1 \quad ; \qquad \frac{\pi}{4} \le \omega \le \pi$$
$$= 0 \qquad \qquad |\omega| \le \frac{\pi}{4}$$

Find the values of h(n) for N=11.Find H(z).   (May 2019)
36)   22) Compare various windowing techniques with respect to side lobes and beam width. (August 2021)

UNIT-IV
2 Marks:
1)   Give any two properties of Butterworth low pass filter. (2 marks) (March 2017)

2)   State the properties of IIR filter. (2 marks) (November 2016)

3)   State the methods used to prevent overflow. (3 marks) (November 2016)

4)   What are the advantages of Butterworth filter? (2 marks) (May 2016)

5)   What are the advantages and disadvantages of Chebyshev filter. (3 marks) (May 2016)

6)   What are the properties of Butterworth Low pass filter? (2marks)(April2018)

7)   Discuss   the   stability   of   the   impulse   invariant   mapping   technique. (3marks)(April2018)

8)   Compare Butterworth and Chebyshev filters.   (May 2019)

5 Marks:

1)   What are the steps to design an analog Chebyshev low pass filter.   (March 2017)

2)   Apply bilinear transformation to   (March 2017)

$$H(s) = \frac{2}{(s+1)(s+2)}$$

with T=1 Sec and find H (z).

3) Consider an analog filter with transfer function

$H(s) = \dfrac{1}{(s+1)(s^2+s+1)}$ Is this a Butterworth or Chebyshev filter? Obtain the transfer function of an IIR digital filter using impulse invariant transformation. Assume T = 1 Sec.

(March 2017, Nov 2020)

4) Design a Butterworth high pass filter satisfying:

f_p = 0.32Hz ; α_p = 0.5 dB

f_s = 0.16Hz ; α_s = 30 dB ; F = 1 Hz   (Nov 2016)

5) Discuss the steps in design of IIR filter using bilinear transformation for any one type of filter.   (Nov 2016, Nov 2020)

6) Discuss in detail about spectral transformations.   (May 2016)

7) Explain how IIR digital filters are designed from analog filters.   (May 2016)

8) Compare the impulsive invariance and bilinear transformation methods.

(May 2016)

9) Find the order and poles of a low pass Butterworth filter that has a -3dB bandwidth of 400 Hz and an attenuation of 20dB at 1 KHz.   (May 2016)

10)   Design a digital IIR low pass Butterworth filter that has a 2dB pass band attenuation at a frequency of 300pi rad/sec and at least 60dB stop band attenuation at 4500pi rad/sec. Use backward reference transformation.   (May 2015)

 11) Determine the order and the poles of a type-I low pass Chebyshev filter that satisfies the following constrains

0.8 ≤ |H(w)| ≤ 1; 0 ≤ W ≤ 0.2pi;

And |H(w)| ≤0.2; 0.6pi≤W ≤ pi.   (May 2015)

12) Determine the system function of IIR Butterworth LPF that satisfies the following constrains

0.9≤ |H(jΩ)| ≤ 1;   0 ≤ Ω≤ 0.2π;

|H(jΩ)| ≤0.2;   0.4π ≤ Ω ≤ π.   (May 2019)

13)   For the analog filter with transfer function H(s) = 2(s+1)(s+3), determine H(z) using bilinear transformation technique. Use T =0.1sec.   (June 2014)

14) Explain impulse invariant method of IIR filter design. (June 2014)

15) Explain briefly the frequency response of LTI systems. (Dec 2013)

16) Discuss direct form-I & II IIR realization structures in detail with necessary flow graphs.

(Dec 2013)

17) List out the merits and demerits of Butterworth and Chebyshev filter approximation techniques. (Dec 2013)

18) Prove that the relationship between analog (Ω) and digital (ω) frequency in bilinear transformation is given by $\Omega = (2/T)\, Tan(\omega/2)$ (Dec 2013)

19) Design a digital low pass filter using Chebyshev filter that meets the following specifications: Pass band magnitude characteristics that is constant to within 1 dB for recurrences below $\omega=0.2\pi$ and stop band attenuation of at least 15dB for frequencies between $\omega=0.3\pi$ and π. Use bilinear transformation. (April 2018)

20) An analog filter has the following system function. Convert this filter into a digital filter by using the impulse invariant technique: (April 2018)

$$H(s) = \frac{1}{(s+0.1)^2+9}$$

21) Using a bilinear transformation, design a Butterworth filter which satisfy the following conditions: (April 2018)

$$0.8 \le |H(e^{j\omega})| \le 1 \qquad 0 \le \omega \le 0.2\pi$$
$$|H(e^{j\omega})| \le 0.2 \qquad 0.6\pi \le \omega \le \pi$$

22) Determine H(z) using impulse invariance method for the following system function:

(April 2018)

$$H(s) = \frac{1}{(s + 0.5)(s^2 + 0.5s + 2)}$$

23) What are the steps to design an analog Chebyshev low pass filter? (May 2019)

37) Sketch and explain the magnitude responses of the chebyshev type-1 and type-2 filters. (August 2021)

UNIT-V

2 Marks:

1) What is over flow oscillations? (March 2017)

2) What is the need for anti-aliasing filter prior to down sampling? (March 2017)

3) Give the steps in multistage sampling rate converter design. (November 2016)

4) Write any four applications of Multi – rate signal processing. (November 2016)

5) Define Decimation. (May 2016)

6) What is the need for Multi rate Digital Signal Processing? (May 2016)

7) What is the need for MultiMate Digital Signal Processing? (April2018)

8) What do you mean by quantization step size? (April2018)

9) Define limit cycle oscillations and give its types. (May 2019)

10) Write a short note on dead band. (May 2019)

5 MARKS:

1) What are the effects of finite word length in digital filters? (March 2017)

2) Explain limit cycles in recursive structures. (March 2017)

3) Explain interpolation process with an example. (March 2017)

4) Explain with block diagrams how can sampling rate be converted by a rational factor M/L both in time domain and frequency domain. (March 2017)

5) With respect to finite word length effects in digital filters, explain over flow limit cycle oscillation with example. (Nov 2016)

6) Explain the applications of Multi rate signal processing. (Nov 2016, Nov 2020)

7) What is meant by signal scaling? Explain. (Nov 2016)

8) What are the dead band effects? Discuss. (May 2016)

9) What is mean by sampling rate conversion? Explain. (May 2016)

10) What are limit cycles and discuss various types of limit cycles in brief. (May 2016)

11) Discuss the process of performing sampling rate conversion by an rational

factor I/D.   (May 2016, August 2021)

12) Explain the characteristics of a limit cycle oscillation with respect to the system

described by the equation   Y(n)=0.85y(n-2)+0.72y(n-1)+x(n)

Determine the dead band of the filter x(n) = ¾ δ(n).   (May 2015)

13) Explain about multi rate signal processing and gives its examples. (May 2015)

14) Consider a single stage interpolator with the following specifications:

> Original sampling rate = 1KHz
>
> Interpolation factor L = 2
>
> Frequency of interest = 0 – 150 Hz
>
> Passband ripple = 0.02 dB
>
> Stopband attenuation = 45 db

(i) Draw the block diagram for the interpolator.

ii)   Determine the window type filter length and cutoff frequency, if the window method

is used for the anti imaging FIR filter design. (May 2015)

15) Explain the process of decimation using relevant expression and block diagram.

(June 2014)

16) Explain the implementation of polyphase filter structure for interpolator.

(June 2014)

17) Write notes on:

(a)Limit cycles

(b)   Over flow oscillations

© Dead band effects.   (June 2014, August 2021)

18) Discuss the process of Interpolation by a factor I with a neat block diagram (Dec 2013)

19) Explain the process of Interfacing of digital systems with different sampling rates

with a neat block diagram.   (Dec   2013,   Nov 2020)

20)   Discuss quantization errors occuring in the computation of DFT.   (Dec 2013, Nov 2020)

21)   What are limit cycles and explain the types of it and also give their remedies. (Dec 2013)

22)   Explain the interpolation process for an integer factor I with an example.

(April 2018, Nov 2020)

23)   Given the limit cycle behavior $y(n) = 0.7y(n-2) + 0.52y(n-1) + x(n)$. Find the

dead band   of the above two systems.   (April 2018)

24) The signal x(n) is defined by   (April 2018)

$$g(n) = \begin{cases} A^n & n > 0 \\ 0 & otherwise \end{cases}$$

i)   Obtain the decimated signal with a factor of 3

ii)   Obtain the interpolated signal with a factor of 3

25) Given the system $y(n) = \frac{1}{2}y(n-1) + x(n)$ (April 2018)

i) Calculate the system response to the input x(n)=$(\frac{1}{4})^n$u(n) assuming infinite precision arithmetic.

ii) Calculate the response y(n), $0 \le n \le 5$ to the same input assuming finite precision with five bits, one sign bit plus four fractional bits. The quantization is performed by truncation. Discuss the results.

(26)   Explain the process of decimation using relevant expression and block diagram.

(May 2019)

(27)   Explain with block diagrams how can sampling rate be converted by a rational factor M/L both in time domain and frequency domain. (May 2019)

<u>**PART-A answers**</u>

<u>**UNIT-1**</u>

1. Show that $\delta(n) = u(n) - u(n-1)$. **(2 marks) (April 2018)**

The unit impulse function, δ(n), also known as the Dirac delta function, is defined as:

   δ(n) = 0   for n≠0;
      = undefined for n= 0

and has the following special property: $\delta(n) = u(n) - u(n-1)$
Unit step function is defined as

$u(n)$ =1 for n≥0
   = 0 for n≤0

Shifted unit step function is defined as
$u(n-1)$ =1 for n≥1
   = 0 for n≤1

u(n) − u(n-1)=
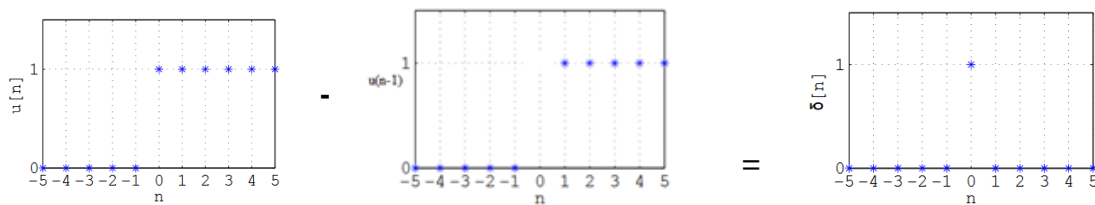
2. Find the z-transform of $f(n) = n^2 u(n)$ **(3 marks) (April 2018)**
Ans: Given $f(n) = n^2 u(n)$

   z-transform of u(n) is

      Z[u(n)]=$\frac{z}{z-1}$

Using differentiation property

$Z[nu(n)] = -z\frac{d}{dz}[\frac{z}{z-1}]$

   =$\frac{z}{(z-1)^2}$

Similarly

$$Z[n^2u(n)] = -z\frac{d}{dz}[\frac{z}{(z-1)^2}]$$

$$= -z\{\frac{(-z-1)(z-1)}{(z-1)^4}\}$$

$$\therefore Z[n^2u(n)] = \frac{z(z+1)}{(z-1)^3}$$

3. What are the applications of digital signal processing? (2 marks) (March 2017)

Digital signal processing (**DSP**) is the use of <u>digital processing</u>, such as by computers, to perform a wide variety of <u>signal processing</u> operations. The signals processed in this manner are a sequence of numbers that represent <u>samples</u> of a <u>continuous variable</u> in a domain such as time, space, or frequency.

Digital signal processing and <u>analog signal processing</u> are subfields of signal processing. DSP applications include <u>audio</u> and <u>speech processing</u>, <u>sonar</u>, <u>radar</u> and other <u>sensor array</u> processing, <u>spectral density estimation</u>, <u>statistical signal processing</u>, <u>digital image processing</u>, signal processing for <u>telecommunications</u>, <u>control systems</u>, <u>biomedical engineering</u>, <u>seismology</u>, among others.

DSP can involve linear or nonlinear operations. Nonlinear signal processing is closely related to <u>nonlinear system identification</u> and can be implemented in the <u>time</u>, <u>frequency</u>, and <u>spatiotemporal domains</u>.

The application of digital computation to signal processing allows for many advantages over analog processing in many applications, such as <u>error detection and correction</u> in transmission as well as <u>data compression</u>. DSP is applicable to both streaming data and static (stored) data.

4. Explain region of convergence and its properties. (3 marks) (March 2017)

The ROC for a given x[n] , is defined as the range of z for which the z-transform converges. Since the z-transform is a power series, it converges when $\sum x[n]z^{-n}$ is absolutely summable. Properties of the Region of Convergence: The Region of Convergence has a number of properties that are dependent on the characteristics of the signal, x[n].

- **The ROC cannot contain any poles.** By definition a pole is a where X(z) is infinite. Since X(z) must be finite for all z for convergence, there cannot be a pole in the ROC.
- **If** x[n] **is a finite-duration sequence, then the ROC is the entire z-plane, except possibly** z=0 **or** |z|=∞.

6. Define decimation and interpolation. (2 marks) (November 2016)?

In digital signal processing, **decimation** is the process of reducing the sampling rate of a signal. The term **down sampling** usually refers to one step of the process, but sometimes the terms are used interchangeably. Complementary to upsampling, which increases sampling rate, decimation is a specific case of sample rate conversion in a multi-rate digital signal processing system. A system component that performs decimation is called a decimator.

When decimation is performed on a sequence of samples of a signal or other continuous function, it produces an approximation of the sequence that would have been obtained by sampling the signal at a lower rate (or density, as in the case of a photograph). The decimation factor is usually an integer or a rational fraction greater than one. This factor multiplies the sampling interval or, equivalently, divides the sampling rate. For example, if compact disc audio at 44,100 samples/second is decimated by a factor of 5/4, the resulting sample-rate is 35,280.

7. State linear and static system with example. (3 marks) (November 2016)

Static systems: Some systems have feedback and some do not. Those, which do not have feedback systems, their output depends only upon the present values of the input. Past value of the data is not present at that time. These types of systems are known as **static systems**. It does not depend upon future values too.

Since these systems do not have any past record, so they do not have any memory also. Therefore, we say all static systems are memory-less systems. Let us take an example to understand this concept much better.

Ex: i. $y(n)=x(n)+x(n-1)$ --- it is not static
     ii. $y(n)=sin[x(n)]$ ---- it is static

A **linear system** follows the laws of superposition. This law is necessary and sufficient condition to prove the linearity of the system. Apart from this, the system is a combination of two types of laws −

- Law of additivity
- Law of homogeneity

i. $y(n)=x(n+1)+x(n-1)$ ----it is linear
ii. $y(n)= x(n)+C$ ----- it is nonlinear

8. Write four advantages of digital signal processing over analog signal Processing? (2 marks) (May 2016)

Advantages of DSP: The advantages of DSP over Analog Signal Processing are:

1. High Accuracy: The accuracy of the analog filter is affected by the tolerance of the circuit components used for design the filter, but DSP has superior control of accuracy.

2. Cheaper: The digital realization is much cheaper than the analog realization in many applications.

3. Flexibility in Configuration: For reconfiguring an analog system, we can only do it by redesign of system hardware; where as a DSP System can be easily reconfigured only by changing the program.

4. Ease of Data Storage: On magnetic media, without the loss of fidelity the digital signals can be stored and can be processed off-line in a remote laboratory.

5. Time Sharing: The cost of the processing signal can be reduced in DSP by the sharing of a given processor among a number of signals.

9. **Show that the frequency response of a discrete system is a periodic function of frequency. (3 marks) (May 2016)**

Note first that $H(\Omega)$ repeats periodically on the frequency (Ω) axis, with period 2π, because a sinusoidal or complex exponential input of the form in Equation

$\qquad$ $x[n] = \cos(\Omega 0n + \theta 0)$,

$\quad$ or

$\qquad$ $x[n] = A0.\exp(\Omega 0n+\theta 0)$ $\qquad$ for all n .

 is unchanged when its frequency is increased by any integer multiple of 2π. This can also be seen from Evaluation, the defining equation for the frequency response. It follows that only the interval $|\Omega| \leq \pi$ is of interest

UNIT-II

1) $\qquad$ **State and prove the any three properties of DFT. (3marks)(April 2018)**

Time Shifting

$$\mathcal{F}[x[m - m_0]] = e^{-jm_0\omega}X(e^{j\omega})$$

Proof:

$$\mathcal{F}[x[m - m_0]] = \sum_{m=-\infty}^{\infty} x[m - m_0]e^{-j\omega m}$$

If we let $m' = m - m_0$, the above becomes

$$\mathcal{F}[x[m - m_0]] = \sum_{m=-\infty}^{\infty} x[m']e^{-j\omega(m'+m_0)} = e^{-j\omega m_0}X(e^{j\omega})$$

Differencing

Differencing is the discrete-time counterpart of differentiation.

$$\mathcal{F}[x[m] - x[m - 1]] = (1 - e^{-j\omega})X(e^{j\omega})$$

Proof:

$$\mathcal{F}[x[m] - x[m - 1]] = \mathcal{F}[x[m]] - \mathcal{F}[x[m - 1]]$$

$$\vdots \quad X(e^{j\omega}) - X(e^{j\omega})e^{-j\omega} = (1 - e^{-j\omega})X(e^{j\omega})$$

Differentiation in frequency

$$\mathcal{F}^{-1}[j\frac{d}{d\omega}X(e^{j\omega})] = m \; x[m]$$

proof: Differentiating the definition of discrete Fourier transform with respect to ω, we get

$$\frac{d}{d\omega}X(e^{j\omega}) \quad \vdots \quad \frac{d}{d\omega}\sum_{m=-\infty}^{\infty} x[m]e^{-j\omega m} = \sum_{m=-\infty}^{\infty} x[m]\frac{d}{d\omega}e^{-j\omega m}$$

$$: \qquad \sum_{m=-\infty}^{\infty} -jmx[m]e^{-j\omega m}$$

2) What is the basic operation of DIF algorithm? (2marks)(April 2018)

- DIFFFT algorithms are based upon decomposition of the output sequence into smaller and smaller sub sequences.
- In this output sequence X(k) is considered to be splitted into even and odd numbered samples

- Splitting operation is done on frequency domain sequence.

- In DIFFFT, input sequence is in natural order. And DFT should be read in bit reversed order.

Example: In DIF N Point DFT is splitted into N/2 points DFT s. X(k) is splitted with k even and k odd this is called Decimation in frequency(DIF FFT).

 N point DFT is given as

$$X(k) = \sum_{n=0}^{N-1} x(n) W_N^{kn} \qquad (1)$$

Since the sequence x(n) is splitted N/2 point samples, thus

$$X(k) = \sum_{m=0}^{N/2-1} x(n)\, W_N + \sum_{m=0}^{N/2-1} x(n+N/2)\, W_N \qquad (2)$$

$$X(k) = \sum_{m=0}^{N/2-1} x(n)\, W_N^{kn} + W_N^{kN/2} \sum_{m=0}^{N/2-1} x(n+N/2)\, W_N^{kn}$$

$$X(k) = \sum_{m=0}^{N/2-1} x(n)\, W_N^{kn} + (-1)^k \sum_{m=0}^{N/2-1} x(n+N/2)\, W_N^{kn}$$

$$X(k) = \sum_{m=0}^{N/2-1} \left[x(n) + (-1)^k x(n+N/2)\; W_N^{k} \right] \qquad (3)$$

Let us split X(k) into even and odd numbered samples

$$X(2k) = \sum_{m=0}^{N/2-1} \left[x(n) + (-1)^{2k} x(n+N/2)\, W_N^{2kn} \right] \qquad (4)$$

$$X(2k+1) = \sum_{m=0}^{N/2-1} \left[x(n) + (-1)^{(2k+1)} x(n+N/2) W_N^{(2k+1)n} \right] \qquad (5)$$

Equation (4) and (5) are thus simplified as

$$g1(n) = x(n) + x(n + N/2)$$
$$g2(n) = x(n) - x(n + N/2) \, W_N{}^n$$

Fig 1 shows **Butterfly computation** in DIF FFT.
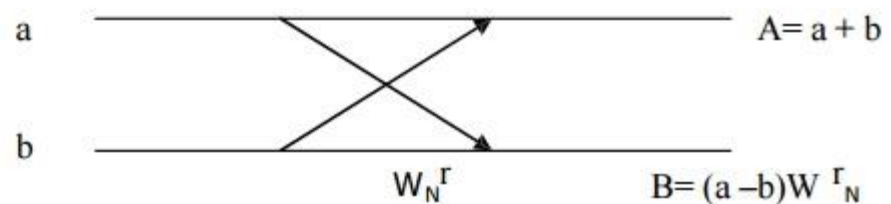
Fig 1. BUTTERFLY COMPUTATION

3) What is zero padding? What are its uses? (2 marks) (March 2017)

Zero-padding a signal increases its **period**. This decreases the spacing(the inverse of the fundamental period) between the DFS(Discrete Fourier Series) coefficients of the signal's periodic summation.

Advantages:

- If length of your sequence doesn't correspond to the size that can be handled efficiently with FFT routine (usually powers of prime numbers) then you might want to add some extra zeros to the nearest power in order to get the maximum speed-up. In worst case you double the memory you need for your signal.
- Adding zeros is equal to interpolating samples of your spectrum with sinc function. Therefore you will find it looking more smoothly. It is not affecting frequency resolution in any way.
- If some peaks were split between two bins, these can be interpolated to some extend and you might be able to retrieve some amplitude information thanks to that.
- If you are trying to plot frequency response of some FIR filter from it's impulse response then you need to add zeros to it. Otherwise you will get as many samples as the length of filter is.
- If you are trying to convolve your signal with some pattern using FFT, then you need to pad your signals with zeros to the appropriate length. Otherwise result of convolution will be incorrect (replicas in frequency domain will overlap).

4)   State and prove time shifting property of DFT. (3 marks) (March 2017)

Timeshifting Property:

$$\mathcal{F}[x[m - m_0]] = e^{-jm_0\omega}X(e^{j\omega})$$

Proof:

$$\mathcal{F}[x[m - m_0]] = \sum_{m=-\infty}^{\infty} x[m - m_0]e^{-j\omega m}$$

If   we   let $m' = m - m_0$,   the   above   becomes

$$\mathcal{F}[x[m - m_0]] = \sum_{m=-\infty}^{\infty} x[m']e^{-j\omega(m'+m_0)} = e^{-j\omega m_0}X(e^{j\omega})$$

5)   If x(n)= cos$\frac{\Pi}{3}$n, find spectra of the signal? (2 marks) (November 2016)

$$x(n) = \cos\frac{\pi n}{3} \qquad \omega_0 = \frac{\pi}{3} \qquad f_0 = \frac{1}{6}$$

Hence x(n) is periodic with fundamental period N=6

$$c_k = \frac{1}{N}\sum_{n=0}^{N-1} x(n)e^{-j2\pi kn/N} = \frac{1}{6}\sum_{n=0}^{5} x(n)e^{-j2\pi kn/6} \quad, k = 0,1,...,5$$

$$x(n) = \cos\frac{\pi n}{3} = \frac{1}{2}e^{j2\pi n/6} + \frac{1}{2}e^{-j2\pi n/6}$$

$$e^{j2\pi n/6} = e^{j2\pi(5-6)n/6} = e^{j2\pi 5n/6} \quad \text{which means that} \quad c_{-1} = c_5$$

$$c_k = \frac{1}{6}\sum_{n=0}^{5}\cos(\frac{n\pi}{3})e^{-j2\pi kn/6} \quad, k = 0,1,...,5$$

$$\cdot \quad \frac{1}{6}\left(1+\cos\frac{\pi}{3}e^{-j2\pi k/6}+\cos\frac{2\pi}{3}e^{-j2\pi k2/6}+\cos\frac{3\pi}{3}e^{-j2\pi k3/6}\right.$$

$$\left.+\cos\frac{4\pi}{3}e^{-j2\pi k4/6}+\cos\frac{5\pi}{3}e^{-j2\pi k5/6}\right), \quad k=0,1,...,5$$

$$\boxed{c_0=0} \quad \boxed{c_1=\frac{1}{2}} \quad \boxed{c_2=0} \quad \boxed{c_3=0} \quad \boxed{c_4=0} \quad \boxed{c_5=\frac{1}{2}}$$

6)   How many multiplications and additions are required to compute N-point DFT using radix – 2 FFT? (3 marks) (November 2016)

Assume N being the no of samples to be present in DFT
1. Complex multiplications = $N/2 \log_2 N$
2. Complex additions = $N \log_2 N$

7)   Give the relation between DTFT and Z- Transform? m. **(2 marks) (May 2016)**

Relationship between DTFT and z-transform

Recall that

- The Discrete-time Fourier transform (DTFT) is $X(\omega)=F[x(n)]=\sum x[n]e^{-j\omega n}$.
- The z-transform is $X(z)=ZT[x(n)]=\sum x[n]z^{-n}$
- So we get X(w) when we replace z with exp(jw) in ZT.

One can obtain the DTFT from the z-transform X(z) by as follows:

$X(z)|z=e^{jw}=X(\omega)$

In other words, if you restrict the z-transoform to the unit circle in the complex

plane, then you get the Fourier transform (DTFT).

8)   Distinguish between linear convolution and circular convolution. (3 marks) (May 2016)

Convolution is a formal mathematical operation, just as multiplication, addition, and integration. Addition takes two numbers and produces a third number, while convolution takes two signals and produces a third signal. Convolution is used in the mathematics of

many fields, such as probability and statistics. In linear systems, convolution is used to describe the relationship between three signals of interest: the input signal, the impulse response, and the output signal. Convolution is an integral concatenation of two signals. It has many applications in numerous areas of signal processing. The most popular application is the determination of the output signal of a linear time-invariant system by convolving the input signal with the impulse response of the system.

Linear convolution is the main function used to calculate the output for the linear time with respect to it's input as well as the impulse response. This convolution is used for infinitesignal.

Circular convolution is also used to calculate output but in this case the system support is always periodic. As the name indicate this is used for finite signal.

Define twiddle factor and give its values for N=4. (2 marks) (May 2019)

Ans: A twiddle factor, in <u>fast Fourier transform</u> (FFT) algorithms, is any of the <u>trigonometric</u> constant coefficients that are multiplied by the data in the course of the algorithm.

$WN = e^{-j2\pi/N}$

For n=4

$W_N = -j$

Unit III

1)   Explain the effects of truncating an infinite Fourier series into a finite series.(2marks)(April 2018)

Ans. The desired frequency response $H_d(e^{j\omega})$ of a filter is periodic in frequency and can be expressed in fourier series. The resultant series is given by

$$H_d(e^{j\omega}) = \sum_{n=-\alpha}^{n=\alpha} h_d(n)e^{-j\omega n}$$

Where

$$h_d(n) = \frac{1}{2\pi} \int_{-\pi}^{\pi} H_d(e^{j\omega}) e^{j\omega n}. d\omega$$

And known as Fourier coefficient having infinite length. One possible way of obtaining FIR filter is to truncate the infinite Fourier series at $n=\pm \left(\frac{N-1}{2}\right)$, where N is the length of the desired sequence. But abrupt truncation of the Fourier series results in oscillations in the pass band and stop band. These oscillations are due to slow convergence of the Fourier series and this effect is known as Gibb's phenomenon. To reduce these oscillations, the Fourier coefficient of the filter are modified b multiplying the infinite impulse response with a finite weighing sequence w(n) called a window where

$$\omega(n) = \omega(-n) \neq 0 \qquad \text{for } |n| \leq \frac{N-1}{2}$$

$$=0 \qquad \text{for } |n| > \frac{N-1}{2}$$

After multiplying window sequence w(n) with $h_d(n)$, we get a finite duration sequence h(n) that satisfies the desired magnitude response

$$h(n) = h_d(n)\, \omega(n) \qquad \text{for all } |n| \leq \frac{N-1}{2}$$

$$=0 \qquad \text{for } |n| > \frac{N-1}{2}$$

2) **What is the condition for the impulse response of FIR filter to satisfy for constant group and phase delay and for constant group delay? (3marks)(April 2018)**

Ans. For linear phase FIR filter to have both constant group delay and constant phase delay

$$\Theta(\omega) = -\alpha\omega \qquad -\pi \leq \omega \leq \pi$$

For satisfying above condition

$$h(n) = h(N-1-n),$$

i.e. the impulse response must be symmetrical about $n = \frac{N-1}{2}$.

If only constant group delay is desired then $\Theta(\omega) = \beta - \alpha\omega$

For satisfying the above condition

H(n)=-h(N-1-n)

i.e. the impulse response is antisymmetrical about $n = \frac{N-1}{2}$

3) **What is Gibbs phenomenon? (2 marks) (March 2017)**

Answer: One possible way of finding an FIR filter that approximates H(ejω)would be to truncate the infinite Fourier series at n= ± (N-1/2).Abrupt truncation of the series will lead to oscillation both in pass band and is stop band .This phenomenon is known as Gibbs phenomenon.

4)   Explain the procedure for designing FIR filters using windows. (3 marks) (March 2017)
Answer: a) Choose the desired frequency response Hd(w)
b)   Take the inverse fourier transform and obtain Hd(n)
c)   Convert the infinite duration sequence Hd(n) to h(n)
d)   Take Z transform of h(n) to get H(Z)

5)   Give the equation for Hamming window and Blackman window. (2 marks) (November 2016)
Answer: Hamming Window - $w(n) = \alpha - \beta(2\pi n/(N-1))$, with $\alpha = 0.54$ and $\beta = 1 - \alpha = 0.46$.
Blackman Window $- w(n) = \alpha_0 - \alpha_1 \cos\left(\frac{2\pi n}{N-1}\right) + \alpha_2 \cos\left(\frac{4\pi n}{N-1}\right), \alpha_0 = \frac{1-\alpha}{2}; \alpha_1 = \frac{1}{2}; \alpha_2 = \alpha/2$.

6)   What is dead band of a filter? (3 marks) (November 2016)
Answer: The limit cycle occur as a result of quantization effect in multiplication. The amplitudes of the output during a limit cycle are confined to a range of values called the dead band of the filter.

7)   Define impulse response. (2 marks) (May 2016)
Answer: The impulse response, or impulse response function (IRF), of a <u>dynamic system</u> is its output when presented with a brief input signal, called an <u>impulse</u>. More generally, an impulse response is the reaction of any dynamic system in response to some external change.

8)   Define sampling and Nyquist rate. (3 marks) (May 2016)
Answer: The process of converting a continuous-time signal into a discrete – time signal is known as sampling.
Nyquist rate is the theoretical minimum sampling rate at which a signal can be sampled and still be recovered from its samples without any distortion.

<u>**Unit IV**</u>

1)   Discuss the stability of the impulse invariant mapping technique.(2marks)(April 2018)

Impulse invariance is a technique for designing discrete-time <u>infinite-impulse-response</u> (IIR) filters from continuous-time filters in which the impulse response of the continuous-time system is sampled to produce the impulse response of the discrete-time system.

Performing a z-transform on the discrete-time impulse response produces the following discrete-time system function

$$H(z) = T \sum_{k=1}^{N} \frac{A_k}{1 - e^{s_k T} z^{-1}}$$

Thus the poles from the continuous-time system function are translated to poles at $z = e^{s_k T}$. The zeros, if any, are not so simply mapped.

Since poles in the continuous-time system at $s = s_k$ transform to poles in the discrete-time system at $z = \exp(s_k T)$, poles in the left half of the s-plane map to inside the unit circle in the z-plane

2)   Give any two properties of Butterworth low pass filter. (2 marks) (March 2017 &April 2018)
Answer: Properties of Butterworth low pass filter are:
1.   It has monotonic amplitude response in both passband and stopband.

2.   Quick roll-off around the cutoff frequency, which improves with increasing order.

3)   What is warping effect? What is its effect on magnitude and phase response? (3 marks)
(March 2017)
Answer: For smaller values of w there exist linear relationship between w and but for larger values of w the relationship is nonlinear. This introduces distortion in the frequency axis. This effect compresses the magnitude and phase response. This effect is called **warping effect.**
The effect of the non linear compression at high frequencies can be compensated. When the desired magnitude response is piecewise constant over frequency, this compression can be compensated by introducing a suitable rescaling or prewar ping the critical frequencies.

4)   State the properties of IIR filter. (2 marks) (November 2016)
Answer: a) The physically realizable IIR filters do not have linear phase.
b) The IIR filter specifications include the desired characteristics for the magnitude response only.

5)   State the methods used to prevent overflow. (3 marks) (November 2016)
Answer: There are two methods used to prevent overflow-
a)   Saturation arithmetic

b)   Scaling

6)   What are the advantages of Butterworth filter? (2 marks) (May 2016)
Answer: The advantage of Butterworth filters is the smooth, monotonically decreasing frequency response in the transition region.

7)   What are the advantages and disadvantages of Chebyshev filter. (3 marks) (May 2016)
Answer: Advantages are:
a)   Chebyshev filters have steeper decline in the band.
b)   Chebyshev filters are used all over the place in electronics.
c)   This type of filter has an all-pole amplitude response with the poles distributed round an ellipse in the complex frequency plane.
d)   This is a simple easy to design filter that has an excellent performance.
Disadvantages are having more distortion in the wavelength frequency available.

UNIT-V

1) What do you mean by quantization step size? (2marks)(April 2018)

After the sampling we have a sequence of numbers which can theoretically still take on any value on a continuous range of values. Because this range in continuous, there are infinitely many possible values for each number, in fact even uncountably infinitely many. In order to be able to represent each number from such a continuous range, we would need an infinite number of digits - something we don't have. Instead, we must represent our numbers with a finite number of digits, that is: after discretizing the time-variable, we now have to discretize the amplitude-variable as well. This discretization of the amplitude values is called quantization.
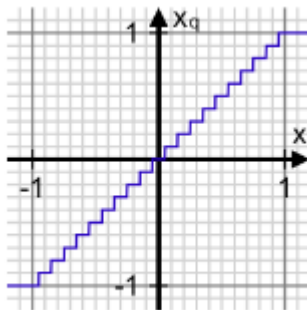
2) What is over flow oscillations? (2 marks) (March 2017)

With fixed-point arithmetic it is possible for filter calculations to overflow. This happens when two numbers of the same sign add to give a value having magnitude greater than one.

Since numbers with magnitude greater than one are not representable, the result overflows. For example, the two's complement numbers 0.101 (5/8) and 0.100 (4/8) add to give 1.001 which is the two's complement representation of −7 / 8.

3) What is the need for anti-aliasing filter prior to down sampling? (3 marks) (March

2017)

An **anti-aliasing filter** (AAF) is a filter used before a signal sampler to restrict the bandwidth of a signal to approximately or completely satisfy the sampling theorem over the band of interest. Since the theorem states that unambiguous reconstruction of the signal from its samples is possible when the power of frequencies above the Nyquist frequency is zero, a real anti-aliasing filter trades off between bandwidth and aliasing. A realizable anti-aliasing filter will typically either permit some aliasing to occur or else attenuate some in-band frequencies close to the Nyquist limit. For this reason, many practical systems sample higher than required to ensure that all frequencies of interest can be reconstructed, a practice called oversampling.

4) Give the steps in multistage sampling rate converter design. (2 marks) (November

2016)

Multiple stages for decimation (or interpolation) can reduce the number of filter coefficients in the filter specifications. The signal can be decimated more than once, using a gradual change in sampling frequency.

Conventional decimation:
x(n)------→ Anti Aliasing Filter(h[n])-------→ Decimation by D----→ y[n]

Decimation in mutliple stages (multistage):
x(n)---→h$_1$ [n]---→ D$_1$ ----→ h$_2$ [n] ----→D$_2$ ----→h$_3$ [n] -----→D$_3$ -------→ y[n].

5) Write any four applications of Multi – rate signal processing. (3 marks) (November 2016)

Applications of Multirate digital signal processing

1) Used for the design of phase shifters

2) Interfacing of digital systems with different sampling rates

3) Implementation of digital filter banks

4) Subband coding of speech signals.

6) Define Decimation. (2 marks) (May 2016)

Multirate DSP consists of:
1. Decimation: It is a process to decrease the sampling rate.
2. Interpolation: It is a process to increase the sampling rate.
 "Downsampling" is a process of removing some samples, without the lowpass filtering. A signal is downsampled only when it is "oversampled"(i.e. sampling rate > Nyquist rate). This combined operation of filtering and downsampling is called "Decimation". To downsample by a factor of M, we must keep every Mth sample as it is and remove the (M-1) samples in between. Ex: To decimate by 4, keep every fourth sample, and remove three out of every four samples.

**7)   What is the need for Multi rate Digital Signal Processing? (3 marks) (May 2016 &
April 2018)**

Multirate systems are building blocks commonly used in digital signal processing (DSP). Their function is to alter the rate of the discrete-time signals, which is achieved by adding or deleting a portion of the signal samples. "Multirate" simply means "multiple sampling rates". A multirate DSP system simply uses more than one sampling rate within the system. In many systems, multrate DSP increases processing efficiency, which reduces DSP hardware requirements. Also, a few systems are inherently multirate, for example, a "sampling rate converter" system that converts an input sampling rate to a different output sampling rate. Multirate systems play a central role in many areas of signal processing, such as filter bank theory and multiresolution theory, they are essential in various standard signal-processing techniques such as signal analysis, denoising, compression and so on.

8)   Define limit cycle oscillations and give its types. (2 marks) (May 2019)

 In some systems, when the input is zero or some non zero constant value the nonlinearities due to the finite precision arithmetic operations often cause periodic oscillations to occur in the output. Such oscillations in recursive systems are called limit cycle oscillations. These oscillations will continue to remain in limit cycle even when the input is made zero. Hence, these limit cycle are also called zero input limit cycles.

Limit cycle operations are of two types –

Limit cycle with fixed output
 Limit cycle with oscillatory output

9)   Write a short note on dead band.(2 marks) (May 2019)

The limit cycles occur as a result of the quantization effects in multiplications. The amplitude of the output during a limit cycle are confined to a range of values that is called the dead band of the filter.

The dead band is given by

$$Dead\ band = \pm \frac{2^{-b}}{1-|a|} = \left[\frac{-2^{-b}}{1-|a|}, \frac{2^{-b}}{1-|a|}\right]$$

Multiple Choice Questions

UNIT I : INTRODUCTION TO DISCRETE TIME SIGNALS AND SYSTEMS

1.   y (n) = x (2n)   [   ]
a) Causal   b) Non-Causal c) Time invariant   d) none

2.   x(-n + 2) is obtained using following operation   [
        ]
a) x (-n) is delayed by two samples   b) x (-n) is advanced by two samples
c) x (n) is shifted left by two samples d) none

3.   The output of anti causal LTI system is   [
        ]
a) y (n) =   b) y (n) =

$$\sum_{K=0}^{\infty} h(k)x(n-k)$$ $$\sum_{K=0}^{n} h(k)x(n-k)$$

c) y (n) =   d) y (n) =

$$\sum_{-\infty}^{-1} h(k)x(n-k)$$ $$\sum_{-\infty}^{\infty} h(k)x(n-k)$$

4.   δ(n-k) * x (n-k) is equal to   [   ]
a) x(n-2k)   b) x(n-k)   c) x(k)   d) none

5.   Given x(n) the y(n) = x(2n − 6) is   [   ]
a) x(n) is Compressed by 2 and shifted by 6   b) x(n) is Compressed by 2 and shifted by 3
c) x(n) is Expanded by 2 and shifted by 3   d) none

6.   Decimation by a factor N is equivalent to   [   ]

a) Sampling x(t) at intervals t_s / N   b) Sampling x(t) at intervals t_sN
c) N fold increase in sampling rate   d) none

7.   In fractional delay, x(n-M/N), specify the order of operation.   [

       ]

a)   Decimation by N, shift by M, Interpolation by N

b)   Shift by M, Decimation by N and Interpolation by N

c)   Interpolation by N, Shift by M and Decimation by N

d)   All are correct

8.   Given g(n) = $\{1, \underset{\uparrow}{2}, 3\}$, find x(n) = g (n / 2), using linear interpolation   [

       ]

a) 1, 0, 2, 0, 3   b) 1, 1, 2, 2, 3, 3   c) 1, 3/2, 2, 5/2, 3   d) none

9.   The h(n) is periodic with period N, x(n) is non periodic with M samples, the output y(n) is
a) Periodic with period N   b) Periodic with period N+M [   ]
c) Periodic with period M   d) none

10. Determine the non causal system   [   ]

a) $y(n) = x(n^2)$ b) $y(n) = \sum_{k=-\infty}^{n} x(k)$
c) $y(n) = x(n) - x(n-1)$ d) $y(n) = nx(n)$

11. Two signals $x_1(n)$={1,2,3,4} and $x_2(n)$={4,3,2,1}, then $x_1(n) + x_2(n)$=   [   ]

a) {2,2,2,2}   b) {3,2,4,1}   c) {1,1,1,1}   d) {5,5,5,5}

12. Identify the dynamic system   [   ]

a) $y(n) = ax^2(n)$ b) $y(n) = ax(n)$ c) $y(n) = ax^2(n) + x(n)$ d) $y(n)$ = x(n)+x(n-1)

13. Find the ROC of signal x(n)=u(n-2)   [   ]

a) $|z| < 1$ b) $|z| > 10$ c) $|z| < 0$ d) $|z| > 1$

14. What is the speed improvement factor in calculating 64 – point DFT of a sequence using direct computation and FFT algorithm   [

       ]

a) 40.33   b) 30.33   c) 10.33   d) 21.33

15. Find the linear convolution of two sequences $x_1(n)$={1,2} and $x_2(n)$={3,4}   [   ]

a) {3,10}   b) {10,3,8}   c) {3,10,8}   d) {3,8,10}

16.Number of complex additions required to calculate Radix – 2 FFT is   [   ]

a) $N - 1$ b) $\frac{N}{2} log_2 N$ c) $N log_2 N$ d) N

17   In the design a IIR Digital filter for the conversion of analog filter in to Digital domain the desirable property is   [   ]

a.   The axis in the s - plane should map outside the unit circle in the z - Plane

b.   The Left Half Plane(LHP) of the s - plane should map in to the unit circle in the Z - Plane

c.   The Left Half Plane(LHP) of the s-plane should map outside the unit circle in the z- Plane

d.   The Right Half Plane(RHP) of the s-plane should map in to the unit circle in the Z - Plane

18   The I I R filter design method that overcomes the limitation of applicability to only Lowpass filter and a limited class of bandpass filters is   [   ]

a.   Approximation of derivatives   b. Impulse Invariance

c.   Bilinear Transformation   d. Frequency sampling

19   In the Frequency Transformations of the analog domain the transformation is [   ]

a.   Low Pass to Lowpass   b. Lowpass to Highpass

c.   Lowpass to Bandpass   d. Lowpass to Bandreject

20   In the Frequency Transformations of the analog domain the transformation is [   ]

a.   Low Pass to Lowpass   b. Lowpass to Highpass

c.   Lowpass to Bandpass   d. Lowpass to Bandreject

ANSWERS

1.b	2.b	3.c	4.b	5.c	6.b	7.c	8.a	9 a	10.a
11.d	12.c	13.d	14.a	15.c	16.b	17.a	18.c	19.b	20a

REALIZATION OF DIGITAL FILTERS:

1. In direct –form II realization the number of memory locations required is more than that of direct form –I realization   [
    ]

2. An LTI system having system function H(z) is stable if and only if all poles of H(z) are out side the unit circle.   [
    ]

3. Relation ship between x(n) and x(z) is ………………..

4. The inverse Z – transform of z/z-a is a^n u(n)   [   ]

5. Digital filters are not realizable for ideal case   [   ]

6.The z-transform of a discrete time signal x(n) is defined as………

7.Relation ship between x(n) and x(z) is ………………..

8.z-transform and roc of the anticausal sequence x(n)={-3,-2,-1,0,1} is ……………

9.A LTI system with the BIBO stable if and only if ROC contains the………….

10.The ROC cannot contain any …………

11.If x(n) is a finite duration ,two sided sequence the ROC is entire Z-plane except at ……….&…………

12.parsevals relation is……….

13.relation between s-plane and z-plane is………..

14……………. Method is used for evaluation of the inverse Z-transform

1. caushy residue theorem is stated as………

2.   ROC of a causal signal is the …………. Of a circle of same radius r

17.The ROC must be a ……….region

18.multiplication property of Z-transform is…………..

19 .Application of z-transform are ………..

20.Inverse of x(z)= z/(z-a)^3 is ……………….

Answers:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
true	false	true	false	false	x(z)	ture	x(z)	r=1	poles
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
cz=0 and 1	magnitude square function	mapping	residue theorem	multiple poles	greater than	unit circle	X(z)h(z)	cascde and df-1	n2an

UNIT II DISCRETE FOURIER TRANSFORM:

1.   Power signal is

a) Periodic   b) aperiodic   c) Continuous   d) none   [   ]

2. W_N^{nK} is

a) $e^{\frac{-j2\Pi K}{N}}$ b) $e^{-j2\Pi nK}$ c) $e^{\frac{-j2\Pi Kn}{N}}$ d) $e^{\frac{2\Pi Kn}{N}}$ [   ]

3.   When the sequence is circularly shifted in time domain by 'm' samples i.e. x((n-m))$_N$ then on applying DFT, it is equivalent multiply sequence in frequency domain by

a) $e^{\frac{j2\Pi Km}{N}}$ b) $e^{\frac{-j2\Pi Km}{N}}$ c) $e^{-j2\Pi Km}$ d) $e^{\frac{-2\Pi Km}{N}}$ [   ]

4.   Multiplication of sequence in time domain, on apply DFT, it corresponds to circular convolution in frequency domain and is given as
            [   ]

a) $x_1(n) \, x_2(n) \xleftarrow{DFT} X_1(K)$ $X_2(K)$ b) $x_1(n) \, x_2(n) \xleftarrow{DFT} X_1(K)X_2(K)$

c) $x_1(n) * x_2(n) \xleftarrow{DFT} X_1(K)$ $X_2(K)$ d) $x_1(n) \, x_2(n) \xleftarrow{DFT} \sum_{K=0}^{N-1} X_1(K)X_2(K)$

5.   Linear convolution of two sequences N_1 and N_2 produces an output sequence of length

a) $N_1 - N_2 + 1$ b) $N_1 + N_2 - 1$ c) $N_1 + N_2 + 1$ d) $2N_1 - N_2 + 1$[   ]

6.   The basic signal flow graph for butterfly computation of DIT-FFT is ……

7.   The Fourier transform of discrete time signal is called ………

8.   FFT's are based on the ……………… of an N-point DFT into successively smaller DFT's.

9.   The Fourier transform of x(n)*h(n) is equal to ………………

10.   Appending zeros to a sequence in order to increase the size or length of the sequence is called ……………

11.   In N-point DFT using radix 2 FFT, the decimation is performed …………… times.

12.   In 8-point DFT by radix 2 FFT, there are …………… stages of computations with ……………… butterflies per stage.

13.   If DFT of x(n) is X(K), then DFT of $W_N{}^{ln}$ x(n) is …………………….

14.   If xp(n) is periodic sequence with period N and DFS[xp(n)]=xp(k) then DFS[xp(n-m)]Is …………

15.The magnitude and phase angle of is ……………….. & ………

16. In linearity property DFT[ax1(n)+bx2(n)]= …………….

17. Fourier transform gives …………… for an A periodic signal

18. Aperiodic sequence xp(n) with fundamental period N can be represented in Fourier transform as ……………..

19……………………. & ……………… are methods used for circular convolution

20.If X(k) is DFT of a sequence x(n),then DFT of imaginary part of x(n) is ………….

ANSWERS

1.a	2.a	3.b	4.b	5.b	6.b	7.adder	8. dierct computation	9. DTFT	10.appending
11.n/2 logn	12.3,2	13.twiddle factor	14.dfs	15.iamg & real	16.a1x1(k)+a2x2(k))	17.energy signal	18.dfs	19.using dft and dft	20.real

FAST FOURIER TRANSFORMS:

1.   The DFT of sequence can be evaluated using …………

2.   In DFT radix-2 FFT … is the name of domain to be decimated

3.   8. DFS is used to find out the spectrum of …………Signals

4.   9. Number of complex multiplication required to calculate Radix-2 FFT is………..

5.   10…………….. is a natural signal

6.   11.A first order LTI system is behaved as…………

7.   12.X(n)*[h(n1)+h(n2)]=………

8.   13.Determine step response of the causal system described by difference equation y(n)=y(n-1)+x(n) is ……….

9.   14.Idft of x(k)=(1,0,1,0) is ………

10.   15…………… is the system function described by the difference equation y[n]=x(n)+2x(n-1)-4x(n-2)+x(n-3)

11.   16. FFT reduces the computation time required to compute ……………

12.   17. For DIT, the input is ………… while the output is in natural order

13.   18………..&……… Are the applications of FFT algorithm

14.   19.The Twiddle factor exponents are a function of the stage index m and is given by …

15.   20.The number of sets or sections of butterflies in each stage is given by ………….

UNIT III: FIR DIGITAL FILTERS :

1.   The Linear Phase symmetric Impulse response having even number of samples cannot be used to design the following filter   [   ]
a) Lowpass   b) Highpass   c) Bandpass   d) Bandstop

2.   The following filter is always stable   [   ]
a) Butterworth filter   b) Chebyshev filter   c) II R filter   d) FIR filter

3.   Which of the filter can be realized in both recursive and non recursive structure?
a) Butterworth filter   b) Chebyshev filter   c) II R filter   d) FIR filter   [   ]

4.   Which filter is free of Limit cycle oscillations when implemented on a finite word length digital system   [   ]
a) Butterworth filter   b) Chebyshev filter   c) II R filter   d) FIR filter

5.   In which filter the memory requirement and execution time are very high[   ]
a) Butterworth filter   b) Chebyshev filter   c) II R filter   d) FIR filter

6.   Which of the following window is used instead of Hanning window for the same main lobe width   [   ]
a) Rectangular window   b) Triangular window
c) Hamming window   d) Kaiser Window

7.   The cascaded form of realization is used   [   ]
a)   When complex poles with absolute magnitude less than one
b)   When complex poles with absolute magnitude greater than one
c)   When complex zeros with absolute magnitude less than one
d)   When complex zeros with absolute magnitude greater than one

8.   In the following window the amplitude of the side lobes is unaffected by the length of the window   [   ]
a) Rectangular window   b)Triangular window
c) Hamming window   d) Kaiser Window

9.   In which of the following windows the transition region is more and stop-band attenuation is less   [   ]
a) Rectangular window   b)Triangular window
c) Hamming window   d) Kaiser Window

10.   The mainlobe width of the Hanning window is twice that of   [   ]

a)Rectangular window   b)Triangular window

c) Hamming window   d)Kaiser window

11.   The Gibbs oscillations are due to   [   ]

a)Abrupt truncation of the Fourier series   b) No truncation of the Fourier series

c) Abrupt termination of the Fourier transform   d) Slow termination of the Fourier series

12.   One of the desirable characteristic of the window is that the central lobe of the

frequency response of the window should contain   [   ]

a)   Most of the energy and should be narrow

b)   Lowest energy and should be narrow

c)   Most of the energy and should be broad

d)   Lowest of the energy and should be broad

13.   In a window the desirable characteristic is that the sidelobes of the frequency response

should [   ]

a)   Increase in energy rapidly as ω tends to π

b)   Decrease in energy rapidly as ω tends to π

c)   Increase in frequency response

d)   Contain most of the energy and should be narrow

14.   Which window has the advantage of flexibility of sidelobe level and N ?   [   ]

a) Rectangular window   b) Triangular window

c) Hamming window   d) Kaiser window

15.   In which filter closed form design equations exist   [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

16.   In which filter all the poles are located at origin   [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

17.   In which filter high selectivity can be achieved by using higher order[   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

18.   Which filter has less flexibility specially for obtaining non-standard frequency

response?   [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

19.   Which filter design methods are iterative procedures that require powerful

Computational facilities for Implementation   [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

20.   Frequency sampling method is suitable for   [   ]

a)   Broad band frequency selective filters   b) Narrow band frequency selective filters

b)   Passband frequency selective filters   d) Stopband frequency selective filters

21.   The frequency sample method can be improved by   [   ]

a) Introducing the stopband   b) Introducing ripples

c) Introducing the transition samples   d) Eliminating the transition samples

22.   In the frequency sampling method the Peak sidelobe level can be reduced by

a) Increasing Transition width   b) Decreasing Transition width [   ]

c) Increasing Ripples   d) Decreasing Ripples

23.   In which of the following filter the errors due to round off noise are more [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

24.   In which of the following filter the poles are placed any where inside the Unit circle

and not always stable is   [   ]

a) FIR Filter   b) II R Filter   c) Butterworth   d) Chebyshev

ANSWERS

1.b	2.d	3.d	4.d	5.d	6.c	7.c	8.a	9.b	10.a	11.a	12.a
13.b	14.d	15.b	16.a	17.a	18.b	19.a	20.b	21.c	22.a	23.b	24.b

UNIT IV :IIR FILTERS:

1.   The magnitude response of the following filter decreases monotonically as frequency

increases   [   ]

a)Butterworth Filter   b.)Chebyshev type – 1   c.)Chebyshev type – 2   d) FIR Filter

2.   The transition band is more in   [

       ]

a)Butterworth Filter   b) Chebyshev type - 1 c) Chebyshev type - 2   d) FIR Filter

3.   The poles of Butterworth filter lies on   [   ]

a)sphere   b) circle   c)ellipse   d)parabola

4.   I I R digital filters are of the following nature   [   ]

a)Recursive   b)Non Recursive   c)Reversive   d)Non Reversive

5.   In I I R digital filter the present output depends on   [   ]

a)Present and previous Inputs only   b)Present input and previous outputs only

c)Present input only   d) Present Input, Previous input and output

6.   Which of the following is best suited for I I R filter when compared with the FIR filter

a)Lower sidelobes in stopband   b)Higher Sidelobes in stopband   [   ]

c)Lower sidelobes in Passband   d)No sidelobes in stopband

In the case of I I R filter which of the following is true if the phase distortion is tolerable   [ ]

a)More parameters for design   b) More memory requirement c)Lower

computational Complexity   d)Higher computational complexity

7.   A causal and stable I I R filter has   [   ]

a)Linear phase   b)No Linear phase   c)Linear amplitude   d) No Amplitude

8.   Neither the Impulse response nor the phase response of the analog filter is Preserved

in the digital filter in the following method   [   ]

a)The method of mapping of differentials   b)Impulse invariant method

c)Bilinear transformation   d)Matched Z - transformation technique

9.   Out of the given I I R filters the following filter is the efficient one   [   ]

a)Circular filter   b)Elliptical filter   c)Rectangular filter   d)Chebyshev filter

10.   What is the disadvantage of impulse invariant method   [   ]

a)Aliasing   b)one to one mapping   c) anti aliasing d) warping

11.   Which of the I I R Filter design method is antialiasing method?   [   ]

a)The method of mapping of differentials   b) Impulse invariant method

c) Bilinear transformation   d) Matched Z - transformation technique

12.   The nonlinear relation between the analog and digital frequencies is called [ ]

a) aliasing   b) warping   c) prewarping   d) antialiasing

13.   The most common technique for the design of I I R Digital filter is   [   ]

a) Direct Method   b) In direct method   c) Recursive method   d) non recursive method

14. In the design a IIR Digital filter for the conversion of analog filter in to Digital domain the desirable property is   [   ]

a)The axis in the s - plane should map outside the unit circle in the z - Plane

b)The Left Half Plane(LHP) of the s - plane should map in to the unit circle in the Z - Plane

c.) The Left Half Plane(LHP) of the s-plane should map outside the unit circle in the z-Plane

d.) The Right Half Plane(RHP) of the s-plane should map in to the unit circle in the Z - Plane

15. The I I R filter design method that overcomes the limitation of applicability to only Lowpass filter and a limited class of bandpass filters is   [   ]

a) Approximation of derivatives   b) Impulse Invariance

c) Bilinear Transformation   d) Frequency sampling

16. In the Frequency Transformations of the analog domain the transformation is [   ]

a) Low Pass to Lowpass   b) Lowpass to Highpass

c) Lowpass to Bandpass   d) Lowpass to Bandreject

17. Frequency Transformations in the Analog domain and in the Digital domain will yield

a) Same Results   c) Different results for Bilinear Transformation   [   ]

b) Different Results   d) Different Results except Bilinear Transformation

18. In the Impulse Invariance method the mapping from analog frequency Ω to the digital frequency ω is   [   ]

a) one to one   b) one to many   c) many to many   d) many to one

19. A discrete impulse function is applied to the inputs of four different filters. The output sequences of these filters are listed below. Which one of these filters has a pole outside the unit circle?   [   ]

a) {1, 2, 3, 4, 5, 6, 0, 0, 0, ... }   b) {1, - 1, 1, - 1, 1, - 1, ... }

c) {1, 2, 4, 8, 16, ... }   d) {1, 0.5, 0.25, 0.125, ... }

20. A discrete impulse function is applied to the inputs of four different filters. For each of the output sequences that follow, state whether the filter is nonrecursive. [ ]

a) {1, 2, 3, 4, 5, 6, 0, 0, 0 ..... }   b) {1, -1, 1, -1, 1, -1 ..... }

c) {1, 2, 4, 8, 16 ..... }   d) {1, 0.5, 0.25, 0.125, ... }

21. A filter has the difference equation: y(nt-2T)+x(nT)+x(nT-T). What traditional filter type best describes this filter?   [   ]

a) Integrator   b) differentiator   c) subtractor   d) multiplier

UNIT V: MULTIRATE SIGNAL PROCESSING:

1.   When the input rate F_X is greater than the output rate F_y in the sampling rate
Conversion the Lowpass filter acts as
a) anti - aliasing pre filter   b) anti - imaging post filter
c) anti - aliasing post filter   d) anti - imaging pre filter

2.   When the input rate F_X is greater than the output rate F_y in the sampling rate
Conversion the Lowpass filter removes the spectral replicas at multiples of
a)F_X b) IF_X c) F_y d) IF_y

3.   An Increase in the sampling rate by an integer factor I can be accomplished by
interpolating
a)I - 1 samples between successive values   b) I - 1 samples between alternate values
c) I - 2 samples between successive values   d) I - 2 samples between alternate values

4.   For the sampling rate conversion process by a factor of   the processes are
a)   First Interpolation and then decimation
b)   First Decimation and then Interpolation
c)   First Extrapolation and then Decimation
d)   First Decimation and then Extrapolation

5.   In the Sampling rate conversion both the up sampling filter and down sampling filters
can be replaced with a single
a) Highpass filter   b) Bandpass filter   c) Lowpass filter   d) Bandstop

6.   Sampling rate conversion by any rational factor can be obtained with
a) only decimation   b) only interpolation
c) only extrapolation   d) decimation and Interpolation

7.   The Process of sampling rate conversion is
a) Only Resampling   b) Only Reconstruction
c) Resampling after Reconstruction   d) Reconstruction after Resampling

8.   In the decimation process, the down sampling operation in combination with filtering on a linear time invariant system results in
a) linear time invariant   b) Linear time variant
c) Non Linear time invariant   d) Nonlinear time - invaraint

9.   The Implementation of sampling rate conversion requires the use of the following Filter
a) Linear time - invariant filter   b) Linear time - variant filter
c) Non Linear time - Invariant filter   d) Non Linear time - variant filter

10.   In the Down sampling process the frequency range of the input signal
a) stretches by a factor D   b) compresses by a factor D
c) stretches by a factor 2D   d) compresses by a factor 2D

11.   Which of the following is not an application of multirate Digital signal processing?
a) Digital filter banks   b) Subband coding
c) Broadband filters   d) Transmultiplexers

12.   The CIC filter structure is
a) Combinational Impulse Cascade   b) Cascade Integrator Comb
c) Cascade Impulse Comb   d) Combinational Integarted Impulse

13.   For the development of Polyphase decimator which of the following is used
a) Commutator b) Decommutator   c) Communicator   d) Transmitter

14.   For the efficient software Implementation of Rational sampling rate conversion the following filter is used
a) II R filter   b) FIR filter   c) Butterworth filter   d) Chebyshev filter

15.   When the output rate F_y is greater than the output rate F_x in the sampling rate Conversion the Lowpass filter removes the spectral replicas at multiples of
a) F_x b) $I F_x$ c) F_y d) $I F_y$

16.   When the output rate F_y is greater than the output rate F_x in the sampling rate Conversion the Lowpass filter acts as
a) anti - aliasing prefilter   b) anti - imaging postfilter
c) anti - aliasing postfilter   d) anti - imaging prefilter

17.   Polyphase filter Structures are used for
a) Up sampling   b) Down sampling
c) Sampling Rate Conversion   d) anti - aliasing

18.   The Polyphase filter structures are suitable for
a) FIR Filters   b) II R Filter   c) FIR and II R filters   d) analog filter

19. The order of the sampling rate converter and a linear time - invariant system can be interchanged by changing
a) Upsampling rate   b) Down sapling rate
c) Filter system function   d) Input function
20. Polyphase filter Structures are used for
a) Up sampling   b) Down sampling
c) Sampling Rate Conversion   d) anti - aliasing

ANSWERS

1.a	2.c	3.a	4.a	5.c	6.d	7.c	8.b	9. b	10.a
11.c	12b	13a	14.b	15.a	16.b	17.c	18.c	19.c	20.c

FINITE WORD LENGTH EFFECTS:

1.   Conversion of a continuous time signal into a digital value produces ……………..

2.   Errors arising from quantization are …………. & ……………

3.   In two's compliment numbers negative number is obtained by ………….. all the bits of the positive number and adding one to……………….

4.   Common methods of quantization are ………….&…………..

5.   From the assumptions of the effects of rounding in digital filter error sequence e(N) is ………….. signal

6.   Quantization step size …………….

7.   Three quantization errors in finite word length registers are………………….

8.   …………… realization is less sensitive to process of quantization

9.   Methods used to prevent over flow are………..

10. A/D converter output is sum of …………&……………

11. for two's complement truncation p(e)=…………

12. The quantization error is given by……………..

13. In one's compliment representation the error for truncation of positive values of the mantissa is…………

14.(11)2*11(2)=…………

15.the finite coefficients are computed to ……………….. in the theory

16.the quantization error leads to………..

17……………. Occurs as a result of the quantization effects in multiplication

18.The amplitudes of the outputs during limit cycles are confined to range of values called as…………

19.when a stable IIR digital filter is excited by a finite input sequence the output will ideally decay to…………..

20.Application of DFT in Dsp are…………

ANSWERS

			4.truncation ,rounding	5.white noise
1.Input quantization error	2.Round off ,Limit cycle oscillations	3.complementing ,least significant bit		
6.(range of noise)/(no. of quantization levels)	7.i/p quantization errors, coefficient quantization errors, product quantization errors	8.cascade form	9.saturation arthimatic,scaling	10.input signal x(n),error signal
11.p(e)=1/q	12.e(N)=x.q(n)-x(n)	13.0>=mt-m>-2^b	14.(1001)2	15.infinite precision
16.instability	17.limit cycles	18.dead band	19.zero	20spectral analysis and digital filtering

(18MC0CS01) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

COURSE INFORMATION SHEET

Programme: ECE	Degree: B. Tech
Course: Fundamentals of Artificial Intelligence	Semester: II CREDITS: 0
Course Code: 18MC0CS01 Regulation: R18	Course Type: Mandatory
Course Area/Domain: Mathematics	Contact Hours/ Week: 3(Tutorial)
Corresponding Lab Course Code (If any): N/A	Lab Course Title: N/A

Syllabus

IIIYear B.Tech.ECE Sem - II   L   T   P   C

                                                      3   1   0   0

(18MC0CS01) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

UNIT- I

Introduction – What is artificial intelligence, foundations of artificial intelligence, history of artificial intelligence Intelligent Agents – agents and environments, the structure, good behavior: the concept of rationality, the nature of environments, the structure of agents.

UNIT - II

Solving Problem by Searching – Problem solving agents, example problems, searching for solutions.

Uninformed Search Strategies – Breadth first search, uniform-cost search, depth first search, depth limited search, iterative deepening search, bidirectional search, comparing uninformed search strategies.

UNIT - III

Logical Agents – Knowledge-based agents, the wumpus world, logic, propositional logic: the very simple logic. Knowledge Representation – Introduction, approaches to knowledge representation-relational knowledge, knowledge represented as logic, procedural knowledge, knowledge representation using semantic networks, inheritance in semantic net.

UNIT - IV

Expert System & Applications – Introduction, phases in building expert systems-knowledge engineering, knowledge representation, expert systems architecture-knowledgebase, inference engine, knowledge acquisition, expert systems versus traditional systems-characteristics of expert systems, evolution of expert systems, advantages and disadvantages of expert systems, languages for es development., applications of expert systems.

UNIT - V

Machine Learning Paradigm – Introduction, machine learning system-components of learning system, rote learning, learning by taking advice.

Supervised & Unsupervised Learning – supervised concept learning, unsupervised concept learning, reinforcement learning.

TEXT BOOKS:

1.Artificial Intelligence-A Modern Approach, 3rd Edition, Stuart J. Russel, Peter Marvin, Pearson Education.

2.Artificial Intelligence, Saroj Kaushik, Cengage Publication

REFERENCE BOOKS:

1.Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair

2.Principles of Artificial Intelligence, Nils J. Nilson.

3.Artificial Intelligence, 3rd Edition, Patric Henry Winston, Pearson Education.

4.Artificial Intelligence Illuminated, Ben Coppin, Narosa Publication

Model Lesson Plan/Consolidated Unit Wise Lesson Plan

Subject	(18MC0CS01) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE			
Faculty	MEGHA DABAS			
Text Books (to be acquired by the Students)				
Book 1	Artificial Intelligence-A Modern Approach, 3rd Edition, Stuart J. Russel, Peter Marvin, Pearson Education			
Book 2	Artificial Intelligence, Saroj Kaushik, Cengage Publication			
Reference Books				
Book 3	Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair			
Book 4	Principles of Artificial Intelligence, Nils J. Nilson			
Book 5	Artificial Intelligence, 3rd Edition, Patric Henry Winston, Pearson Education.			
Book 6	Artificial Intelligence Illuminated, Ben Coppin, Narosa Publication			

Unit	Topic	Chapters		No of Classes
		Book 1	Book 2	
I	Artificial Intelligence, Intelligent Agents	1	—	16
II	Solving Problem by Searching	1	—	15
III	Logical Agents	—	1	10
IV	Expert System & Applications	2	2	12

V	Machine Learning Paradigm	—	2	7
Contact classes for syllabus coverage				60
Descriptive Tests				02
Remedial Classes				02
Tutorial classes				16
Total classes				80

MICRO LESSON PLAN

S.No.	Name of the Topic	No. of Classes required	Cumulative number of periods	Teaching AID
1	Course Objective and Course Outcomes: Explaining	1	1	PPT/E-Board
UNIT I				
2	Introduction - What is artificial intelligence	2	3	PPT/E-Board
3	Foundations of artificial intelligence	2	5	PPT/E-Board
4	History of artificial intelligence	1	6	PPT/E-Board
5	Intelligent Agents – agents and environments	2	8	PPT/E-Board
6	Agents Structure	2	9	PPT/E-Board
7	Agents good behaviour	2	11	PPT/E-Board
8	The concept of rationality	2	14	PPT/E-Board
9	The nature of environments	1	15	PPT/E-Board
10	The structure of agents	1	16	PPT/E-Board
UNIT II				
11	Solving Problem by Searching	2	18	E-Board
12	Problem solving agents	2	20	E-Board

13	Example problems,	2	22	E-Board
14	Searching for Solutions.	2	24	PPT/E-Board
15	Uninformed Search Strategies	1	25	PPT/E-Board
16	Breadth first search	1	26	PPT/E-Board
17	Uniform-cost search	1	27	PPT/E-Board
18	Depth first search	1	28	E-Board
19	Depth limited search	1	29	E-Board
20	Iterative deepening search, Bidirectional search	1	30	PPT/E-Board
21	Comparing uninformed search strategies	1	31	E-Board
Descriptive Test I				
UNIT III				
22	Logical Agents - Knowledge-based agents	2	33	E-Board
23	The wumpus world	2	35	PPT/E-Board
24	Propositional logic: The very simple logic	1	36	PPT/E-Board
25	Knowledge Representation - Introduction	1	37	E-Board
26	Approaches to knowledge representation-relational	1	38	PPT/E-Board
27	Knowledge represented as logic	1	39	PPT/E-Board
28	Procedural knowledge	1	40	PPT/E-Board
29	Knowledge representation using semantic networks Inheritance in	1	41	PPT/E-Board
UNIT IV				
31	Expert System & Applications	1	42	E-Board
32	Introduction, phases in building expert systems	1	43	PPT/E-Board
33	Knowledge engineering, knowledge representation	1	44	PPT/E-Board
34	Expert systems architecture-knowledgebase	1	45	PPT/E-Board
35	Inference engine	1	46	PPT/E-Board
36	Knowledge acquisition	1	47	PPT/E-Board

37	Expert systems versus traditional systems	1	48	PPT/E-Board
38	Characteristics of Expert Systems	1	49	PPT/E-Board
39	Evolution of Expert Systems	1	50	PPT/E-Board
40	Advantages and disadvantages of	1	51	PPT/E-Board
41	Languages for es development	1	52	PPT/E-Board
42	Applications of expert systems	1	53	PPT/E-Board
UNIT V				
43	Machine Learning Paradigm Introduction	1	54	E-Board
44	Machine learning system	1	55	PPT/E-Board
45	Components of learning system	1	56	PPT/E-Board
46	Rote learning, learning by taking advice	1	57	PPT/E-Board
47	Supervised & Unsupervised learning	1	58	PPT/E-Board
48	Supervised concept learning, unsupervised concept learning	1	59	PPT/E-Board
49	Reinforcement learning	1	60	PPT/E-Board
Descriptive Test II				

Total Hours	60
Tutorial Classes	16
Descriptive Tests	02
Remedial Classes	02
Total Number of Classes	80

ASSIGNMENT Questions

UNIT-I

1. Design a medical diagnosis system using PEAS factors.

2. Illustrate utility based agent with an example.

3. Describe the fundamental concepts of AI.

4. Distinguish a) simple reflex agent and model based reflex agent.

5. Analyze the Characteristic of intelligent Agents with example.

UNIT-II

1. Develop algorithms for Depth first and Breadth First search algorithms?

2. Describe the following uninformed i) Iterative Deepening Depth First Search ii) Bidirectional Search.

3. Explain 8-Queen problem formulation.

4. Compare Depth-First search and Bidirectional search and support your views?

5. Can you apply the facts to describe Iterative deepening depth first search?

UNIT-III

1. Explain the method of representing simple facts in logic.

2. State various ways of representing ISA and Instance Relationship.

3. What are the issues in Knowledge Representation? Explain in detail.

4. Draw and describe the semantics network representation with example

5. Explain in detail the connectives used in propositional logic.

UNIT-IV

1. Write short notes on

   i)Inference engine

   ii)knowledge acquisition

   iii)Knowledge base System

2. Write short notes on

   i) Capabilities of the Expert System

   ii) Limitations of Expert System

3. List out development languages for expert system development along with example.

4. What are steps for evolution of expert systems? Explain with example.

5. Compare and Contrast   expert systems versus traditional systems.

UNIT-V

1. Describe the components of a machine learning framework

2. Explain Reinforcement learning concept with the help of example

3. What is clustering? Describe the main algorithm used for clustering.

4. Write the various application of machine learning5. Write short notes on

 i) Learning by Parameter Adjustment. ii) Learning with Macro-Operators. iii) Learning by Analogy.

Question Bank / Previous Question Papers questions

BTL- Blooms Taxonomy Level

Level 1 - Remembering

Level 2 - Understanding

Level 3 - Applying

Level 4 - Analyzing

Level 5 - Evaluating

Level 6 - Creating

S.No.	Questions	BTL level	Course Outcome

Unit – I

Part – A

	Generalize what is a rational agent?	2	CO1
	Define Artificial Intelligence.	1	CO1
	What are the applications of AI?	1	CO1
4.	Define an agent? With an example.	1	CO1
5.	List the agent types.	1	CO1
6.	What are the limitations of AI?	1	CO1
7.	Access what is meant by a Turing Test?	2	CO1
8.	Order the different type of agents.	2	CO1
9.	Analyze how to measure the performance of an agent?	2	CO1
10.	List the properties of environments.	1	CO1

PART-B

1.	Design a medical diagnosis system using PEAS factors.	3	CO1
2.	a) Illustrate utility based agent with an example.	2	CO1
	b) Describe the model based reflex agent.		
3.	Explain environment types with an example.	2	CO1
4.	Describe the fundamental concepts of AI.	2	CO1
5.	Explain the history of AI.	2	CO1
6.	Distinguish a) simple reflex agent and model based reflex agent.	3	CO1
	b) Single agent and multiple agent.		
7.	Write a note on learning agent.	2	CO1
8.	Will you state or interpret in your own words PEAS description for a Vacuum cleaner?	2	CO1
9.	How did you describe PEAS description for at least four agent types?	1	CO1
10.	Analyze the characteristic of intelligent agents with example.	3	CO1

UNIT-II

PART-A

1.	State the advantages of breadth first search.	2	CO2
2.	Define the following terms	1	CO2
	a) Goal test b) Path		
3.	What is search? What are the steps for problem solving?	1	CO2
4.	Define initial state and state space.	1	CO2
5.	Compare BFS and DFS.	2	CO2
6.	What are the properties of DFS.	1	CO2
7.	Give example for real world and toy problems.	2	CO2
8.	Express the ways to formulate a problem?	2	CO2
9.	List some of the uninformed search techniques.	1	CO2
10.	Access the depth-limited search.	2	CO2

PART-B

1.	Discuss the algorithms for Depth first and Breadth First search algorithms.	2	CO2
2.	Explain any two uninformed Search Strategies.	2	CO2
3.	Show the performance measure of various search algorithms.	2	CO2
4.	Describe the following uninformed i) Iterative Deepening Depth First Search ii) Bidirectional Search	2	CO2
5.	Discuss in detail the uninformed search strategies and compare the analysis of various searches.	2	CO2
6.	Explain the properties of DFS and DLS.	1	CO2
7.	Explain 8-Queen problem formulation.	1	CO2
8.	Compare Depth-First search and Bidirectional search and support your views?	2	CO2

9.	explain depth limited search in detail with suitable example?	2	CO2
10.	Can you apply the facts to describe iterative deepening depth first search? Discuss.	3	CO2

UNIT-III

PART-A

1	What is Tautology? Give example.	1	CO3
2	List the elements of propositional logic.	1	CO3
3	Describe the types of knowledge based agents.	2	CO3
4	What are the properties of good knowledge representation system?	1	CO3
5	Give steps to apply declarative approach for KBA.	1	CO3
6	Express 'I will visit my friend's house if and only if she visits me' in propositional logic.	2	CO3
7	Define semantic net. Give example.	2	CO3
8	Find the resolvent of following sets i) { P V ~Q, Q V R V S} ii) {P, Q, P V Q}	3	CO3
9	Translate the sentence into proposition formulae: I spend money only when I buy clothes or I buy vegetables.	3	CO3
10	List operations of knowledge base agent.	2	CO3

PART-B

1	Explain the method of representing simple facts in logic.	2	CO3
2	State various ways of representing ISA and instance relationship.	2	CO3
3	What are the issues in knowledge representation? Explain in detail.	2	CO3
4	Differentiate procedural and declarative knowledge.	2	CO3
5	differentiate forward and backward reasoning.	2	CO3
6	Compare procedural and declarative knowledge.	2	CO3
7	Describe forward chaining system.	2	CO3

8	What are limitations in using propositional logic to represent the knowledge base? Discuss.	2	CO3
9	Explain in detail the connectives used in propositional logic.	2	CO3
10	Draw and describe the semantics network representation with example.	3	CO3

UNIT-IV

PART-A

1	List out the expert system applications.	1	CO4
2	Give characteristics of expert systems.	2	CO4
3	What is knowledge acquisition?	1	CO4
4	Define expert system with components.	1	CO4
5	Describe about the participants in developments of expert systems.	2	CO4
6	Summarize the capabilities of Expert systems.	2	CO4
7	How inference engine different from knowledge base? Give reasons.	2	CO4
8	How many phases in building expert systems? Justfy with one example.	2	CO4
9	Why error possibilities are less if the KB contains correct knowledge.	2	CO4
10	Like a human being, why expert systems cannot produce a creative output for different scenarios? Justify.	2	CO4

PART-B

1	Draw the expert systems architecture-knowledgebase? Explain in detail.	2	CO4
2	Describe about phases in building expert systems-knowledge engineering.	2	CO4
3	Compare and contrast expert systems versus traditional systems.	2	CO4
4	Explain about characteristics of expert systems in detail.	2	CO4
5	What are steps for evolution of expert systems? Explain with example.	2	CO4
6	Give advantages and disadvantages of expert systems.	2	CO4

7	List out development languages for expert system development along with example.	2	CO4
8	Explain applications of Expert systems with example.	2	CO4
9	Write short notes on i) Capabilities of the Expert System	2	CO4
	ii) Limitations of Expert System		
10	Write short notes on	2	CO4
	Inference engine		
	knowledge acquisition		
	Knowledge base System		

UNIT-V

PART-A

1	Define rote learning.	1	CO5
2	What is learning by taking advice?	2	CO5
3	Define supervised learning.	1	CO5
4	Define unsupervised learning.	1	CO5
5	Define reinforcement learning.	1	CO5
6	What do you understand be training set and test set?	2	CO5
7	What do you understand by machine learning?	2	CO5
8	What is memorization?	1	CO5
9	How is classification different from regression?	2	CO5
10	What is learning?	1	CO5

PART-B

1	Describe the components of a machine learning framework.	2	CO5
2	What are the difference between supervised and unsupervised learning? Explain.	2	CO5
3	Explain reinforcement learning concept with the help of example.	2	CO5

4	What is clustering? Describe the main algorithm used for clustering.	2	CO5
5	Compare and contrast classification and regression.	2	CO5
6	Write the various application of machine learning.	2	CO5
7	Write short notes on i) Learning by Parameter Adjustment ii) Learning with Macro-Operators iii) Learning by Analogy	2	CO5
8	Compare and contrast regression and classification.	2	CO5
9	Describe the different types of methods in the learning.	2	CO5
10	How is artificial intelligence and machine learning related? Justify with examples.	2	CO5

MULTIPLE CHOICE QUESTIONS

UNIT-1

1.Which particular generation of computers is associated with artificial intelligence?

Second

Fourth

Fifth

Third

2. The characteristics of the computer system capable of thinking, reasoning and learning is known is

machine intelligence

human intelligence

artificial intelligence

virtual intelligence

3. Which of the following is not Properties of Environment?

Discrete / Continuous

Static / Dynamic

Deterministic / Non-deterministic

No agent / Multiple agents

4. What among the following is/are not the example of the intelligent agents ?

Human

Robot

Autonomous spacecraft

Hardware

5. Chess is example of which properties ?

Discrete

Continuous

Episodic

Non-deterministic

6. The conference that launched the AI revolution in 1956 was held at:

Dartmouth

Harvard

New York

Stanford

7. An agent is composed of _____

Architecture

Agent Function

Perception Sequence

Architecture and Program

8. What of the following is considered to be a pivotal event in the history of AI

1949, Donald O, The organization of Behaviour,

1950, Computing Machinery and Intelligence.

1956, Dartmouth University Conference Organized by John McCarthy

1961, Computer and Computer Sense.

9. Which of the given language is not commonly used for AI?

LISP

PROLOG

Python

Perl

10. Turing is an example of _____.

Systems that thinks like human

Systems that thinks rationally.

Systems that act like human

Systems that act rationally

11. What is an AI?

Making a Machine intelligent

Putting your intelligence into Computer

Programming with your own intelligence

putting more memory into Computer

12. What is meant by agent's percept sequence?

Used to perceive the environment

Complete history of actuator

Complete history of perceived things

None of the mentioned

13. Which environment is called as semi dynamic?

Environment does not change with the passage of time

Agent performance changes

Environment will be changed

Environment does not change with the passage of time, but Agent performance changes

14. What kind of environment is crossword puzzle?

Static

Dynamic

Semi Dynamic

None of the mentioned

All of the mentioned

15. The first AI programming language was called :

BASIC

FORTRAN

IPL

LISP

16. Rational agent always does the right things.

Yes

No

17. A.M. turing developed a technique for determining whether a computer could or could not demonstrate the artificial Intelligence, Presently, this technique is called _____

Turing Test

Algorithm

Boolean Algebra

Logarithm

18. What is the action of task environment in artificial intelligence?

Problem

Solution

Agent

Observation

19. Which of these is agent's perceptual inputs at a given instance.

Behavior of Agent

Percept

Percept Sequence

Agent Function

20. What are the main goals of AI?

To Create Expert Systems

To Implement Human Intelligence in Machines

To extract data

None of the Above

UNIT-2

1. Which search is implemented with an empty first-in-first-out queue?

Depth-first search

Breadth-first search

Bidirectional search

None of the mentioned

2. Which search implements stack operation for searching the states?

Depth-limited search

Depth-first search

Breadth-first search

None of the mentioned

3. State space is…

Representing your problem with variable and parameter

Problem you design

Your Definition to a problem

The whole problem

4. Breadth-first search always expands the _____ node in the current fringe of the search tree.

Shallowest

Child node

Deepest

Minimum cost

5. The main function of problem-solving agent is to_____.

Solve the given problem and reach the goal

Find out which sequence of action will get it to the goal state.

Traveling salesman problem

None

6. Which data structure conveniently used to implement BFS?

Stacks

Queues

Priority Queues

None of the Above

7. Another name for uninformed search is

Heuristic search

Uniform-cost search

Blind search

Depth limited search

8. Is optimality and completeness exist in bidirectional search algorithm?

Yes, Yes

No, Yes

Yes, No

No, No

9. What is the rule of simple reflex agent?

Simple-action rule.

Condition-action rule

Simple & Condition-action rule

None of the mentioned

10. What is the main task of a problem-solving agent?

Solve the given problem and reach to goal

To find out which sequence of action will get it to the goal state

All of the mentioned

None of the mentioned

11. The Process of deciding what actions and states to consider given a goal is called

Problem formulation

Goal formulation

Solution

Goal-seeking

12. In which search problem, to find the shortest path, each city must be visited once only?

Map coloring Problem

Depth-first search traversal on a given map represented as a graph

Finding the shortest path between a source and a destination

Travelling Salesman problem

13. What is the space complexity of Depth-first search?

O(b)

O(bl)

O(m)

O(bm)

14. In Artificial Intelligence (AI), which agent deals with happy and unhappy state?

Simple reflex agent

Model based agent

Learning agent

Utility based agent

15. Which of the following searching technique takes less memory?

Optimal search

Breadth-First Search

Linear Search

Depth-First Search

16. The starting position of "Play Chess" can be described as an _____.

8X8 array

16X16 array

9X9 array

10X10 array

17. Which function will select the lowest expansion node at first for evaluation?

Greedy best-first search

Best-first search

Depth-first search

None of the mentioned

18. One definition of AI focuses on problem solving methods that process :

smell

symbols

touch

algorithms

19. Which search algorithm imposes a fixed depth limit on nodes?

Depth-limited search

Depth-first search

Iterative deepening search

Bidirectional search

20. LIFO is _____ where as FIFO is _____

Stack, Queue

Queue, Stack

Priority Queue, Stack

Stack. Priority Queue

UNIT-3

1. Using how many levels can a knowledge-based agent be defined?

3 levels

2 levels

4 levels

none of the above

2. The central component of a knowledge-based agent is

Database

Knowledge chest

Knowledge representation

Knowledge base.

3. Which is used to compute the truth of any sentences ?

Semantics of propositional logic

Alpha-beta pruning

First order logic

Both semantics of propositional logic and Alpha-beta pruning

4. Wumpus World is a classic problem, best example of _____

Single player Game

Two player Game

Reasoning with Knowledge

Knowledge based Game

5. Which is created by using single propositional symbol?

Complex sentences

Atomic sentences

Composition sentences

None of the mentioned

6. For propositional Logic, which statement is false?

The sentences of Propositional logic can have answers other than True or False.

Each sentence is a declarative sentence.

Propositional logic is a knowledge representation technique in AI.

None of the above

7. A) Knowledge base (KB) is consists of set of statements. B) Inference is deriving a new sentence from the KB.Choose the correct option.

A is true, B is true

A is false, B is false

A is true, B is false

A is false, B is true

8. Which is created by using single propositional symbol?

Complex sentences

Atomic sentences

Composition sentences

None of the mentioned

9. Which is used to compute the truth of any sentences ?

Semantics of propositional logic

Alpha-beta pruning

First order logic

Both semantics of propositional logic and Alpha-beta pruning.

10. In the Wumpus World Problem, the reason for the uncertainty is that the agent's sensor gives only__

Full & Global information

Partial & Global Information

Full & local information

Partial & local Information

11. In the Wumpus world game, the agent will perceive a breeze in a square if it is directly Adjacent to a __

Wumpus

Agent

Pit

Heap of Gold

12. Which one is not various knowledge-based agent levels in AI.

Knowledge Level

Logical Level

Common Sense Level

Implementation Level

13. Knowledge and reasoning also play a crucial role in dealing with _____ environment.

Completely Observable

Partially Observable

Neither Completely nor Partially Observable

Only Completely and Partially Observable

14. Among the given options, which is also known as inference rule?

Reference

Reform

Resolution

None of the above

15. If according to the hypothesis, the result should be positive, but in fact it is negative, then it is known as_____.

False Negative Hypothesis

False Positive Hypothesis

Specialized Hypothesis

Consistent Hypothesis

16. Which were built in such a way that humans had to supply the inputs and interpret the outputs?

Agents

AI system

Sensor

Actuators

17. A game can be formally defined as a kind of search problem with the following components :

Initial state

Successor function

Terminal state

All the above

18. AI is Artificial intelligence till it is achieved; after which the acronym reduces to

Already Implemented

Already induced

All Indexed

None

19. Which is created by using single propositional symbol ?

Complex sentences

Atomic sentences

Composition sentences

None of the mentioned

20. Which is used to construct the complex sentences ?

Symbols

Connectives

Logical connectives

All the mentioned

UNIT 4

1. An expert system is based on the knowledge of _____

domain expert

engineer

student

client

2. The explanation facility of an expert system may be used to _____

construct a diagnostic model

expedite the debugging process

explain the system's reasoning process

explain the system's reasoning process & expedite the debugging process

3. Which university introduced Expert systems ?

Massachusetts Institute of Technology

University of Oxford

Stanford University

University of Cambridge

4. Which of the following is not a Capabilities of Expert Systems?

Advising

Demonstrating

Explaining

Expanding

5. Which of the following are Components of Expert Systems?

Knowledge Base

Inference Engine

User Interface

All of the above

6. Which of the following is incorrect application of Expert System?

Design Domain

Monitoring Systems

Knowledge Domain

Systems domain

7. In LISP, the function returns t if is even and nil otherwise _____

(evenp <integer>)

(even <integer>)

(numeven <integer>)

(numnevenp <integer>)

8. The "Turing Machine" showed that you could use a/an _____ system to program any algorithmic task.

binary

electro-chemical

recursive

semantic

9. Input segments of AI programming contain(s)?

Sound

Smell

Touch

None of the Above

10. Which of the following is not a benefits of Expert Systems?

Availability

Speed

Time

Less Error Rate

11. What is the full form of JESS in Expert System Technology?

Java Expert System Shell

Javascript Expert System Shell

Java Expert Sub System

Javascript Expert Sub System

12. What is the form of Knowledge representation?

IF-THEN

IF-THEN-ELSE

IF-ELSE

All of the above

13.Graph used to represent semantic network is _____

Undirected graph

Directed graph

Directed Acyclic graph (DAG)

Directed complete graph

14. What is full form of NLP?

Natural Language Processing

Nature Language Processing

Natural Language Process

Natural Language pages

15. How many Components of NLP are there?

2

3

4

5

16. What is full form of NLG?

Natural Language Generation

Natural Language Genes

Natural Language Growth

Natural Language Generator

17. Which of the following includes major tasks of NLP?

Discourse Analysis

Automatic Summarization

Machine Translation

All of the above

18. Which of the following is used to mapping sentence plan into sentence structure?

Text planning

Sentence planning

Text Realization

None of the Above

19. How many steps of NLP is there?

3

4

5

6

20. In linguistic morphology _____ is the process for reducing inflected words to their root form.

Rooting

Stemming

Text-Proofing

Both Rooting & Stemming

UNIT 5

Which of the following is the component of the learning system?

Goal

Model

Learning rules

All of the mentioned

The expert system uses a(n) _____ to select the most appropriate response.

data source

inference

knowledge base

decision support system

Which of the following is Capabilities of Expert Systems?

Possessing human capabilities

Suggesting alternative options to a problem

Refining their own knowledge

Substituting human decision makers

In regression the output is

Discrete

Continuous and always lies in a finite range

Continuous

May be discrete or continuous

What is Machine learning?

The autonomous acquisition of knowledge through the use of computer programs

The autonomous acquisition of knowledge through the use of manual programs

The selective acquisition of knowledge through the use of computer programs

The selective acquisition of knowledge through the use of manual programs

In an Unsupervised learning _____

Specific output values are given

Specific output values are not given

No specific Inputs are given

Both inputs and outputs are given

Because of orderly and well documented information of the industry, the_____
field was the area used for some of the first successful expert system

medical

aviation

insurance

robotics

What is Hypernym relation?

A is part of B

B has A as a part of itself

A is a kind of B

 A is superordinate of B

A _____ is nothing but an expert system without knowledge base.

Tools

Shell

Expert System

Knowledge

Expert system primarily started in the field of

insurance

medical

robotics

aviation

Semantic Network represents _____

Syntactic relation between concepts

 Semantic relations between concepts

All of the mentioned

None of the mentioned

Automated vehicle is an example of _____

Supervised learning

Unsupervised learning

Active learning

Reinforcement learning

Determine which is the best approach for following problem: What attribute similarities group customers holding one or several insurance policies?

supervised learning

unsupervised clustering

reinforcement learning

none of the above

Which of the following is not a Characteristics of Expert Systems?

Understandable

Highly responsive

Unreliable

High performance

The inference engine is:

A strategy for searching the rule base in an expert system that begins with information entered by the user.

The programming environment of an expert system.

A method of organizing expert system knowledge into chunks.

A strategy used to search through the rule base in an expert system.

Which of the following, is a component of an expert system?

inference engine

knowledge base

user interface

All of the above

ML is the field of AI consisting of learning algorithm that

Improve their performance

At executing come task

Over time with experience

All of above

A computer program is said to learn from experience E with respect to some task T and some performance measure P if its performance on T, as measured by P, improves with experience E. Suppose we feed a learning algorithm a lot of historical weather data, and have it learn to predict weather. In this setting, what is T?

The weather prediction task

None of these

The probability of it correctly predicting a future date's weather

The process of the algorithm examining a large amount of historical weather data

Data, information, and past experience combined together are termed as _____.

Inference

Acquisition

Vision

Knowledge

20. In which of the following learning the teacher returns reward and punishment to learner?

a. Active learning

b. Reinforcement learning

c. Supervised learning

d. Unsupervised learning

III Year B.Tech.ECE Sem-1
L   T   P   C
3   1   0   4

COMPUTER NETWORKS (18PC0CS15)
PRE-REQUISITES:

SYLLABUS:
UNIT – I
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: Internet, ARPANET. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, Power lines, fiber optics. Wireless transmission: Electromagnetic spectrum, Radio transmission, Microwave transmission, Infrared transmission, and Light transmission.

UNIT – II
Data link layer: Design issues, framing, Error detection and correction: Hamming codes, Parity, Checksum, and Cyclic Redundancy Check. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols.

UNIT – III
Network Layer: Design issues, Routing algorithms: the optimality principle, shortest path algorithm, Flooding, distance vector routing, Hierarchical routing, Broadcast Routing, Multicast Routing. Congestion Control Algorithms, Quality of Service, Internetworking, the Network layer in the internet: IPv4 Protocol, IP Address, IPv6.

UNIT – IV
Transport Layer: Transport Service, Elements of Transport protocols: Addressing, Connection Establishment, Connection Release. Connection management. The Internet Transport Protocols: Introduction to UDP, Remote Procedure calls, Introduction to TCP, The TCP Service Model, The TCP Protocol, and The TCP Segment Header, The TCP Connection Establishment, TCP Connection Release

UNIT – V
Application Layer –Domain name system: The DNS Name Space, Domain Resource Records, Name Servers, Electronic Mail: Architecture Services, SMTP, the World Wide Web: Architectural Overview, HTTP, Streaming audio and video: digital audio, digtal video, streaming stored media, streaming live media, real time conferencing.

TEXT BOOK:

1.Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall,5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1.   An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2.   Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition TMH.

Subject	(18PC0CS15) Computer Networks			
Faculty	Mr. KUMAR GAURAV			
Text Books (to be acquired by the Students)				
Book 1	Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall 5th Edition. Pearson Education/PHI			
Reference Books				
Book 2	An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education			
Book 3	Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition TMH.			

Unit	Topic	Chapters			No of Classes
		Book 1	Book 2	Book3	
I	Over view of the Internet, OSI,	Ch 1, 2 & 3	-	-	10
II	Data link Layer	Ch 4	-	-	10
III	Network Layer	Ch 5	-	-	10
IV	Transport Layer	Ch 6	-	-	11
V	Application Layer	Ch 6, 7	-	-	12
	Contact classes for syllabus coverage				55
	Classes for beyond syllabus :03 Descriptive tests: 02 \n\n Remedial Classes/NPTL Classes: 04				09
	Tutorial classes				16
	Total classes				**80**

COURSE INFORMATION SHEET

SUBJECT: Computer Networks

PROGRAMME: **ELECTRONICS AND COMMUNICATION**	DEGREE: **BTECH**
COURSE: **COMPUTER NETWORKS**	SEMESTER: **I** CREDITS: **4**
COURSE CODE: **18PC0CS15** REGULATION: **R18**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: : **COMPUTER NETWORKS**	CONTACT HOURS: **4+1 (Tutorial) Hours/Week**
CORRESPONDING LAB COURSE CODE : **18PC0CS19**	LAB COURSE NAME: **COMPUTER NETWORKS LAB**

Syallbus:

UNIT	DETAILS	HOURS
I	**UNIT -I:**Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: Internet, ARPANET. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, Power lines, fiber optics. Wireless transmission: Electromagnetic spectrum, Radio transmission, Microwave transmission, Infrared transmission, and Light transmission	10
II	**UNIT –II:**Data link layer: Design issues, framing, Error detection and correction: Hamming codes, Parity, Checksum, and Cyclic Redundancy Check. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat. Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols.	12
III	**UNIT -III:**Network Layer: Design issues, Routing algorithms: the optimality principle, shortest path algorithm, Flooding, distance vector routing, Hierarchical routing, Broadcast Routing, Multicast Routing. Congestion Control Algorithms, Quality of Service, Internetworking, the Network layer in the internet: IPv4 Protocol, IP Address, IPv6.	11
IV	**UNIT -IV:**Transport Layer: Transport Service, Elements of Transport protocols: Addressing, Connection Establishment, Connection Release. Connection management. The Internet Transport Protocols: Introduction to UDP, Remote Procedure calls, Introduction to TCP, The TCP Service Model, The TCP Protocol, and The TCP Segment Header, The TCP Connection Establishment, TCP Connection Release..	11
V	**UNIT -V:**Application Layer –Domain name system: The DNS Name Space, Domain Resource Records, Name Servers, Electronic Mail: Architecture Services, SMTP, the World Wide Web: Architectural Overview, HTTP, Streaming audio and video: digital audio, digtal video, streaming stored media, streaming live media, real time conferencing.	11
TOTAL HOURS		55

Tutorial Classes	16
Descriptive Tests	2
Classes for beyond syllabus	3
Remedial Classes/NPTL	4
Total Number of Classes	80

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Computer Networks - Andrew S Tanenbaum, David. j. Wetherall, 5th Edition, Pearson Education/PHI
R	An Engineering Approach to Computer Networks - S.Keshav, 2nd Edition, Pearson Education
R	Data Communications and Networking – Behrouz A. Forouzan, Third Edition TMH

Guru Nanak Institutions Technical Campus (Autonomous)
School of Engineering & Technology

Lecture Plan with Blooms Taxonomys

Name of the Subject   : Computer Networks
Subject Code   : 18PC0CS15
Name of Faculty   : KUMAR GAURAV
Class & section   : III ECE Sec-4&5

BTL- Blooms Taxonomy Level

Level 1   - Remembering
Level 2   - Understanding
Level 3   - Applying
Level 4   - Analyzing
Level 5   - Evaluating
Level 6   - Creating

Cumulative Periods	Time (Min)	Topics	BTL	Teaching – Learning Method
1	10	Attendance and Introduction of Computer Networks	1	PPT
	30	Unit-1 : Network Hardware, Network Software	1	PPT
	10	Introduction to N/W hardware and software	1	PPT
2	10	Attendance and Discussion of previous topics	1	PPT

	30	OSI Model, Introduction to OSI Model	1	PPT
	10	Introduction of each layer in OSI Model	1	PPT
3	10	Attendance and Discussion of previous topics	1	PPT
	30	Introduction toTCP/IP Reference Model	2	PPT
	10	Comparison of OSI and TCP/IP models	1,2	PPT
4	10	Attendance and Discussion of previous topics	1	PPT
	30	Examples of some networks	1,2,3	PPT
	10	ARPANET, Examples of ARPANET	1,2	PPT
5	10	Attendance and Discussion of previous topics	1	PPT
	30	Internet Physical Layer	1,5	PPT
	10	Physical Layer	1	PPT
6	10	Attendance and Discussion of previous topics	1	PPT
	30	Guided Transmission Media with Examples	1	PPT
	10	Transmission Media	1	PPT
7	10	Attendance and Discussion of previous topics	1	PPT
	30	Introduction and Explanation of Twisted Pairs	1	PPT
	10	Examples of Twisted Pairs	1	PPT
8	10	Attendance and Discussion of Previous topics	1	PPT
	30	Introduction and Explanation of Coaxial Cable	1	PPT
	10	Examples of Coaxial Cable	4	PPT
9	10	Attendance and Previous topics Discussion	1	PPT
	30	Wireless Transmission	4	PPT
	10	Examples of Wireless Transmission	1	PPT
10	10	Attendance and Previous topics Discussion	1	PPT
	30	Unit-2 : Introduction to Data Link Layer	2	PPT
	10	Design issues of Data Link Layer	1	PPT/Digital Board
11	10	Attendance and Previous topics Discussion	1	PPT
	30	Framing, Error detection and correction	1	PPT

	10	Types of Errors, Detection versus Correction	1	PPT
	10	Attendance and previous topics Discussion	1	PPT
12	30	Data Link Protocol	1,2	PPT
	10	Simplex Protocol	1,2	PPT/Digital Board
	10	Attendance and Discussion of Previous topics Association	1	PPT
13	30	Simplex stop and wait protocol for an error-free channel	1,2	PPT/ Digital Board
	10	Stop and wait protocol	1	PPT
	10	Attendance and Discus of previous topics	1	PPT
14	30	Simplex stop and wait for noisy channel, Simplex stop and wait	1	PPT
	10	Noisy channel	1,2	PPT
	10	Attendance and Disscus of previous topics Other adornments	1	PPT
15	30	Sliding Window Protocol	1	PPT/ Digital Board
	10	One-bit Sliding Protocol	1	PPT
	10	Attendance and Previous topics Discussion	1	PPT
16	30	Protocol using Go back N	1	PPT/ Digital Board
	10	Protocol using Selective Repeat	1	PPT
	10	Attendance and Previous topics Discussion	1	PPT
17	30	Examples of Data Link Protocols	1	PPT
	10	Revision and questionary on Data Link Protocol	2,5	PPT
	10	Attendance and Previous topics Discussion	1	PPT
18	30	Medium Access Sub-layer: The Channel Allocation Problem	1	PPT
	10	Examples of the Channel Allocation Problem	1	PPT
	10	Attendance and Previous topics Discussion	1	PPT
19	30	Multiple Access Protocol	1,2	PPT
	10	Revision of Multiple Access Protocol	1	PPT
	10	Attendance and Previous topics Discussion	1	PPT
20	30	ALOHA Carrier sense multiple access protocols	1	PPT

	10	Collision Free Protocols, Wireless LANs	1,2	PPT
21	10	Attendance and Previous topics Discussion	1	PPT
	30	Data Link Layer Switching	2	PPT
	10	Data Link Layer Switching examples	2	PPT
22	10	Attendance and Previous topics Discussion	1	PPT
	30	Unit-3 : Introduction to Network Layer, Design Issues	1	PPT
	10	Routing algorithms	1,2	PPT/ Digital Board
23	10	Attendance and previous topics Discussion	1	Digital Board
	20	Routing Algorithms: Shortest path routing	1	PPT/ Digital Board
	10	Types of Routing Algorithms	1	PPT
	10	Flooding Hierarchical routing	1	PPT
24	10	Attendance and previous topics Discussion	1	Digital Board
	30	Broadcast Algorithm	1.2	PPT/ Digital Board
	10	Multicasting Algorithm	1	PPT/ Digital Board
25	10	Attendance and Previous topics Discussion	1	Digital Board
	40	Distance Vector Routing	1	PPT/ Digital Board
26	10	Attendance and Previous topics Discussion	1	Digital Board
	40	Congestion Control Algorithms	5	PPT
27	10	Attendance and Previous topics Discussion	1	Digital Board
	30	Quality of Service with some examples, Internet working	5	PPT
	10	Internet working examples	1	PPT/ Digital Board
28	10	Attendance and Previous topics Discussion	1	Digital Board
	30	Network Layer in the Internet	1	PPT/ Digital Board
	10	Use of Network Layer in the Internet	1	PPT/ Digital Board
29	10	Attendance and Previous topics Discussion	5	PPT
	40	Unit-4 : Internetworking - Tunneling	1	PPT

	10	Attendance and Previous topics Discussion	1	Digital Board
30	30	Internetwork Routing	1	PPT/ Digital Board
	10	Internetwork Routing Algorithm	1	PPT/ Digital Board
31	10	Attendance and Previous topics Discussion	1	PPT
	40	Packet Fragmentation	1	PPT
32	10	Attendance and Previous topics Discussion	1	Digital Board
	40	IPv4	1	PPT
33	10	Attendance and Previous topics Discussion	1	Digital Board
	20	IPv6 Protocol, IP addresses	1	PPT/ Digital Board
	10	CIDR, IMCP	1	PPT/ Digital Board
	10	Difference between IPv4 and IPv6	1	PPT/ Digital Board
34	10	Attendance and Previous topics Discussion	1	Digital Board
	40	CIDR, IMCP	1	PPT
35	10	Attendance and Previous topics Discussion	1	Digital Board
	40	RP, RARP, DHCP	1	PPT/ Digital Board
36	10	Attendance and previous topics Discussion	1	Digital Board
	40	Introduction to Transport Layer	1	PPT/ Digital Board
37	10	Attendance and Previous topics Discussion	1	Digital Board
	40	Transport Layer : Services provided to the upper layers	1	PPT/ Digital Board
38	10	Attendance and Previous topics Discussion	1	Digital Board
	40	Elements of Transport Protocol-Addressing Connection Establishment	1	PPT/ Digital Board
39	10	Attendance and Previous topics Discussion	1	Digital Board
	30	Connection Release	1	PPT/ Digital Board
	10	Crash Recovery	1	PPT/ Digital Board

	10	Attendance and Previous topics Discussion	1	Digital Board
40	30	Internet Transport Protocols - UDP, RPC	1	PPT/ Digital Board
	10	Real-time Transport Protocols, Introduction to TCP	1	PPT/ Digital Board
	10	Attendance and privious topics discussion	1	Digital Board
41	20	TCP Service Model, TCP Segment Header	1	PPT/ Digital Board
	10	Connection Establishment of TCP	1	PPT/ Digital Board
	10	TCP Connection Release	1	PPT/ Digital Board
42	10	Attendance and previous topics discussion	1	Digital Board
	40	TCP Connection Management Modeling	1	PPT/ Digital Board
43	10	Attendance and previous topics discussion	1	Digital Board
	40	TCP Sliding Window	1	PPT/ Digital Board
44	10	Attendance and previous topics discussion	1	Digital Board
	40	TCP Congestion Control, The Future	1	PPT/ Digital Board
45	10	Attendance and previous topics discussion	1	Digital Board
	30	Introduction to Application Layer	1	PPT/ Digital Board
	10	Application Layer: Introduction, Providing Services	1	Digital Board
46	10	Attendance and previous topics discussion	1	PPT
	30	Application Layer Paradigms	1	PPT/ Digital Board
	10	SSH	1	PPT/ Digital Board
47	10	Attendance and previous topics discussion	1	Digital Board
	40	Client - Server Model	1	PPT
48	10	Attendance and previous topics discussion	1	Digital Board
	40	Standard client – server application, HTTP	1	PPT/ Digital Board

	10	Attendance and previous topics discussion	1	PPT/ Board	Digital
49	30	Standard client – server application	1	PPT/ Board	Digital
	10	HTTP	1	PPT/ Board	Digital
50	10	Attendance and previous topics discussion	1	PPT/ Board	Digital
	40	Difference between client and server	5	PPT	
51	10	Attendance and previous topics discussion	1	PPT	
	40	Application Layer: Introduction, Providing Services	5	PPT/ Board	Digital
52	10	Attendance and previous topics discussion	1	PPT/ Board	Digital
	30	FTP	5	PPT/ Board	Digital
	10	Advantages of FTP	5	PPT/ Board	Digital
53	10	Attendance and previous topics discussion	1	PPT/ Board	Digital
	30	Introduction of FTP	5	PPT/ Board	Digital
	10	Examples of File Transfer Protocol	5	PPT/ Board	Digital
54	10	Attendance and previous topics Discussion	1	PPT/ Board	Digital
	30	Electronic mail	5	PPT/ Board	Digital
	10	Necessity of Email	5	PPT/ Board	Digital
55	10	Attendance and previous topics discussion	1	PPT/ Board	Digital
	30	Telnet, DNS	5	PPT/ Board	Digital
	10	Examples	5	PPT/ Board	Digital

Guru Nanak Institutions Technical Campus (Autonomous)
Assignment Questions with Blooms Taxonomy Level (BTL)

Academic Year   : 2022-23

Subject Name with code   : Computer Networks (18PC0CS15)

Class   : III CSE Sec-4 and Sec-5

Name of the Faculty Member   : Mr. KUMAR GAURAV

Blooms Taxonomy Levels (BTL)

1.   Remembering
2.   Understanding
3.   Applying
4.   Analyzing
5.   Evaluating
6.   Creating

Sl. No.	Questions (Select Questions from University question Bank and mention year in bracket or you may give own standard question with (new) in bracket)	BTL level (Please mention L1 or L2 or etc...)	Course Outcome (Please mention CO1 or CO2 etc…)
	Unit - I		
1.	What is layered architecture? Explain about the functionalities of each layer in OSI/ISO reference model with a neat sketch.	L1	CO1
2.	Explain TCP/IP reference model with a neat sketch. [May-2019]	L1	CO1
3.	Describe wireless transmission with neat sketch.	L2	CO1
4.	Explain guided transmission media.	L2	CO1
5.	Explain about Types of Networks?	L2	CO1
	Unit – II		
1.	Explain CRC Method with an Example?	L2	CO2
2.	What are the design issues of the data link layer?	L2	CO2
3.	Explain simplex, stop and wait protocol.	L2	CO2
4.	What is piggybacking? Describe Go back 'N' and selective repeat protocols.	L2	CO2
5.	What is Medium Access Control? Explain CSMA with collision detection.	L2	CO2
	Unit – III	L3	CO2
1.	Explain Distance Vector Routing Algorithm	L2	CO3
2.	Explain about Link State Routing Algorithm.	L2	CO3
3.	What are the characteristics of Virtual Circuit Networks?	L3	CO3
4.	Describe the concepts of Shortest path routing with an example.	L3	CO3
5.	Explain About Admission Control Algorithm.?	L3	CO3
	Unit – IV		
1.	Describe Transport Layer Services.	L2	CO4

2.	Explain the process of Connection Establishment in Transport Layer, addressing various issues involved.	L2	CO4
3.	Explain the process of Crash Recovery Mechanism in the Transport Layer.	L2	CO4
4.	Explain the protocol scenarios for Establishing Connection Release using two-way army Problem	L2	CO4
5.	Explain in brief about various fields of TCP Header with the help of a neat diagram.	L2	CO4
	Unit – V		
1.	Describe the Architecture of Email and its services.	L2	CO5
2.	Describe the Architecture of the Web.	L2	CO5
3.	Explain different types of MIME.	L2	CO5
4.	Write short notes on a) Static web page b) Dynamic web page.	L2	CO5
5.	Explain about SMTP protocol?	L2	CO5

Question Bank / Previous Question Papers questions

Guru Nanak Institutions Technical Campus (Autonomous)
Academic Year   : 2022-23

Subject Name with code   : Computer Networks (18PC0CS15)

Class   : III CSE Sec-4 and sec -5
Name of the Faculty Member   : Mr. KUMAR GAURAV

Blooms Taxonomy Levels (BTL)

1.   Remembering
2.   Understanding
3.   Applying
4.   Analyzing
5.   Evaluating
6.   Creating

Sl. No.	Questions (Select Questions from University question Bank and mention year in bracket or you may give own standard question with (new) in bracket)	BTL level (Please mention L1 or L2 or etc...)	Course Outcome (Please mention CO1 or CO2 etc…)
	Unit - I		
	Part – A (2 Marks)		
1.	List Out types Of networks?	L2	CO1
2.	Brief the Guided Transmission Media	L1	CO1
3.	What is internet? Differentiate it from intranet.	L2	CO1
4.	List out OSI/ISO reference Model& Tcp/Ip reference model layers	L3	CO1
5.	Define Network?	L3	CO1
6.	What are the applications of infrared waves?	L1	CO1
7.	Explain Coaxial Cable Types?	L2	CO1
8.	Explain Network Hard ware devices?	L1	CO1
9.	Classify the Un Guided transmission media?	L1	CO1
10.	Describe Types of Twisted Pair Cables?	L2	CO1
	Part – B (5 Marks)		
1	What is layered architecture? Explain about the functionalities of each layer in OSI/ISO reference model with a neat sketch.	L1	CO1
2	Explain TCP/IP reference model with a neat sketch. [May-2019]	L1	CO1
3	Describe wireless transmission with neat sketch.	L2	CO1
4	Explain guided transmission media.	L2	CO1
5	Explain about Types of Networks?	L2	CO1
6	Explain about Twisted - Pair cables with neat sketch.	L2	CO1
7	What is fiber optics? Explain fiber cables with neat sketch.	L2	CO1

8	Explain Advantages &Disadvantages of Networking?	L2	CO1
9	Explain ARPANET in detail with diagram.	L3	CO1
10	Differentiate between OSI-ISO &TCP/IP reference Model?		
	Unit – II		
	Part – A (2 Marks)		
1.	Discuss the design issues of data link layer.	L3	CO2
2.	What is the purpose of Hamming code?	L3	CO2
3.	Define Collision?	L1	CO2
4.	List out Types Multiple access protocols?	L2	CO2
5.	Describe types of Error correcting Codes?	L3	CO2
6.	Explain about Elementary data link protocols:?	L2	CO2
7.	Describe types of Error Detecting Codes?	L1	CO2
8.	List out types of Framing Methods?	L1	CO2
9.	What is Piggybacking? How does it useful?	L2	CO2
10.	Explain Bit Stuffing Method?		
	Part – B (5 Marks)		
1	Explain CRC Method with an Example?	L2	CO2
2	What are the design issues of the data link layer?	L2	CO2
3	Explain simplex, stop and wait protocol.	L2	CO2
4	What is piggybacking? Describe Go back 'N' and selective repeat protocols.	L2	CO2
5	What is Medium Access Control? Explain CSMA with collision detection.	L2	CO2
6	Describe Bit-Map Protocol?	L3	CO2
7	Explain Sliding Window protocol?	L3	CO2
8	Explain CSMA Protocols?	L3	CO2
9	.Describe Channel Allocation Problem?	L3	CO2
10	Explain Selective Repeat Protocol?	L3	CO2
	Unit – III	L3	CO2
	Part – A (2 Marks)		
1.	What is Tunneling ?	L1	CO3
2.	Explain briefly about flooding algorithm?	L2	CO3
3.	What is Crash Recovery?	L1	CO3
4.	What is Optimality Principle?]	L1	CO3
5.	What are the metrics used by routing protocols?	L2	CO3
6.	Define Routing? Explain types of Routing	L3	CO3
7.	Give the advantages of hierarchical routing.	L2	CO3
8.	What is Multi casting?	L1	CO3
9.	Write the responsibilities of network layer.	L2	CO3
10.	List Out Types of Congestion Control Algorithms?		
	Part – B (5 Marks)		
1	Explain Distance Vector Routing Algorithm	L2	CO3
2	Explain about Link State Routing Algorithm.	L2	CO3
3	What are the characteristics of Virtual Circuit Networks?	L3	CO3
4	Describe the concepts of Shortest path routing with an example.	L3	CO3

5	Explain About Admission Control Algorithm.?	L3	CO3
6	Give the advantages of Hierarchical Routing.	L3	CO3
7	State the principle of Congestion Control. What are the congestion prevention policies?	L3	CO3
8	Explain about Quality of Service Technique?	L3	CO3
9	Describe Network layer in the internet?	L4	CO3
10	Explain IPV4 Header Format?	L4	CO3
	Unit – IV		
	Part – A (2 Marks)		
1.	Explain about Transport Layer Primitives?	L1	CO4
2.	Define Multiplexing?	L1	CO4
3.	What is Crash Recovery?	L2	CO4
4.	Define quality of service?	L1	CO4
5.	List out different services provided in TCP	L2	CO4
6.	What is Addressing?	L1	CO4
7.	Explain TCP Connection Establishment?	L1	CO4
8.	Explain TCP Connection Release?	L2	CO4
9.	Give types of Internet Transport Protocols?	L2	CO4
10.	Explain About RPC Protocol?	L3	CO4
	Part – B (5 Marks)		
1	Describe Transport Layer Services.	L2	CO4
2	Explain the process of Connection Establishment in Transport Layer, addressing various issues involved.	L2	CO4
3	Explain the process of Crash Recovery Mechanism in the Transport Layer.	L2	CO4
4	Explain the protocol scenarios for Establishing Connection Release using two-way army Problem	L2	CO4
5	Explain in brief about various fields of TCP Header with the help of a neat diagram.	L2	CO4
6	Describe UDP in detail.	L3	CO4
7	Explain the protocol scenarios for Establishing Connection using three-way handshake mechanisms.	L3	CO4
8	Why transport layer protocols like TCP and UDP are called end-to-end protocols? What is the difference between them?	L4	CO4
9	Explain Dynamic Host Configuration Protocol (DHCP).	L2	CO4
10	Explain about ARP and RARP Protocol.	L2	CO4
	Unit – V		
	Part – A (2 Marks)		
1	Give the HTTP message Format?	L1	CO5
2	What is DNS? Write its properties.	L2	CO5
3	What are the basic functions of email systems?	L2	CO5
4	What are the MIME content Types??	L1	CO5
5	Define Multimedia?	L2	CO5
6	What is cryptography?	L1	CO5
7	Explain MIME Header.	L2	CO5
8	Explain Streaming Audio and Video.	L4	CO5

9	Discuss about Protocols used between Mail Transfer Agents?	L4	CO5
10	Explain about digital audio?	L4	CO5
	Part – B (5 Marks)		
1	Describe the Architecture of Email and its services.	L2	CO5
2	Describe the Architecture of the Web.	L2	CO5
3	Explain different types of MIME.	L2	CO5
4	Write short notes on a) Static web page b) Dynamic web page.	L2	CO5
5	Explain about SMTP protocol?	L2	CO5
6	What is DNS? Explain Domain Resource Records.	L3	CO5
7	What is Real Time Conferencing? Explain H.323 & SIP.	L3	CO5
8	What is the use of DNS? Explain how it works.	L3	CO5
9	Discus about JPEG and MPEG.	L4	CO5
10	Write short notes on a) WWW b) Digital Video	L4	CO5

OBJECTIVE QUESTIONS

UNIT:I

1. The physical layer is concerned with _____
a) bit-by-bit delivery
b) process to process delivery
c) application to application delivery
d) port to port delivery
Answer: a

2. Which transmission media provides the highest transmission speed in a network?
a) coaxial cable
b) twisted pair cable
c) optical fiber
d) electrical cable
Answer: c

3. Bits can be sent over guided and unguided media as analog signal by _____
a) digital modulation
b) amplitude modulation
c) frequency modulation
d) phase modulation
Answer: a

4. The portion of physical layer that interfaces with the media access control sublayer is called _____
a) physical signalling sublayer
b) physical data sublayer
c) physical address sublayer
d) physical transport sublayer
Answer: a

5. The physical layer provides _____
a) mechanical specifications of electrical connectors and cables
b) electrical specification of transmission line signal level
c) specification for IR over optical fiber
d) all of the mentioned
Answers: d

6. In asynchronous serial communication the physical layer provides _____
a) start and stop signalling
b) flow control
c) both start & stop signalling and flow control
d) only start signaling
Answer: c

7. The physical layer is responsible for _____
a) line coding
b) channel coding
c) modulation
d) all of the mentioned

Answer: d

8. The physical layer translates logical communication requests from the _____ into hardware specific operations.
a) data link layer
b) network layer
c) trasnport layer
d) application layer
Answer: a

9. A single channel is shared by multiple signals by _____
a) analog modulation
b) digital modulation
c) multiplexing
d) phase modulation
Answer: c

10. Wireless transmission of signals can be done via _____
a) radio waves
b) microwaves
c) infrared
d) all of the mentioned
Answer: d

10.. A list of protocols used by a system, one protocol per layer, is called
a) protocol architecture
b) protocol stack
c) protocol suit
d) none of the mentioned
Answer:b

11. Network congestion occurs
a) in case of traffic overloading
b) when a system terminates
c) when connection between two nodes terminates
d) none of the mentioned
Answer:a

12. Which one of the following extends a private network across public networks?

a) local area network
b) virtual private network
c) enterprise private network
d) storage area network
Answer:b

13) The IETF standards documents are called
a) RFC
b) RCF
c) ID
d) None of the mentioned
Answer: a

14) In the layer hierarchy as the data packet moves from the upper to the lower layers, headers are
a) Added
b) Removed
c) Rearranged
d) Modified
Answer: a

15) The structure or format of data is called
a) Syntax
b) Semantics
c) Struct
d) None of the mentioned
Answer: a

16) Communication between a computer and a keyboard involves _____ transmission
a) Automatic
b) Half-duplex
c) Full-duplex
d) Simplex
Answer: d

17) The first Network
a) CNNET
b) NSFNET
c) ASAPNET
d) ARPANET
Answer: d

18) The _____ is the physical path over which a message travels
a) Ppath
b) Medium
c) Protocol
d) Route
Answer: b

19) Which organization has authority over interstate and international commerce in the communications field?
a) ITU-T
b) IEEE
c) FCC
d) ISOC
Answer: c

20) Which of this is not a network edge device?
a) PC
b) Smartphones
c) Servers
d) Switch
Answer: d.

21) A set of rules that governs data communication
a) Protocols
b) Standards
c) RFCs
d) None of the mentioned
Answer: a

22) Three or more devices share a link in _____ connection
a) Unipoint
b) Multipoint
c) Point to point
d) None of the mentioned
Answer: b

23)OSI stands for
a) open system interconnection
b) operating system interface
c) optical service implementation
d) none of the mentioned
Answer:a.

24). The OSI model has ___ layers.
a) 4
b) 5
c) 6
d) 7
Answer:d

25). TCP/IP model does not have _____ layer but OSI model have this layer.
a) session layer
b) presentation layer
c) application layer
d) both (a) and (b)
Answer:d

26). Which layer links the network support layers and user support layers
a) session layer
b) data link layer
c) transport layer
d) network layer
Answer:c

27). Which address is used in an internet employing the TCP/IP protocols?
a) physical address and logical address
b) port address
c) specific address
d) all of the mentioned
Answer:d

28). TCP/IP model was developed _____ the OSI model.
a) prior to
b) after
c) simultaneous to
d) none of the mentioned
Answer:a

29). Which layer is responsible for process to process delivery?
a) network layer
b) transport layer
c) session layer
d) data link layer
Answer:b.

30). Which address identifies a process on a host?
a) physical address
b) logical address
c) port address
d) specific address

Answer:c

Fill in the blanks

31. Coaxial cables can be used for………
Answer: Both in telephone and cable TV networks.

32. Eavesdropping is not possible in…--------------
Answer: fiber optics

33. In digital data transmission baud rate is equal to --------------
   Answer: Bit rate

34. In simplex transmission data can be Transmitted in --------------direction.
   Answer: One

35. Data networks for the efficiency of communication reasons, uses--------------
   Answer: Full-duplex transmission

36. PCs connected with --------------can also be used for education, entertainment, etc.
   Answer: Modem

37. The meaning of a digital channel means that the channel is --------------.
   Answer: Carrying digital data.

38. Fiber optics communication system uses--------------.
   Answer: Full-duplex

39. A different carrier frequency is used for each channel in --------------. Multiplexing.
   Answer: Frequency Division

40. The Ethernet _____ sub layer is responsible for communicating directly with the physical layer.
   Answer: Media Access Control(MAC)

UNIT:II

1. The data link layer takes the packets from _____ and encapsulates them into frames for transmission.
a) network layer
b) physical layer
c) transport layer
d) application layer
Answer: a

2. Which of the following tasks is not done by data link layer?

a) framing
b) error control
c) flow control
d) channel coding
Answer: d

3. Which sublayer of the data link layer performs data link functions that depend upon the type of medium?
a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) error control sublayer
Answer: b

4. Header of a frame generally contains _____
a) synchronization bytes
b) addresses
c) frame identifier
d) all of the mentioned
Answer: d

5. Automatic repeat request error management mechanism is provided by _____
a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) application access control sublayer
Answer: a

6. When 2 or more bits in a data unit has been changed during the transmission, the error is called _____
a) random error
b) burst error
c) inverted error
d) double error
Answer:b

7. CRC stands for _____
a) cyclic redundancy check
b) code repeat check
c) code redundancy check
d) cyclic repeat check
Answer: a

8. Which of the following is a data link protocol?
a) ethernet
b) point to point protocol
c) hdlc

d) all of the mentioned
Answer: d

9. Which of the following is the multiple access protocol for channel access control?
a) CSMA/CD
b) CSMA/CA
c) Both CSMA/CD & CSMA/CA
d) HDLC
Answer: c

10. The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____
a) piggybacking
b) cyclic redundancy check
c) fletcher's checksum
d) parity check
Answer: a

11. The data link layer takes the packets from _____ and encapsulates them into frames for transmission.
a) network layer
b) physical layer
c) transport layer
d) application layer
Answer:a
.
12. Which one of the following task is not done by data link layer?
a) framing
b) error control
c) flow control
d) channel coding
Answer:d

13. Which sublayer of the data link layer performs data link functions that depend upon the type of medium?
a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) none of the mentioned
Answer:b

14. Header of a frame generally contains
    a) synchronization bytes

b) addresses
c) frame identifier
d) all of the mentioned
Answer:d

15. Automatic repeat request error management mechanism is provided by
a) logical link control sublayer
b) media access control sublayer
c) network interface control sublayer
d) none of the mentioned
Answer:a

16. When 2 or more bits in a data unit has been changed during the transmission, the error is called
a) random error
b) burst error
c) inverted error
d) none of the mentioned
Answer:b

17. CRC stands for
a) cyclic redundancy check
b) code repeat check
c) code redundancy check
d) cyclic repeat check
Answer:a

18. Which one of the following is a data link protocol?
a) ethernet
b) point to point protocol
c) HDLC
d) all of the mentioned
Answer:d.

19. Which one of the following is the multiple access protocol for channel access control?
a) CSMA/CD
b) CSMA/CA
c) both (a) and (b)
d) none of the mentioned
Answer:c

20. The technique of temporarily delaying outgoing outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called
a) piggybacking
b) cyclic redundancy check
c) fletcher's checksum
d) none of the mentioned
Answer:a

21Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?
a) CDMA
b) CSMA/CA
c) ALOHA
d) none of the mentioned
Answer:b

22. In wireless distribution system
a) multiple access point are inter-connected with each other
b) there is no access point
c) only one access point exists
d) none of the mentioned
Answer: a

23. A wireless network interface controller can work in
a) infrastructure mode
b) ad-hoc mode
c) both (a) and (b)
d) none of the mentioned
Answer:c

Explanation:In infrastructure mode WNIC needs access point but in ad-hoc mode access point is not required.

24. In wireless network an extended service set is a set of
a) connected basic service sets
b) all stations
c) all access points
d) none of the mentioned
Answer:a

25. Mostly _____ is used in wireless LAN.
a) time division multiplexing
b) orthogonal frequency division multiplexing
c) space division multiplexing
d) none of the mentioned
Answer:b

26. Which one of the following event is not possible in wireless LAN.
a) collision detection
b) Acknowledgement of data frames
c) multi-mode data transmission
d) none of the mentioned
Answer:a

27. What is Wired Equivalent Privacy (WEP) ?
a) security algorithm for ethernet
b) security algorithm for wireless networks
c) security algorithm for usb communication
d) none of the mentioned
Answer:b

Explanation:None.

28 What is WPA?
a) wi-fi protected access
b) wired protected access
c) wired process access
d) wi-fi process access
Answer:a

29. What is internet?
a) a single network

b) a vast collection of different networks

c) interconnection of local area networks

d) none of the mentioned

Answer:b

30. To join the internet, the computer has to be connected to a

a) internet architecture board

b) internet society

c) internet service provider

d) none of the mentioned

<u>Fill in the blanks</u>

31. ------------is a set of rules that governs the communications between computers on a network.

    Answer: Protocol

32. Each web sites is identified by the --------

    Answer: URL

33. Aloha is the type of Random access protocol, It have two types one is -------- and another is------------.

    Answer : Pure Aloha and Slotted Aloha

  34. ------------- is a flow control protocol.

    Answer: Sliding window protocol

  35. Sliding Window Protocol. Sliding window protocols are --------- for reliable and sequential   delivery of data frames.

  Answer: data link layer protocols

36. The sliding window is also used in --------------------

Answer: Transmission Control Protocol

37. --------- is an implementation of a sliding window protocol.

  Answer: . Go back N protocol

38. In Selective Repeat protocol, sender window size is always same as -------------

    Answer: receiver window size

39. ------- protocol uses independent acknowledgements only.

 Answer: Selective repeat

40. ------------ protocols are devised so that collisions do not occur

Answer: Collision – free

Unit III

1. The network layer is concerned with _____ of data.
a) bits
b) frames
c) packets
d) bytes
Answer: c

2. Which one of the following is not a function of network layer?
a) routing
b) inter-networking
c) congestion control
d) error control
Answer: d

3. A 4 byte IP address consists of _____
a) only network address
b) only host address
c) network address & host address
d) network address & MAC address
Answer: c

4. In virtual circuit network each packet contains _____
   a) full source and destination address
   b) a short VC number
   c) only source address
   d) only destination address
   Answer: b

5. Which of the following routing algorithms can be used for network layer design?
a) shortest path algorithm
b) distance vector routing
c) link state routing
d) all of the mentioned
Answer: d

6. Which of the following is not correct in relation to multi-destination routing?
 a) is same as broadcast routing
 b) contains the list of all destinations
 c) data is not sent by packets
 d) there are multiple receivers
Answer: c

7. A subset of a network that includes all the routers but contains no loops is called _____
a) spanning tree

b) spider structure
c) spider tree
d) special tree
 Answer: a

8. Which one of the following algorithm is not used for congestion control?
a) traffic aware routing
b) admission control
c) load shedding
d) routing information protocol
 Answer: d

9. The network layer protocol for internet is _____
a) ethernet
b) internet protocol
c) hypertext transfer protocol
d) file transfer protocol
 Answer: b

10. ICMP is primarily used for _____
a) error and diagnostic functions
b) addressing
c) forwarding
d) routing
Answer: a

11. ISP exchanges internet traffic between their networks by
a) internet exchange point
b) subscriber end point
c) ISP end point
d) none of the mentioned
Answer:a

12. Which one of the following protocol is not used in internet?
a) HTTP
b) DHCP
c) DNS
d) none of the mentioned
Answer:d

13. IPv6 addressed have a size of
a) 32 bits
b) 64 bits

c) 128 bits

d) 265 bits

Answer:c

14. Internet works on

a) packet switching

b) circuit switching

c) both (a) and (b)

d) none of the mentioned

Answer:a

15. Which one of the following is not an application layer protocol used in internet?

a) remote procedure call

b) internet relay chat

c) resource reservation protocol

d) none of the mentioned

Answer:c

16. Which protocol assigns IP address to the client connected in the internet?

a) DHCP

b) IP

c) RPC

d) none of the mentioned

Answer:a

17. Which one of the following is not used in media access control?

a) ethernet

b) digital subscriber line

c) fiber distributed data interface

d) none of the mentioned

Answer:d

18. The network layer concerns with

a) bits

b) frames

c) packets

d) none of the mentioned

Answer:c

19. Which one of the following is not a function of network layer?
a) routing
b) inter-networking
c) congestion control
d) none of the mentioned
Answer:d

20. The 4 byte IP address consists of
a) network address
b) host address
c) both (a) and (b)
d) none of the mentioned
Answer:c

21. In virtual circuit network each packet contains
a) full source and destination address
b) a short VC number
c) both (a) and (b)
d) none of the mentioned
Answer:b

22. Which one of the following routing algorithm can be used for network layer design?
a) shortest path algorithm
b) distance vector routing
c) link state routing
d) all of the mentioned
Answer:d

23. Multidestination routing
a) is same as broadcast routing
b) contains the list of all destinations
c) data is not sent by packets
d) none of the mentioned
Answer:c

24. A subset of a network that includes all the routers but contains no loops is called
a) spanning tree
b) spider structure
c) spider tree
d) none of the mentioned
Answer:a

25. Which one of the following algorithm is not used for congestion control?
a) traffic aware routing
b) admission control
c) load shedding
d) none of the mentioned
Answer:d

26. The network layer protocol of internet is
a) ethernet
b) internet protocol
c) hypertext transfer protocol
d) none of the mentioned
Answer:b

27. ICMP is primarily used for
a) error and diagnostic functions
b) addressing
c) forwarding
d) none of the mentioned
Answer:a

28) Ping can
a) Measure round-trip time
b) Report packet loss
c) Report latency
d) All of the mentioned
Answer: d

29) Ping sweep is a part of
a) Traceroute
b) Nmap
c) Route
d) Ipconfig
Answer: b
Explanation: A ping sweep is a method that can establish a range of IP addresses which map to live hosts and are mostly used by network scanning tools like nmap.

30) ICMP is used in
a) Ping
b) Traceroute
c) Ifconfig
d) Both a and b
Answer: d

Fill in the blanks

31. In the ipv4, the data gram is of_____
 Answers: variable length

32. The header of the datagram in the ipv4 has_____
      Answer: 20 to 60 bytes

33. The network layer at the source is responsible for creating a packet from the data coming from another_____
 Answer: protocol

34. A modem is a ------------- de vice.
  Answer: Bidirectional

35. A network of networks is known as ----------
 Answer: Internet

36. Which level is the network layer in the OSI model _____
  Answer: Third

37. Data in network layer is transferred in the form of _____
  Answer: Packets

38. The network layer is considered as the _____ of the network layer.
  Answer: Back bone

39. The network layer contains which hardware device--------------, -------------- and -------

Answer: Routers, Bridges and Switches

40. RIP stands for _____
    Answer: Routing Information Protocol

Unit IV

1. Transport layer aggregates data from different applications into a single stream before passing it to _____
a) network layer
b) data link layer
c) application layer
d) physical layer
Answer: a

2. Which of the following are transport layer protocols used in networking?
a) TCP and FTP
b) UDP and HTTP
c) TCP and UDP
d) HTTP and FTP
 Answer: c

3. User datagram protocol is called connectionless because _____
a) all UDP packets are treated independently by transport layer
b) it sends data as a stream of related packets
c) it is received in the same order as sent order
d) it sends data very quickly
Answer: a

4. Transmission control protocol _____
a) is a connection-oriented protocol
b) uses a three way handshake to establish a connection
c) receives data from application as a single stream
d) all of the mentioned
Answer: d

5. An endpoint of an inter-process communication flow across a computer network is called _____
a) socket
b) pipe
c) port
d) machine
Answer: a

6. Socket-style API for windows is called _____
a) wsock
b) winsock

c) wins

d) sockwi

Answer: b

7. Which one of the following is a version of UDP with congestion control?

a) datagram congestion control protocol

b) stream control transmission protocol

c) structured stream transport

d) user congestion control protocol

Answer: a

8. A _____ is a TCP name for a transport service access point.

a) port

b) pipe

c) node

d) protocol

Answer: a

9. Transport layer protocols deals with _____

a) application to application communication

b) process to process communication

c) node to node communication

d) man to man communication

Answer: b

10. Which of the following is a transport layer protocol?

a) stream control transmission protocol

b) internet control message protocol

c) neighbor discovery protocol

d) dynamic host configuration protocol

Answer: a

11) TCP is a .... protocol.

a). stream-oriented

b). message-oriented

c). block-oriented

d). packet-oriented

Answer: a. stream-oriented

12) Which of the following is not the layer of TCP/IP protocol.

A. Physical layer

B. link layer

C. network layer

D. transport layer.

Answer: A. Physical layer

13) TCP groups a number of bytes together into a packet called a ....
A. user datagram
B. segment
C. datagram
D. packet

Answer: **B. segment**

14) The .... of TCP/IP protocol is responsible for figuring out how to get data to its destination.
A. application layer
B. link layer
C. network layer
D. transport layer.

Answer: **C. network layer**

15) TCP is a(n) .... transport protocol.
A. protocol delivery
B. reliable
C. best-effort delivery
D. effortless delivery

Answer: B

16) .... is the protocol that hides the underlying physical network by creating a virtual network view.
A. Internet Protocol(IP)
B. Internet Control Message Protocol(ICMP)
C. Address Resolution Protocol(ARP)
D. Bootstrap Protocol(BOOTP)

Answer:A

17) To use the services of UDP, we need .... socket addresses.
A. four
B. two

C. three
D. four

Answer: B

18) Which of the following is not the name of Regional Internet Registries(RIR) to administer the network number portion of IP address.
A. American Registry for Internet Numbers(ARIN)
B. Reseaux IP Europeans(RIPE)
C. Europeans Registry for Internet Numbers(ERIN)
D. Asia Pacific Network Information Center(APNIC)

Answer: C

19) UDP packets are called ....
A. user datagrams
B. segments
C. frames
D. packets

Answer: A

20) .... addresses use 21 bits for the and 8 bits for the portion of the IP address for TCP/IP network.
A. Class A
B. Class B
C. Class C
D. Class D

Answer: C

21) UDP packets have fixed-size header of .... bytes.
A. 16
B. 8
C. 32
D. 64

Answer: B

22) .... messages are never sent in response to datagrams with a broadcast or a multicast destination address.
A. ICMP
B. ARP
C. IP
D. BOOTP

Answer: A

23) TCP assigns a sequence number to each segment that is being sent. The sequence number for each segment is number of the .... byte carried in that segment.
A. first
B. last
C. middle
D. zero

Answer: A

24) .... is responsible for converting the higher level protocol address (IP addresses) to physical network addresses.
A. Internet Protocol(IP)
B. Internet Control Message Protocol(ICMP)
C. Address Resolution Protocol(ARP)
D. Bootstrap Protocol(BOOTP)

Answer: C

25) UDP and TCP are both .... layer protocols.
A. data link
B. network
C. transport
D. interface

Answer C

26) .... is a process-to-process protocol that adds only port addresses, checksum error control, and length information to the data from upper layer.
A. TCP
B. UDP

C. IP

D. ARP

Answer B

27) Which of the following functions does UDP perform?

A. Process-to-process communication

B. Host-to-host communication

C. End-to-end reliable data delivery

D. Interface-to-interface communication.

Answer A

28) A port address in TCP/IP is ....bits long.

A. 32

B. 48

C. 16

D. 64

Answer C

29) When the IP layer of a receiving host receives a datagram, ...

A. delivery is complete

B. a transport layer protocol takes over

C. a header is added

D. a session layer protocol takes over

Answer: B

30) TCP/IP is a .... hierarchical protocol suite developed before the OSI model.

A. seven-layer

B. five-layer

C. six-layer

D. four-layer

Answer: B. five-layer

Fill in the blanks

31. What are the functions of the transport layer _____

Answer: Multiplexing & De multiplexing

32. Which services are provided by transport layer _____
Answer: Error Control

33. TCP and UDP are called _____
Answer: Transport Protocols

34. Security based connection is provided by which layer_____
Answer: Transport Layer

35. Using which method in transport layer data integrity can be ensured _____
Answer: Check Sum

36. Buffer overrun can be reduced by using _____
Answer: Flow Control

37. Transport layer can identify the symptoms of overload nodes using _____
Answer: Traffic Control

38. Transport layer receives data in the form of _____
Answer: Byte Streams

39. Congestion control can control traffic entry into a telecommunications network, so to avoid _____
Answer: Congestive Collapse

40. UDP packets are called as _____
Answer: Datagram'
Unit V

1. Which is not a application layer protocol?
a) HTTP
b) SMTP
c) FTP
d) TCP
Answer: d

2. The packet of information at the application layer is called _____
a) Packet
b) Message
c) Segment
d) Frame
Answer: b

3. Which one of the following is an architecture paradigms?
a) Peer to peer

b) Client-server
c) HTTP
d) Both Peer-to-Peer & Client-Server
Answer: d

4. Application developer has permission to decide the following on transport layer side
a) Transport layer protocol
b) Maximum buffer size
c) Both Transport layer protocol and Maximum buffer size
d) None of the mentioned
Answer: c

5. Application layer offers _____ service.
a) End to end
b) Process to process
c) Both End to end and Process to process
d) None of the mentioned
Answer: a

6. E-mail is _____
a) Loss-tolerant application
b) Bandwidth-sensitive application
c) Elastic application
d) None of the mentioned
Answer: c

7. Which of the following is an application layer service?
a) Network virtual terminal
b) File transfer, access, and management
c) Mail service
d) All of the mentioned
Answer: d

8. To deliver a message to the correct application program running on a host, the _____ address must be consulted.
a) IP
b) MAC
c) Port
d) None of the mentioned
Answer: c

9. Transport services available to applications in one or another form _____
a) Reliable data transfer
b) Timing
c) Security
d) All of the mentioned
Answer: d

10. Electronic mail uses which Application layer protocol?
a) SMTP
b) HTTP
c) FTP
d) SIP
Answer: a

11) This is not a application layer protocol
a) HTTP
b) SMTP
c) FTP
d) TCP

Answer:d

12) The packet of information at the application layer is called
a) Packet
b) Message
c) Segment
d) Frame
Answer: b

13) This is one of the architecture paradigm
a) Peer to peer
b) Client-server
c) HTTP
d) Both a and b
Answer: d
Explanation: HTTP is a protocol.

14) Application developer has permission to decide the following on transport layer side
a) Transport layer protocol
b) Maximum buffer size
c) Both of the mentioned
d) None of the mentioned
Answer: c

15) Application layer offers _____ service
a) End to end

b) Process to process
c) Both of the mentioned
d) None of the mentioned
Answer: a

16) E-mail is
a) Loss-tolerant application
b) Bandwidth-sensitive application
c) Elastic application
d) None of the mentioned
Answer: c
Explanation: Because it can work with available throughput.

17) Pick the odd one out
a) File transfer
b) File download
c) E-mail
d) Interactive games
Answer: d
Explanation: Internet telephony is Loss-tolerant other applications are not.

18) Which of the following is an application layer service ?
a) Network virtual terminal
b) File transfer, access, and management
c) Mail service
d) All of the mentioned

19) To deliver a message to the correct application program running on a host, the _____
address must be consulted
a) IP
b) MAC
c) Port
d) None of the mentioned
Answer: c

20) This is a time-sensitive service
a) File transfer
b) File download
c) E-mail

d) Internet telephony

Answer: d

21) Transport services available to applications in one or another form

a) Reliable data transfer

b) Timing

c) Security

d) All of the mentioned

Answer: d

22) Electronic mail uses this Application layer protocol

a) SMTP

b) HTTP

c) FTP

d) SIP

Answer: a

23. The entire hostname has a maximum of

a) 255 characters

b) 127 characters

c) 63 characters

d) 31 characters

24. A DNS client is called

a) DNS updater

b) DNS resolver

c) DNS handler

d) none of the mentioned

View Answer Answer:b

25Servers handle requests for other domains

a) directly

b) by contacting remote DNS server

c) it is not possible

d) none of the mentioned

Answer:b

Explanation:None.

26) DNS database contains

a) name server records

b) hostname-to-address records
c) hostname aliases
d) all of the mentioned
Answer:d
Explanation:None.

27. If a server has no clue about where to find the address for a hostname then
a) server asks to the root server
b) server asks to its adjcent server
c) request is not processed
d) none of the mentioned
Answer:a

28) Which one of the following allows client to update their DNS entry as their IP address change?
a) dynamic DNS
b) mail transfer agent
c) authoritative name server
d) none of the mentioned
Answer:a

29. Wildcard domain names start with label
a) @
b) *
c) &
d) #
Answer:b

30) The right to use a domain name is delegated by domain name registers which are accredited by
a) internet architecture board
b) internet society
c) internet research task force
d) internet corporation for assigned names and numbers
Answer:d

Fill in the blanks

31. The _____ translates internet domain and host names to IP address.
 Answer: Domain name system

32. Which one of the following allows a user at one site to establish a connection to another site and then pass keystrokes from local host to remote host _____
 Answer: telnet

33. Application layer protocol defines _____

Answer: Syntax and semantics

34. Which one of the following protocol delivers/stores mail to receiver server _____
Answer: Simple mail transfer protocol

35. The ASCII encoding of binary data is _____--
Answer: 64 Encoding

36. _____ is an internet standard protocol for managing devices on IP network
Answer: Simple network management protocol

37. _____ is the following is not an application layer protocol
Answer: resource reservation protocol

38. _____ is a signaling communication protocol used for controlling multimedia communication sessions
Answer: session initiation protocol

39. When displaying a web page, the application layer uses the _____
Answer: HTTP protocol
40. DNS stands for _____ Answer: Domain Name System

Department of ELECTRONICS AND COMMUNICATION Engineering

Question Bank (Part A with answers)

Unit-I

1.   List out types of Networks.
Ans: There are different types of hardware networks. They are
o   Personal Area Networks (PAN)
o   Local Area Networks (LAN)
o   Metropolitan Area Networks (MAN)
o   Wide Area Networks (WAN)
o   Internetworks (Internet)

2.   **Brief the Guided Transmission Media**.
Ans:

```
                          ┌──────────────┐
                          │ Transmission │
                          │    media     │
                          └──────────────┘
                    ┌────────────┴────────────┐
            ┌──────────────┐          ┌──────────────┐
            │   Guided     │          │  Unguided    │
            │   (wired)    │          │  (wireless)  │
            └──────────────┘          └──────────────┘
       ┌──────────┼──────────┐               │
┌────────────┐┌──────────┐┌────────────┐┌────────────┐
│Twisted-pair││ Coaxial  ││ Fiber-optic││            │
│   cable    ││  cable   ││   cable    ││ Free space │
└────────────┘└──────────┘└────────────┘└────────────┘
```
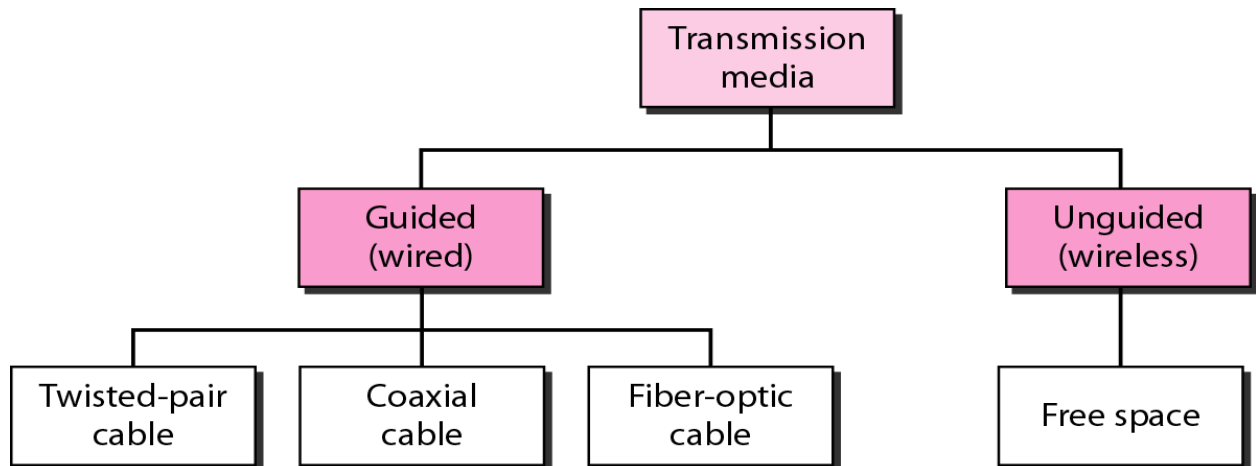
•   Guided media, which are those that provide a conduit from one device to another, include twisted-pair cable, coaxial cable, and fiber- optic cable.
3.   What is internet? Differentiate it from intranet.
Ans: The Internet is a network of networks of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It consists of private, public, academic, business, and government networks from local to global.
An intranet is a private computer network that uses internet protocols, network connectivity to access and share anenterprise information and operations securely with its staff.

4.   List out OSI/ISO reference Model& TCP/IP reference model layers.

Ans: OSI/ISO reference model layers: There are seven layers. They are

- Application
- Presentation
- Session
- Transport
- Network
- Data link
- Physical

TCP/IP reference model layers: There are four layers. They are

- Application
- Transport
- Internet
- Link

5.   Define Network?

Ans: A computer network is a group of computers that use a set of common communication protocols for sharing resources located on network nodes. A node is a computer network may include personal computers, servers, networking hardware, or other specialised or general-purpose hosts connected via communication network technologies, based on physically wired, optical, and wireless radio-frequency. They are identified by hostnames and network addresses.

6.   What are the applications of infrared waves?

Ans: Infrared waves are used in industrial, scientific, military, commercial, and medical applications. They are

o   Night-vision
o   Communications
o   Cooling
o   Thermal-Imaging
o   Thermography
o   Tracking
o   Hyperspectral imaging
o   Spectroscopy
o   Thin film metrology
o   Meteorology
o   Climatology
o   Astronomy
o   Art conservation and analysis

o   Biological systems

7. Explain About Coaxial Cable?

Ans: Coaxial cable is a type of cable that has an inner conductor surrounded by an insulating layer, surrounded by a conductive shielding. Many also have an insulating outer jacket The diagram below illustrates the construction of a typical cable. Electrical signal flows through the center conductor.

8. Explain Network Hard ware devices?

Ans: The common network hardware devices are:

- **Hub** - Hubs connect multiple computer networking devices together. It also acts as a repeater. It can be used with both digital and analog data.
- **Switch** - Switches are more intelligent than hubs. A switch is a multiport device that improves network efficiency over hubs or routers because of the virtual circuit capability. it allows connections to systems like hubs or routers.
- **Router** - Router are also used to divide internal networks into two or more subnetworks.
- **Bridge** - Bridges are used to connect two or more hosts or network segments together. It is used to divide larger networks into smaller sections by sitting between two physical network segments and managing the flow of data between the two.
- **Gateway** - Gateways perform all of the functions of routers and more. Gateways normally work at the Transport and Session layers of the OSI model.
- **Modem** - Modems (modulators-demodulators) are used to transmit digital signals over analog telephone lines.
- **Repeater** -A repeater is an electronic device that amplifies the signal it receives. Repeaters work on the Physical layer.

9. Classify the Un Guided transmission media?

- Ans: transmission and reception are achieved by means of an antenna
- directional
  – transmitting antenna puts out focused beam
  – transmitter and receiver must be aligned
- omnidirectional
  – signal spreads out in all directions
can be received by many antennas

10. Describe Types of Twisted Pair Cables?

Ans: Twisted pairs can be used for transmitting either analog or digital information. Twisted-pair cabling comes in several varieties. They are

- Cat 3 - Category 3 cables consists of two insulated wires gently twisted together. It supports speed of 100-Mbps.
- Category 5 (Cat 5)- Cat 5 replaced earlier Category 3 cables. Four such pairs are typically grouped in a plastic sheath to protect the wires and keep them together. More twists result in less crosstalk and a better-quality signal over longer distances. It supports speed of 1-Gbps.
- Cat 6 or Cat 7- These categories has more stringent specifications to handle signals with greater bandwidths. They have shielding on the individual twisted pairs, as well as around the entire cable. It support speed of 10-Gbps.

Unit-II

1. **Discuss the design issues of data link layer**.
Ans:
- **Frame synchronization:** Data are sent in blocks called frames. The beginning and end of each frame must be recognizable.
- **Flow control:** The sending station must not send frames at a rate faster than the receiving station can absorb them.
- **Error control:** Bit errors introduced by the transmission system should be corrected.
- **Addressing:** On a shared link, such as a local area network (LAN), the identity of the two stations involved in a transmission must be specified.
- **Access Control:** It is usually not desirable to have a physically separate communications path for control information. Accordingly, the receiver must be able to distinguish control information from the data being transmitted.
- **Link management:** The initiation, maintenance, and termination of a sustained data exchange require a fair amount of coordination and cooperation among stations. Procedures for the management of this exchange are required.

2. **What is the purpose of Hamming code?**
Ans: Hamming code is a block code that is capable of detecting up to two simultaneous bit errors and correcting single-bit errors. It makes use of the concept of parity and parity bit s, which are bits that are added to data, so that the validity of the data can be checked when it is read or after it has been received in a data transmission.

3. **Define Collision?**
Ans: Collision theory states that for a chemical reaction to occur, the reacting particles must collide with one another. ... For collisions to be successful, reacting particles must (1) collide with (2) sufficient energy, and (3) with the proper orientation.

4. **List out Types Multiple access protocols?**
Ans: Following are the various methods to access the channel based on their time, distance and codes

      FDMA (Frequency Division Multiple Access)
      TDMA (Time Division Multiple Access)
      CDMA (Code Division Multiple Access)

5. **Describe types of Error correcting Codes?**

Ans: There four different error-correcting codes:

- Hamming Codes − It is a block code that is capable of detecting up to two simultaneous bit errors and correcting single-bit errors.
- Binary Convolution Code − Here, an encoder processes an input sequence of bits of arbitrary length and generates a sequence of output bits.
- Reed - Solomon Code − They are block codes that are capable of correcting burst errors in the received data block.
- Low-Density Parity Check Code − It is a block code specified by a parity-check matrix containing a low density of 1s. They are suitable for large block sizes in very noisy channels.

6.   Explain about Elementary data link protocols:?

Ans:

Simplex protocol

Stop&Wait protocol

Go-Back –N protocol

Selective repeat protocol

7.Describe types of Error Detecting Codes?

   Types of Error detection

Parity Checking.

Cyclic Redundancy Check (CRC)

Longitudinal Redundancy Check (LRC)

   Check Sum.

8.List out types of Framing Methods?

Ans: The data link layer divides the stream of bits received from the network layer into manageable data units called frames.

Framing can be done in two ways:

1.   Fixed Size Framing

2.   Variable Size Framing

- Fixed Size Framing:

▪   In fixed-size framing, there is no need for defining the boundaries of the frames; the size itself can be used as a delimiter.

Ex: ATM Cell which is of 53Bytes.

- Variable-Size Framing:

▪   In variable-size framing, we need a way to define the end of the frame and the beginning of the next.

9.What is Piggybacking? How does it useful?

Ans: **Piggy Backing:**

o   A method to combine a data frame with ACK.

o   Station A and B both have data to send.

o   Instead of sending separately, station A sends a data frame that includes an ACK. Station B does the same thing.

o   Piggybacking saves bandwidth.

A   B

$R = 0$

$S = 0$ Frame 0, ACK 0 $R = 0$

$R = 0$ Frame 0, ACK 1 $S = 0$

$S = 1$ Frame 1, ACK 1 $R = 1$

$R = 1$ Frame 1, ACK 0 $S = 1$

$S = 0$

Time   Time
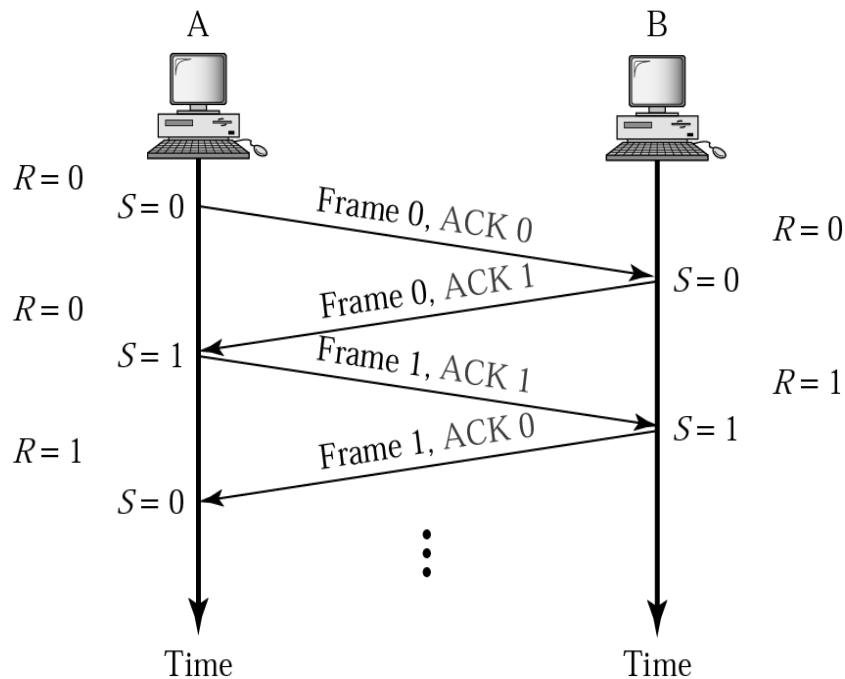
10.Explain Bit Stuffing Method?

Ans: Bit stuffing is used for various purposes, such as for bringing bit streams that do not necessarily have the same or rationally related bit rates up to a common rate, or to fill buffers or frames. The location of the stuffing bits is communicated to the receiving end of the data link, where these extra bits are removed to return the bit streams to their original bit rates or form. Bit stuffing may be used to synchronize several channels before multiplexing or to rate-match two single channels to each other. he transmitted bit sequence "01111110" containing six adjacent 1 bits is the Flag byte. Bit stuffing ensures that this pattern can never occur in normal data, so it can be used as a marker for the beginning and end of the frame without any possibility of being confused with normal data.[

Unit-III

1.   What is Tunnelling?

Ans: A tunneling is a communication protocol that allows movement of data from one network to another. It involves allowing private network communications to be sent across a public network (such as the Internet) through a process called encapsulation.

2.   Explain briefly about flooding in computer networks?

Ans: Flooding is a technique which requires no network information like topology, load condition , cost of diff. paths. Every incoming packet to a node is sent out on every outgoing like except the one it arrived on.

Characteristics –

- All possible routes between Source and Destination is tried. A packet will always get through if path exists
- As all routes are tried, there will be atleast one route which is the shortest
- All nodes directly or indirectly connected are visited

Limitations –

- Flooding generates vast number of duplicate packets
- Suitable damping mechanism must be used

3.   What is Crash Recovery?

Ans: Crash recovery is the process by which the database is moved back to a consistent and usable state. This is done by rolling back incomplete transactions and completing committed transactions that were still in memory when the crash occurred . ... A hardware failure such as memory, disk, CPU, or network failure.

4.   **What is Optimality Principle?**   ]

Ans: optimality principle states about optimal routes without regard to network topology or traffic. It states that if router J is on the optimal path from router I to router K, then the optimal path from J to K also falls along the same route.

5.   What are the metrics used by routing protocols?

Ans: Router metrics can contain any number of values that help the router determine the best route among multiple routes to a destination. A router metric typically based on information like path length, bandwidth, load, hop count, path cost, delay, MTU, reliability and communications cost.

6.   Define Routing? Explain types of Routing.

Ans: Routing is a process performed by network layer (devices) in order to deliver the packets by choosing an optimal path from source machine to destination machine.

There are 3 types of routing:

1. Static routing: Static routing is a process of adding routes manually in routing table.

2. Default Routing: In default routing, router is configured to send all packets towards a single router. It doesn't matter to which network the packet belongs, it is forwarded out to router which is configured for default routing.

3. Dynamic Routing – Dynamic routing makes automatic adjustment of the routes according to the current state of the route in the routing table.

7.   Give the advantages of hierarchical routing.

Ans: Hierarchical routing is the procedure of arranging routers in a hierarchical manner. A good example would be to consider a corporate intranet. Most corporate intranets consist of a high speed backbone network. Connected to this backbone are routers which are in turn connected to a particular workgroup. These workgroups occupy a unique LAN. The reason this is a good arrangement is because even though there might be dozens of different

workgroups, the span (maximum <u>hop count</u> to get from one host to any other host on the network) is 2. Even if the workgroups divided their LAN network into smaller partitions, the span could only increase to 4 in this particular example.

Considering alternative solutions with every router connected to every other router, or if every router was connected to 2 routers, shows the convenience of hierarchical routing. It decreases the complexity of <u>network topology</u>, increases routing efficiency, and causes much less <u>congestion</u> because of fewer routing advertisements. With hierarchical routing, only core routers connected to the backbone are aware of all routes. Routers that lie within a LAN only know about routes in the LAN. Unrecognized destinations are passed to the default route.

8.   What is Multi casting?

Ans: Multicast is a method of group communication where the sender sends data to multiple receivers or nodes present in the network simultaneously.

•   Multicasting is a type of one-to-many and many-to-many communication as it allows sender or senders to send data packets to multiple receivers at once across LANs or WANs.

•   It helps in minimizing the data frame of the network.

•   Multicasting works in similar to Broadcasting.

•   Multicasting allows a single transmission that can be split up among the multiple users; consequently, this reduces the bandwidth of the signal.

9.   Write the responsibilities of network layer.

Ans: The network layer is responsible for delivery of data packets from the source to the destination across multiple hops or links.

The functions are

•   The network layer accepts data from the transport layer, divides and encapsulates it into packets and sends it to the data link layer. The reverse procedure is done during receiving data.

•   It also addresses messages and translates logical addresses (i.e., IP addresses) into physical addresses (i.e., MAC addresses).

•   The network layer is responsible for routing packets from the source host to the destination host.

•   Many networks are partitioned into sub-networks or subnets. The network layer controls the operations of the subnets.

10.   List Out Types of Congestion Control Algorithms?

Ans: Too many packets present in (a part of) the network causes packet delay and
loss that degrades performance. This situation is called congestion.
The network and transport layers share the responsibility for handling congestion.There are different approaches to congestion control. they are
Traffic-Aware Routing
Admission control
Traffic Throttling
Load Shedding
Unit-IV

1.   **Explain about Transport Layer Primitives**?

Ans: There are five types of service primitives:

1.   LISTEN : When a server is ready to accept an incoming connection it executes the LISTEN primitive. It blocks waiting for an incoming connection.
2.   CONNECT : It connects the server by establishing a connection. Response is awaited.
3.   RECIEVE: Then the RECIEVE call blocks the server.
4.   SEND : Then the client executes SEND primitive to transmit its request followed by the execution of RECIEVE to get the reply. Send the message.
5.   DISCONNECT : This primitive is used for terminating the connection. After this primitive one can't send any message. When the client sends DISCONNECT packet then the server also sends the DISCONNECT packet to acknowledge the client. When the server package is received by client then the process is terminated

2.   **Define Multiplexing?**

Ans: Multiplexing is the process of combining multiple signals into one signal, over a shared medium. If analog signals are multiplexed, it is Analog Multiplexing and if digital signals are multiplexed, that process is Digital Multiplexing

3.   What is Crash Recovery?

Ans: Crash recovery is the process by which the database is moved back to a consistent and usable state. This is done by rolling back incomplete transactions and completing committed transactions that were still in memory when the crash occurred (Figure 1). ... A hardware failure such as memory, disk, CPU, or network failure.

4.   **Define quality of service?**

Ans: Quality of Service (QoS) is a set of technologies that work on a network to guarantee its ability to dependably run high-priority applications and traffic under limited network capacity. ... Measurements of concern to QoS are bandwidth (throughput), latency (delay), jitter (variance in latency), and error rate

5.   **List out different services provided in TCP.**

Ans: The Transmission Control Protocol is the most common transport layer protocol. It works together with IP and provides a reliable transport service between processes using the:
1.   Process-to-Process Communication TCP provides process to process communication, i.e, the transfer of data takes place between individual processes executing on end systems. This is done using port numbers or port addresses. Port numbers are 16 bit long that help identify which process is sending or receiving data on a host.
2.   Stream oriented this means that the data is sent and received as a stream of bytes(unlike UDP or IP that divides the bits into datagram's or packets). However, the network layer, that provides service for the TCP, sends packets of information not streams of bytes. Hence, TCP groups a number of bytes together into a *segment* and adds a header to each of these segments and then delivers these segments to the network layer. At the network layer, each of these segments are encapsulated in an

IP packet for transmission. The TCP header has information that is required for control purpose which will be discussed along with the segment structure.

3.   Connectionorientedservice   –
Unlike UDP, TCP provides connection oriented service. It defines 3 different phases:

-                   Connection establishment
-                   Data transfer
-                   Connection termination

6.   What is Addressing?

Ans: An IPv6 anycast address is an address that is assigned to more than one interface (typically belonging to different nodes), with the property that a packet sent to an anycast address is routed to the "nearest" interface having that address, according to the routing protocols' measure of distance

7.   Explain TCP Connection Establishment?

Ans: To establish a connection, TCP usesa three-way handshake. Before a client attempts to connect with a server, the server must first bind to and listen at a port to open it up for connections: this is called a passive open. ... ACK: Finally, the client sends an ACK back to the server.

8.   Explain TCP Connection Release?

Ansr: the normal way of terminating a TCP connection is by using the graceful TCP connection release. This mechanism uses the FIN flag of the TCP header and allows each host to release its own direction of data transfer. ... The first path is when the host receives a segment with sequence number x and the FIN flag set.

9.   Give types of Internet Transport Protocols?

Transmission Control Protocol (TCP

Internet Protocol (IP)

User Datagram Protocol (UDP)

Post office Protocol (POP)

Simple mail transport Protocol (SMTP)

File Transfer Protocol (FTP)

Hyper Text Transfer Protocol (HTTP)

Hyper Text Transfer Protocol Secure (HTTPS)

10.   Explain About RPC Protocol?

Ans: In distributed computing a remote procedure call (RPC) is when a computer program causes a procedure (subroutine) to execute in another address space (commonly on another computer on a shared network), which is coded as if it were a normal (local) procedure call, without the programmer explicitly coding the details for the remote interaction.That is, the programmer writes essentially the same code whether the subroutine is local to the executing program, or remote.

Based on the needs of different systems, several communication protocols have been proposed for use in RPC which are mentioned below:

Client   Server

First RPC
Request message   Procedure execution

Next RPC
Request message   Procedure execution
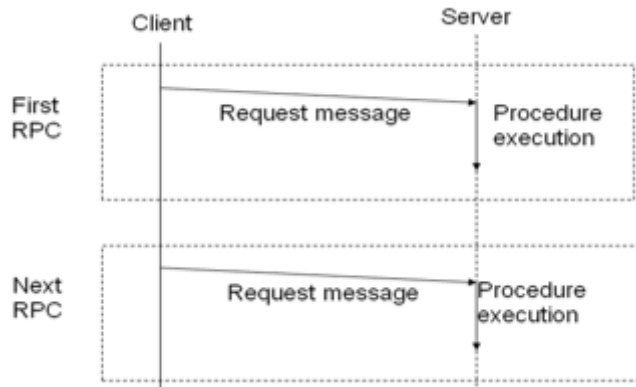
Unit-V

1.   Give the HTTP message Format?

Ans: HTTP Message is used to show how data is exchanged between the client and the server. It is based on client-server architecture. An HTTP client is a program that establishes a connection to a server to send one or more HTTP request messages. An HTTP server is a program that accepts connections to serve HTTP requests by sending an HTTP response messages.

`   HTTP-message = Request | Response ; HTTP/1.1 messages

2.   What is DNS? Write its properties.

Ans: The domain name system (DNS) connects URLs with their IP address. With DNS, it's possible to type words instead of a string of numbers into a browser, allowing people to search for websites and send emails using familiar names. When you search for a domain name in a browser, it sends a query over the internet to match the domain with its corresponding IP. Once located, it uses the IP to retrieve the website's content. Most impressively, this whole process takes just milliseconds.

3.   What are the basic functions of email systems?

        Discussing Business Decisions.

Evidence in court.

Get your attachments right. The most common mistake in emailing is clicking "reply all" when you meant to click "reply". ...

Limit forwarding and pointless email threads. ...

Try to see the big picture.

4.   What are the MIME content Types?

Ans:

Extension	Kind of document	MIME Type
.arc	Archive document (multiple files embedded)	**application**/x-freearc
.avi	AVI: Audio Video Interleave	video/x-msvideo
.azw	Amazon Kindle eBook format	**application**/vnd.amazon.ebook
.bin	Any kind of binary data	**application**/octet-stream

5. Define Multimedia?

Ans: Multimedia is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation. In other words we can say that Multimedia is a computerized method of presenting information combining textual data, audio, visuals (video), graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).

Multimedia as name suggests is the combination of Multi and Media that is many types of media (hardware/software) used for communication of information.

6. What is cryptography?

Ans: Cryptography, or cryptology (from Ancient Greek: κρυπτός, romanized: kryptós "hidden, secret"; and γράφειν graphein, "to write", or -λογία -logia, "study", respectively), is the practice and study of techniques for secure communication in the presence of third parties called adversaries.

7. Explain MIME Header?

The MIME stands for Multi-Purpose Internet Mail Extensions. As the name indicates, it is an extension to the Internet email protocol that allows it's users to exchange different kinds of data files over the Internet such as images, audio, and video. The MIME is required if text in character sets other than ASCII.

8.Explain Streaming Audio and Video

Streaming audio or video is delivered by a streaming server, which can deliver a constant flow of audio and/or video across a network that might be slow or congested. It is much like watching television with an antenna; you will receive only the video that you will be watching immediately. In contrast, video files that reside on a web server will be downloaded for viewing, instead of streamed. Viewers will need to wait for enough of the video to be downloaded before they can view it. This can be a preferable means of transmission if you want to preserve the quality of your video for all viewers

9.Discuss about Protocols used between Mail Transfer Agents?

Email or the SMTP SMTP is the protocol for transferring electronic mail. RFC 5321 describes the protocol for the use of sending mail between mail servers also referred to as mail transfer agents. SMTP has a dedicated well-known port number 25. It is not the protocol for collecting mail by a user.

10.Explain about digital audio?

Digital audio is a representation of <u>sound</u> recorded in, or converted into, <u>digital form</u>. In digital audio, the <u>sound wave</u> of the <u>audio signal</u> is typically encoded as numerical <u>samples</u> in a continuous sequence. For example, in <u>CD audio</u>, samples are taken 44,100 <u>times per second</u>, each with 16-bit <u>sample depth</u>. Digital audio is also the name for the entire technology of <u>sound recording and reproduction</u> using audio signals that have been encoded in digital form..

In a digital audio system, an <u>analog electrical signal</u> representing the sound is converted with an <u>analog-to-digital converter</u> (ADC) into a digital signal, typically using <u>pulse-code modulation</u> (PCM). This digital signal can then be recorded, edited, modified, and copied using <u>computers</u>, audio playback machines, and other digital tools. When the sound engineer wishes to listen to the recording on headphones or loudspeakers (or when a consumer wishes to listen to a digital sound file), a <u>digital-to-analog converter</u> (DAC) performs the reverse process, converting a digital signal back into an analog signal, which is then sent through an <u>audio power amplifier</u> and ultimately to a <u>loudspeaker</u>.

Guru Nanak Institutions Technical Campus (Autonomous)
School of Engineering & Technology

III Year B.Tech. ECE II-Sem   **L   T   P   C**

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA (18OE0CS1A)

SYLLABUS:

UNIT – I

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm; Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

UNIT – II

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT – III

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes. Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

UNIT – IV

Files: Streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT – V

GUI programming with Java: The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components, containers, JFrame, JApplet, JDialog, JPanel; Overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications; Layout management: Layout manager types: Border, grid and flow; Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.

TEXT BOOKS:

1. Herbert Schildt, Dale Skrien, "Java Fundamentals: A Comprehensive Introduction", McGraw Hill, 1st Edition, 2013.

2. Herbert Schildt, "Java the Complete Reference", McGraw Hill, Osborne, 8th Edition, 2011.

3. T. Budd, "Understanding Object Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

REFERENCE BOOKS:

P.J. Deitel, H. M. Deitel, "Java: How to Program", Prentice Hall, 6th Edition, 2005.

P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, CRC Press, 2007.

Bruce Eckel, "Thinking in Java", Prentice Hall, 4th Edition, 2006.

Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

MODEL LESSON PLAN / CONSOLIDATED UNIT WISE LESSON PLAN

Subject	Object Oriented Programming through JAVA			
Faculty	Mr. Mohd. Irfan			
Text Books (to be acquired by the Students)				
Book 1	Herbert Schildt, Dale Skrien, "Java Fundamentals: A Comprehensive Introduction", McGraw Hill, 1st Edition, 2013.			
Book 2	Herbert Schildt, "Java the Complete Reference", McGraw Hill, Osborne, 8th Edition, 2011.			
Reference Books				
Book 3	.J. Deitel, H. M. Deitel, "Java: How to Program", Prentice Hall, 6th Edition, 2005.			

Unit	Topic	Chapters			No of Classes
		Book 1	Book 2	Book 3	
I	Object oriented Programming Concepts	Chap-1, 2,3,4,5,6,7	Chap-1,2	Chap 1	15
II	Inheritance	Chap-8,9	Chap 3,4	Chap 2,3	12
III	Exception handling, Multithreading	Chap-10,12	Chap 4,5	Chap	10
IV	Files	Chap-11	Chap 7,8	Chap 6,7	9
V	GUI programming with Java	Chap-17,18	Chap 9,10	Chap 8,9	9
Total Classes					55
Tutorial Classes					16
Classes for Beyond Syllabus-03, Remedial Classes-04, Descriptive Tests-02					09
Total Number of Classes					80

MICRO LESSON PLAN

Sl. No	Name of the Topic	No. of Classes required	Cumulative number of periods	Teaching AID
UNIT – I				
1	OOP concepts: Classes and objects, data abstraction	1	1	PPT/Chalk & Talk
2	encapsulation, inheritance, benefits of inheritance, polymorphism,	1	2	PPT/Chalk & Talk
3	procedural and object oriented programming paradigm; Java programming	1	3	PPT/Chalk & Talk
4	Tutorial Class	1	4	PPT/Chalk & Talk
5	History of Java, Java buzzwords, data types, variables,	2	6	PPT/Chalk & Talk
6	scope and life time of variables, arrays, operators	1	7	PPT/Chalk & Talk
7	expressions, control statements, type conversion and casting,	1	8	PPT/Chalk & Talk
8	Tutorial Class	1	9	PPT/Chalk & Talk
9	simple java program, concepts of classes, objects, constructors, methods,	1	10	PPT/Chalk & Talk
10	access control, this keyword, garbage collection, overloading methods and constructors	2	12	PPT/Chalk & Talk
11	method binding, inheritance, overriding and exceptions,	1	13	PPT/Chalk & Talk
12	Parameter passing, recursion, nested and inner classes, exploring string class.	1	14	PPT/Chalk & Talk
13	Tutorial Class	1	15	Practice
14	Remedial/NPTEL	1	16	Practice

	UNIT – II			
15	Inheritance: Inheritance hierarchies, super and subclasses	1	17	PPT/Chalk & Talk
16	Member access rules, super uses, using final with inheritance,	1	18	PPT/Chalk & Talk
17	preventing inheritance: final classes and methods	1	19	PPT/Chalk & Talk
18	Tutorial Class	1	20	Practice
19	Polymorphism: Dynamic binding, method overriding	1	21	PPT/Chalk & Talk
20	Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces	1	22	PPT/Chalk & Talk
21	Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages	1	23	PPT/Chalk & Talk
22	Tutorial Class	1	24	Practice
23	Understanding CLASSPATH, importing packages	1	25	PPT/Chalk & Talk
24	differences between classes and interfaces, defining an interface	1	26	PPT/Chalk & Talk
25	implementing interface, applying interfaces	1	27	PPT/Chalk & Talk
26	variables in interface and extending interfaces, Exploring java.io.	2	29	PPT/Chalk & Talk
27	Tutorial Class	1	30	Practice
28	Remedial/NPTEL	1	31	Practice
29	Special Descriptive test-1	1	32	Test
	UNIT – III			
30	Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling,	1	33	PPT/Chalk & Talk
31	Termination or resumptive models, exception hierarchy,	1	34	PPT/Chalk & Talk
32	Tutorial Class	1	35	Practice
33	usage of try, catch, throw, throws and finally	1	36	PPT/Chalk & Talk

34	built in exceptions, creating own exception sub classes	1	37	PPT/Chalk & Talk
35	Tutorial Class	1	38	Practice
36	String handling,Exploring java.util.	1	39	PPT/Chalk & Talk
37	Differences between multi threading and multitasking, thread life cycle, creating threads	2	41	PPT/Chalk & Talk
38	thread priorities, synchronizing threads, inter thread communication, thread groups	1	42	PPT/Chalk & Talk
39	Tutorial Class	1	43	Practice
40	daemon threads. Enumerations, auto boxing, annotations, generics	2	45	PPT/Chalk & Talk
41	Remedial/NPTEL	1	46	Practice
UNIT – IV				
42	Files: Java's I/O is built on streams, Byte Streams and character streams	1	47	PPT/Chalk & Talk
43	The Byte Stream classes, The character stream classes	1	48	PPT/Chalk & Talk
44	Using Byte Streams, Reading and writing files	1	49	PPT/Chalk & Talk
45	Tutorial Class	1	50	Practice
46	Reading and writing Binary data	1	51	PPT/Chalk & Talk
47	Random Access files	1	52	PPT/Chalk & Talk
48	File I/O using character stream.	1	53	PPT/Chalk & Talk
49	Tutorial Class	1	54	Practice
50	Discussion of various drivers	1	55	PPT/Chalk & Talk
51	Connecting to database	1	56	PPT/Chalk & Talk
52	querying a database	1	57	PPT/Chalk & Talk
53	Tutorial Class	1	58	Practice
54	processing the results	1	59	PPT/Chalk & Talk

55	updating data with JDBC.	1	60	PPT/Chalk & Talk
56	updating data with JDBC.	1	61	PPT/Chalk & Talk
57	Tutorial Class	1	62	Practice
58	Topics Beyond Syllabus	2	64	Guest Lecture
59	Remedial/NPTEL	1	65	Practice
60	Special Descriptive Test-2	1	66	Test
UNIT V				
61	Applets – Concepts of Applets,	1	67	PPT/Chalk & Talk
62	differences between applets and applications, life cycle of an applet	1	68	PPT/Chalk & Talk
63	types of applets, creating applets	1	69	PPT/Chalk & Talk
64	Tutorial Class	1	70	Practice
65	passing parameters to applets.	1	71	PPT/Chalk & Talk
66	Swing – Introduction, limitations of AWT	1	72	PPT/Chalk & Talk
67	MVC architecture, components	1	73	PPT/Chalk & Talk
68	containers, exploring swing- JApplet, JFrame	1	74	PPT/Chalk & Talk
69	JComponent, Icons and Labels, Text fields, buttons	1	75	PPT/Chalk & Talk
70	Tutorial Class	1	76	Practice
71	JButton class, Check boxes, Radio buttons, Combo boxes	1	77	PPT/Chalk & Talk
72	Tabbed Panes, Scroll Panes, Trees, and Tables	1	78	PPT/Chalk & Talk
73	Topics Beyond Syllabus	1	79	Guest Lecture
74	Tutorial Class	1	80	Practice
Total Classes			55	

Tutorial Classes	16
Topics for Beyond Syllabus	03
Descriptive Tests	02
Remedial classes/NPTEL	04
Total Number of Classes	80

ASSIGNMENT QUESTIONS

UNIT-I

1. What is a Constructor? What are the special properties? (GNITC AUTONOMOUS,DEC- 2017)

2. Demonstrate two dimensional arrays in Java with an example. (GNITC AUTONOMOUS, DEC 2017)

3. What feature of Java makes it platform independent and portable? (JNTUH, DEC 2017)

4. Is Java a robust language? Justify your answer. (JNTUH, DEC 2017)

5. Differentiate between a class and object. (JNTUH, DEC 2017)

UNIT-II

1. What is method overloading? Can you define two methods that have same name but different parameter types? Can you define two methods in a class that have identical method names and parameter profile with different return values types or different modifier? (GNITC,AUTONOMOUS,2017)

2. What is inheritance? Explain different forms of inheritance with suitable program segments and real world example classes. (JNTUH DEC-2017)

3. Program to demonstrate Constructor overloading? (DEC-2017)

4. What is meant by Dynamic Method Dispatch? (DEC-2017)

5. How the problem of Method Overriding will occur in program and define overriding? (MAY-15,GNITC AUTONOMOUS DEC-2017)

UNIT-III

1. Write a program to illustrate the use of multiple catch blocks for a try block. (JNTUH,DEC-17)

2. What are the uses of "throw and "throws" clause with example? (JNTUH,DEC-2017)

3. Discuss about the thread priority with example? (MAY-15)

4. How consumer-producer problem can be solved? (MAY-15)

5. Explain the Synchronization among threads with example. (MAY-17,JNTUH DEC 2017)

UNIT-IV

1. What are the methods available in the Character Stream? (JNTUH DEC-18,R16)

2. Distinguish between Byte Stream and Character Stream Classes. (JNTUH DEC-18,R16)

3. Explain the types of drivers used in JDBC. (JNTUH MAY-16,R13)

4. What is JDBC? Explain the role & responsibility of JDBC API. (GNITC Dec 2019)

5. What is Driver Manager Class? Explain the types of JDBC Driver with suitable diagram. (GNITC DEC 2019)

UNIT-V

1. What are the different Swing components? Explain. (MAY-17)

2. List out various Swing containers and explain them clearly. (MAY-15)

3. Write a Java program for develop simple calculator using Swings. (MAY-15)

4. Discuss about various methods defined in the following classes:

a. JLabel   b. JTextField   c. JButton   d. JTextArea   (MAY-16,17)

5. Explain the usage of JFrame with example and explain about check box, Combo box, Radio button? (MAY-16,17)

QUESTION BANK / PREVIOUS QUESTION PAPERS QUESTIONS

PART-A

UNIT-I

1. What is the size of char data type? Why does it differ from C language? (JNTUH DEC-17,R13)

2. Define Data abstraction. (JNTUH DEC-2017,R13)

3. What are the features of Java Language? (JNTUH MAY-17,R15)

4. List the types of operators used in java. (JNTUH MAY-17,R15)

5. What is Static Inner class? (JNTUH MAY-17,R15)

6. Distinguish between break and continue. (JNTUH MAY-16,R13)

7. What is type casting? (JNTUH MAY-16,R13)

8. List String Manipulation function of Java String class. (JNTUH MAY-15,R13)

9. Define Polymorphism. (JNTUH NOV-16,R13)

10. Why java is known as Platform Independent? (JNTUH NOV-16,R13)

UNIT-II

1. What is package? (JNTUH DEC-2017,R13)

2. What is the use of Super keyword? (JNTUH MAY-16,R13)

3. Distinguish between abstract class and concrete class. (MAY-16,R13/JNTUH,R15JNTUH DEC-2018)

4.What is java package? What is CLASSPATH? (JNTUH MAY-17,R15/ JNTUH MAY-2018,R16)

5. Differentiate between interface and Abstract Class. (JNTUH MAY-15/R13, JNTUH JUNE-14/ JNTUH,R15 DECEMBER-2018)

6. What are the uses of final keyword in java? (JNTUH MAY-15,R13/ JNTUH,R15 DECEMBER-2018)

7. What is Runtime Polymorphism? (JNTUH ,JUNE-14)

8. What is the significance of the Classpath environment variable in creating/using a package? (JNTUH DEC-2017,R16)

9. What is abstract class? Give example. (JNTUH MAY-2018,R16)

10. Write a java program to demonstrate hierarchical and multiple inheritance using interfaces. (GNITC OCT 2020 R18)

UNIT-III

1. Differentiate between error and exception. (JNTUH DEC-17,R16)

2. Explain how multiple catch statements work. (JNTUH MAY-17,R15,JNTUH,R15 DEC-2018)

3. What are the advantages of multithreading? (JNTUH MAY-16,R13/)

4. What are the types of Exceptions? (JNTUH MAY-16,R13)

5. List any six built-in exceptions in java. (JNTUH MAY-15,R13)

6. What are checked and unchecked Exceptions? (JNTUH R13,MAY-16)

7. What is Synchronization and why it is important?(JNTUH DEC-17,R16)

8. How do we start and stop a thread? (JNTUH MAY-18,R16)

9. Write the complete life cycle of thread. (JNTUH MAY-18,R16)

10. How do we set Priorities for threads? (JNTUH MAY-18,R16)

UNIT-IV

1. Compare byte streams with Character Stream. (JNTUH,R15 DEC-2018)

2. List file access operations. (JNTUH,R15 DECEMBER-2018)

3. What are the methods available in Character Stream? (JNTUH, DEC-17 R16)

4. What types of streams does java define? (JNTUH,R15 DEC-2018)

5. What streams are used to read and write binary data? (R15 DEC-2018)

6. Write the syntax to create a random file. (JNTUH April/May -2018)

7. What class is used to read characters from a file? Write the syntax? (JNTUH May 2018)

8. What method is used to list the files in a directory?(JNTUH Dec 2018)

9. Write a program to compare two files? (JNTUH,R15 DEC-2018)

10. What is the use of FileInputStream and FileOutputStream? (JNTUH,R15 DEC-2018)

UNIT-V

1. What is the use of Layout Manager? (MAY-17,DEC-17 JNTUH R13)

2. Give the hierarchy for swing components. (JNTUH DEC-17,R13)

3. What are the containers available in Swings? (JNTUH MAY-15,R13)

4. Difference between Applet and Application? (JNTU MAY-16,MAY-15,R13)

5. What are the limitations of AWT? (JNTUH MAY-18,R16)

6. Why do applet class need to be declared as public? (JNTUH MAY-18,R16)

7. What is Swing in Java? How it is differs from Applet? (JNTUH DEC-18,R16)

8. How do Java applets differ from Application programs? (JNTUH DEC-18,R16)

9. List the types of containers? (JNTUH DEC-18,R16)

10. Write a simple program for swing? JNTUH MAY-18,R16)

PART-B

UNIT-I

1.a).Differentiate procedural and object oriented programming paradigms? (GNITC DEC-20,R18)

   b).Explain and write syntax of various control flow statement used in java?

2. Write the significance of Java Virtual Machine. (JNTUH DEC-18,R16)

3. How do we implement polymorphism in Java? (JNTUH DEC-18,R16)

4. What is a Array? How to declare Array in Java? Give Examples. (JNTUH DEC-18,R16)

5. What is inheritance and how does it help to create new classes quickly? (JNTUH MAY-18,R16)

6. Describe different levels of access protection available in Java. (JNTUH MAY-18,R16)

7. List and explain the primitive data types available in Java. (JNTUH MAY-18,R16)

8. What is polymorphism? Explain different types of polymorphisms with example. (JNTUH MAY-18,R16)

9. a).What is the use of super keyword in JAVA?What are the difference between static and final methods? (GNITC DEC-20,R18)

   b).Explain different parameter passing methods with examples?

10. Explain the significance of public, protected and private access specifiers in inheritance.

      (JNTUH DEC-17,R16)

UNIT-II

1. What is package? How do you create a package with suitable examples? (JNTUH DEC-17,R16), (GNITC DEC-20,R18)

2.a).What is inheritance?what are the different types of inheritances?Explain with neat diagrams?

   b).Explain how to create interface and how to implement interface with example? (GNITC DEC-20,R18)

3. What is the accessibility of a public method or field inside a non public class or interface? Explain. (JNTUH DEC-17,R16)

4. What is an interface? What are the similarities between interface and classes? (JNTUH MAY-2018,R16)

5. How can you extend one interface by the other interface? Discuss. (JNTUH MAY-2018,R16)

6. Discuss about CLASSPATH environment variables. (JNTUH MAY-2018,R16)

7. How to design and implement interface in Java? Give Example. (JNTUH MAY-2018,R16)

8. What are the three uses of final keyword? Explain with example. (JNTUH MAR-17,R13)

9. Make a comparison between the Classes and Interfaces. (JNTUH NOV-16,R13)

10. How can you extend one interface by the other interface? Discuss. (GNITC OCT 2020 R18)

UNIT-III

1. Write a program to use multiple catch blocks in a try block. (JNTUH ,R13,DEC-2017/ JNTUH,R15 DECEMBER-2018)

2.a). What is an Exception? How is an Exception handled in Java? (JNTUH DEC-18,R16)(GNITC DEC-20,R-18)

  b). Differentiate between error and exception.

3. Differentiate between multiprocessing and multithreading. (JNTUH DEC-2018,R16)

4. What are the advantages of using Exception handling mechanism in a program? (JNTUH MAY-18,R16)

5. Write a java program that demonstrates how certain exception types are not allowed to be thrown? (JNTUH MAY-2018,R16)

6. What are the different ways that are possible to create multiple threaded programs in Java? Discuss the differences between them. (JNTUH MAY-2018,R16)

7. Write a program to create four threads using Runnable interface. (JNTUH MAY-2018,R16), (GNITC DEC-20,R18)

8. Differentiate between checked and unchecked exceptions with examples. (JNTUH DEC-17,R16)

9. What are the different ways to handle exceptions? Explain.(JNTUH MAY-2018,R16)

10.a).How many ways are possible in java to create multithreaded programs? Discuss the differences between them. (JNTUH MAY-2018,R16)

   b).Explain different inter thread communication methods? (GNITC DEC-20,R-18)

UNIT-IV

1. What are the methods available in the Character Stream? (JNTUH DEC-18,R16)

2. Distinguish between Byte Stream and Character Stream Classes. (JNTUH DEC-18,R16)(GNITC DEC-20,R-18)

3. What is JDBC?Explain the types of drivers used in JDBC. (JNTUH MAY-16,R13))(GNITC DEC-20,R-18)

4. What is JDBC? Explain the role & responsibility of JDBC API. (GNITC DEC 2019).

5. What is Driver Manager Class? Explain the types of JDBC Driver with suitable diagram. (GNITC DEC 2019).

6. What is Thin Driver? Which driver is fast among the four JDBC drivers? Justify.(GNITC DEC 2019

7. What is statement? Explain the types of statement in JDBC. (JNTUH DEC-18,R16)

8. How to read and write files in java? Explain with example? (JNTUH MAY-16,R13)(GNITC DEC-20,R-18)

9. Write a Program to display the details of a user created file. (Name, length, path, absolute path, read and write mode). (JNTUH, DEC-17 R16)

10. Write a program for file using the seek() of various locations? (JNTUH DEC-18,R16)

UNIT-V

1. Explain about parameter passing to applets. (R13,JNTUH MAR-17)

2. What is the difference between init() and start() methods in an Applet? When will each be executed? (JNTUH DEC-18,R16)

3. Write the applets to draw the Cube and Circle/Cylinder shapes. (JNTUH DEC-18,R16/ JNTUH MAY-18,R16)

4. Explain various layout managers in Java. (JNTUH DEC-18,R16/ JNTUH MAY-18,R16)

5. What is an Applet? Explain the life cycle of Applet with neat sketch. (JNTUH MAY-18,R16) (GNITC DEC 20,R18)

6. Write a program that create a frame window that responds to key strokes. (JNTUH MAY-18,R16)

7. Discuss about different applet display methods in brief. (JNTUH DEC-17,R16)

8. Explain the various components of Swings. (JNTUH DEC-17,R16)(GNITC DEC 20,R18)

9. Explain move or drag component placed in Swing Container. (JNTUH DEC-17,R16)

10. Write a Swing Program using checkboxes and radio buttons. (R07,JNTUH DEC-15)

OBJECTIVE TYPE QUESTIONS

UNIT I

1. Which of these operators is used to allocate memory for an object?
A. malloc

B. alloc

C. new

D. give

2. What is the return type of a method that does not returns any value?
A. int

B. float

C. void

D. double

3. Which of the following is a method having same name as that of it's class?
A. finalize

B. delete

C. class

D. constructor

4. Which keyword is used by method to refer to the object that invoked it?
A. import

B. catch

C. abstract

D. this

5. Which function is used to perform some action when the object is to be destroyed?
A. finalize()

B. delete()

C. main()

D. None of the mentioned

6. Which of these can be overloaded?
A. Methods

B. Constructors

C. All of the mentioned

D. None of the mentioned

7. Which of these is used to access member of class before object of that class is created?
A. public

B. private

C. static

D. protected

8. Which of these cannot be declared static?
A. class

B. object

C. variable

D. method

9. Which of these method of String class is used to obtain character at specified index?
A. char()

B. Charat()

C. charat()

D. charAt()

10. Which of these keyword must be used to inherit a class?
A. super

B. this

C. extent

D. extends

11. What is the process of defining a method in subclass having same name & type signature as a method in its superclass?
A. Method overloading

B. Method overriding
C. Method hiding

D. None of the mentioned

12. Which of these keywords can be used to prevent Method overriding?
A. static

B. constant

C. protected

D. final

13. Which of these class is superclass of every class in Java?
A. String class

B. Object class

C. Abstract class

D. ArrayList class

14. Which of these keywords can be used to prevent inheritance of a class?
A. super

B. constant

C. Class

D. final

15. Which of these class is superclass of String and StringBuffer class?
A. java.util

B. java.lang

C. ArrayList

D. None of the mentioned

16. Which of these method of class String is used to obtain length of String object?
A. get()

B. Sizeof()

C. lengthof()

D. length()

17. Which of these cannot be declared static?
A. class

B. object

C. variable

D. method

18. Which of these is a process of converting a simple data type into a class?
A. type wrapping

B. type conversion

C. type casting

D. None of the Mentioned.

19. Which of these keywords is used to define packages in Java?

A. pkg

B. Pkg

C. package

D. Package

20. Which of these keywords is used to define interfaces in Java?
A. interface

B. Interface

C. intf

D. Intf

21. What is the extension of compiled java classes?
    a) .txt
    b) .js
    c) .class
    d) .java

22. Which of these are selection statements in Java?
    a) break
    b) continue
    c) for()
    d) if()

23.Which of these is not a bitwise operator?
a)&
b)&=
c)|=
d) <=

24. Which of these can be returned by the operator &?
a)Integer
b)Boolean
c)Character
d) Integer or Boolean

25. Literal can be of which of these data types?
a) integer
b) float

c) boolean

d) all of the mentioned

UNIT II

1. Java does not support multiple inheritance, but some of the abilities of multiple inheritance are available by

A. Implementing interfaces.

B. Creating aliases.

C. Importing classes.

D. Using public rather than protected or private modifiers.

2. In order to determine the type that a polymorphic variable refers to, the decision is made by the

A. Operating system when the program is loaded into memory.

B. Java run-time environment at run time.

C. Compiler at compile time.

D. Programmer at the time the program is written.

3. The relationship between a parent class and a child class is referred to as a(n) _____ relationship.

A. is-a

B. was-a

C. has-a

D. instance-of

4. _____ is the process by which object of one class acquires the properties of object of another class

A. Encapsulation

B. Data hiding

C. Inheritance

D. None of the above

5. The concept of inheritance provides the idea of _____

A. taking more than one form

B. reusability

C. data hiding

D. None of the above

6. The derived class is known as _____

A. superclass

B. subclass

C. parentclass

D. None of the above

7. The class from which the subclass derives the properties is called as _____

A. superclass

B. subclass

C. baseclass

D. None of the above

8. The property or the ability to take more than one form is called as _____

A. encapsulation

B. polymorphism

C. inheritance

D. None of the above

9. Polymorphism is extensively used in implementing _____

A. encapsulation

B. polymorphism

C. inheritance

D. None of the above

10. Java achieves dynamic polymorphism using

A. encapsulation

B. data hiding

C. method overriding

D. inheritance

11. Which of these keywords is used to define interfaces in Java?

A. interface

B. Interface

C. intf

D. Intf

12. Which of these can be used to fully abstract a class from its implementation?

A. Objects

B. Packages

C. Interfaces

D. None of the Mentioned.

13. Which of these access specifiers can be used for an interface?

A. Public

B. Protected

C. private

D. All of the mentioned

14. Which of these keywords is used by a class to use an interface defined previously?

A. import

B. Import

C. implements

D. Implements

15. Which of the following is correct way of implementing an interface salary by class manager?

A. class manager extends salary {}

B. class manager implements salary {}

C. class manager imports salary {}

D. None of the mentioned.

16. Which of the following is incorrect statement about packages?

A. Interfaces specify what class must do but not how it does.

B. Interfaces are specified public if they are to be accessed by any code in the program.

C. All variables in interface are implicitly final and static.

D. All variables are static and methods are public if interface is defined pubic.

17. Which of the following package stores all the standard java classes?

A. lang

B. java

C. util

D. java.packages

18. Which of these interfaces declares core method that all collections will have?

A. Set

B. EventListner

C. Comparator

D. Collection

19. Which of this interface handle sequences?

A. Set

B. List

C. Comparator

D. Collection

20. Which of this interface is not a part of Java's collection framework?

A. List

B. Set

C. SortedMap

D. SortedList

UNIT III

1. When does Exceptions in Java arises in code sequence?
A. Run Time

B. Compilation Time

C. Can Occur Any Time

D. None of the mentioned

2. Which of these keywords is not a part of exception handling?
A. try

B. finally

 C. thrown

D. catch

3. Which of these keywords must be used to monitor for exceptions?
A. try

B. finally

C. throw

D. catch

4. Which of these keywords must be used to handle the exception thrown by try block in some rational manner?
A. try

B. finally

C. throw

D. catch

5. Which of these keywords is used to manually throw an exception?
A. try

B. finally

 C. throw

 D. catch

6. In Java, exceptions are divided into two categories, namely checked and unchecked exceptions.

A. True

B. False

7. The subclass exception should precede the base class exception when used within the catch clause.

A. True

B. False

8. What are checked exceptions

A. checked by java compiler

B. checked by java virtual machine

C. above two

D. none of the above

9. Is it possible to re-throw exceptions

A. True

B. False

10. What are unchecked exceptions

A. checked by java compiler

B. checked by java virtual machine

C. above two

D. none of the above

11. exception is available in util package

A. True

B. False

12. The statements following the throw keyword in a program are not executed.

A. True

B. False

13. Finally block will get invoke whether the exception is thrown or not

A. True

B. False

14. If you throw an exception in your code, then you must declare it using the throws keyword in your method declaration.

A. True

B. False

15. Question: Match each situation in the first list with an item in the second list. a)int[] A; A[0] = 0; b)The JVM starts running your program, but the JVM can't find the Java platform classes. (The Java platform classes reside in classes.zip or rt.jar.) c)A program is reading a stream and reaches the end of stream marker. d)Before closing the stream and after reaching the end of stream marker, a program tries to read the stream again. 1__error 2__checked exception 3__compile error 4__no exception

A. a-2,b-1,c-3,d-4

B. a-4,b-3,b-2,c-1

C. a-3,b-1,c-4,d-2

D. a-1,b-2.c-3.d-4

16. Creating an exception object and handling it to the run time system is called

A. exception handler

B. catch the exception

C. pass the exception

D. throwing an exception

17. Pick runtime exception?

A. class cast exception

B. File not found exception

C. Nullpointer exception

D. security exception

18. Checked exceptions include all subtypes of Exception, including classes that extend RuntimeException.

A. True

B. False

19. Exceptions can be caught or rethrown to a calling method.

A. True

B. False

20. Which one of the following statement is correct?

A. The 'try' block should be followed by a 'catch' block.

B. The 'try' block should be followed by a 'finally' block.

C. The 'try' block should be followed by either a 'catch' block or a 'finally' block.

D. The 'try' block should be followed by at least two 'catch' blocks. The 'try' block should be followed by at least two 'catch' blocks.

UNIT IV

1. Which of these classes contains the methods used to write in a file?
A. FileStream

B. FileInputStream
C. BUfferedOutputStream

D. FileBufferStream

2. Which of these exceptions is thrown in cases when the file specified for writing it not found?
A. IOException

B. FileException

C. FileNotFoundException

D. FileInputException

3. Which of these methods are used to read in from file?
A. get()

B. read()

C. scan()

D. readFileInput()

4. Which of these values is returned by read() method is end of file (EOF) is encountered?
A. 0

B. 1

C. -1

D. Null

5. Which of these exception is thrown by close() and read() methods?
A. IOException

B. FileException
C. FileNotFoundException

D. FileInputOutputException

6. Which of these methods is used to write () into a file?
A. put()

B. putFile()

C. write()

D. writeFile()

7. The JDBC-ODBC Bridge supports multiple concurrent open statements per connection?

A. yes

B. No

8. A Java program cannot directly communicate with an ODBC driver because ....

A. ODBC written in C language
B. ODBC written in C# language
C. ODBC written in C++ language
D. ODBC written in Basic language

9. Which of this class is used to read from a file?

A. InputStream

B. BufferedInputStream

C. FileInputStream

D. BufferedFileInputStream

10. _____method returns the length of this file.

A. len()

B. lengthof()

C. length()

D. lengthofFile()

11. Which of this class is used to read characters and strings in Java from console?

A. BufferedReader

B. StringReader

C. BufferedStreamReader

D. InputStreamReader

12. Which of this class is implemented by FilterInputStream class?

A. InputStream

B. InputOutputStream

C. BufferedInputStream

D. SequenceInputStream

13. Which of these classes are used by character streams input operations?

A. InputStream

B. Reader

C. ReadStream

D. InputOutputStream

14. _____method closes this random access file stream

A. closeat()

B. close()

C. closed()

D. exitall()

15. Which of this class is implemented by FilterOuputStream class?

A. OuputStream

B. InputOutputStream

C. BufferedInputStream

D. SequenceInputStream

16. _____method sets the file-pointer offset, measured from the beginning of this file, at which the next read or write occurs.

A. getfp()

B. seek()

C. setfp()

D. offset()

17. Which of these class is used for reading and writing to random access file

A. RandomAccessFile

B. InputOutputStream

C. BufferedInputStream

D. SequenceInputStream

18. _____method creates the directory named by this abstract pathname

A. listDir()

B.createDir()

C. mkdir()

D. dir()

19. _____method returns an array of abstract pathnames denoting the files in the directory denoted by this abstract pathname.

A. list()

B. seek()

C. listFiles()

D. listdir()

20. Which of these method(s) is/are used for writing bytes to an outputstream?

A. put()

B. print() and write()

C. printf()

D. write() and read()

UNIT V

1. Which of these methods is a part of Abstract Window Toolkit (AWT) ?
A. display()

B. print()

C. drawString()

D. transient()

2. Which of these functions is called to display the output of an applet?
A. display()

B. print()

C. displayApplet()

D. PrintApplet()

3. Which of these methods can be used to output a sting in an applet?
A. display()

B. print()

 C. drawString()

 D. transient()

4. What does AWT stands for?
A. All Window Tools

B. All Writing Tools
C. Abstract Window Toolkit

D. Abstract Writing Toolkit

5. What is the most number of states a CheckBox can have?

A. 0

B. 1

C. 2

D. 3

6. What is the standard prefix for the name of a CheckBox?

A. chb

B. chk

C. ckb

D. ckx

7. A CheckBox can also appear as a(n):

A. button

B. RadioButton

C. ScrollBar

D. Both a and b

8. What is the standard prefix for the name of a RadioButton?

A. rad

B. rab

C. rdo

D. rdb

9. How many RadioButtons in a Group Box can be selected at the same time?

A. 0

B. 1

C. 2

D. 3

10. Which of these methods is a part of Abstract Window Toolkit (AWT)?
A. display()

B. paint()

C. drawString()

D. transient()

11. Which of these modifiers can be used for a variable so that it can be accessed from any thread or parts of a program?
A. transient

B. volatile

C. global

D. No modifier is needed

12. Which of these package is used for text formatting in Java programming language?
A. java.text

B. java.awt

C. java.awt.text

D. java.io

13. Where are the following four methods commonly used?
A. public void add(Component c)

B. public void setSize(int width,int height)
C. public void setLayout(LayoutManager m)

D. public void setVisible(boolean)

14. Which is the container that doesn't contain title bar and MenuBars but it can have other components like button, textfield etc?

A. Window

B. Frame

C. Panel

D. Container

15. In Graphics class which method is used to draws a rectangle with the specified width and height?
A. public void drawRect(int x, int y, int width, int height)

B. public abstract void fillRect(int x, int y, int width, int height)

C. public abstract void drawLine(int x1, int y1, int x2, int y2)

D. public abstract void drawOval(int x, int y, int width, int height)

16. Which of these operators can be used to get run time information about an object?

A. getInfo

B. Info

C. instanceof

D. getinfoof

17. Name the class used to represent a GUI application window, which is optionally resizable and can have a title bar, an icon, and menus.

A. Window

B. Panel

C. Dialog

D. Frame

18. Which is a component in AWT that can contain another component like buttons, text fields, labels etc.?

A. Window

B. Container

C. Panel

D. Frame

19. What are the different types of controls in AWT?

A. Labels

B. Pushbuttons

C. Checkboxes

D. Choice lists

20. Which class provides many methods for graphics programming?

A. java.awt

B. java.Graphics

C. java.awt.Graphics

D. None of the above

KEY:

UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
1.C	1.A	1.B	1.B	1.C
2.C	2.B	2.C	2.C	2.A
3.D	3.A	3.C	3.B	3.C
4.D	4.C	4.B	4.C	4.C
5.A	5.B	5.D	5.C	5.B
6.C	6.B	6.B	6.B	6.C
7.C	7.A	7.A	7.B	7.B
8.B	8.B	8.A	8.B	8.A
9.D	9.C	9.A	9.C	9.C
10.D	10.C	10.B	10.C	10.B
11.B	11.A	11.A	11.A	11.B
12.D	12.C	12.B	12.A	12.B
13.B	13.A	13.A	13.B	13.D
14.D	14.C	14.B	14.B	14.B
15.B	15.B	15.C	15.A	15.B
16.D	16.D	16.B	16.B	16.C
17.B	17.B	17.B	17.A	17.B
18.A	18.D	18.B	18.C	18.B
19.C	19.B	19.A	19.C	19.C
20.A	20.D	20.C	20.B	20.B

Guru Nanak Institutions Technical Campus (Autonomous)
School of Engineering & Technology
MC300HS: GENDER SENSITIZATION LAB

B.Tech. III Year II Sem.

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SYLLABUS

UNIT - I

UNDERSTANDING GENDER

Gender: Why Should We Study It? (*Towards a World of Equals:* Unit -1)

Socialization: Making Women, Making Men (*Towards a World of Equals:* Unit -2)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste.
Different Masculinities.

UNIT - II

GENDER AND BIOLOGY

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals:* Unit -4)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals:* Unit -10)

Two or Many? Struggles with Discrimination.

UNIT - III

GENDER AND LABOUR

Housework: the Invisible Labour (*Towards a World of Equals:* Unit -3)

"My Mother doesn't Work." "Share the Load."

Women's Work: Its Politics and Economics (*Towards a World of Equals:* Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and
Conditions of Work.

UNIT - IV

ISSUES OF VIOLENCE

Sexual Harassment: Say No! (*Towards a World of Equals:* Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out (*Towards a World of Equals:* Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals:* Unit -11)

Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT - V

GENDER: CO - EXISTENCE

Just Relationships: Being Together as Equals (*Towards a World of Equals:* Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOK

All the five Units in the Textbook, **"*Towards a World of Equals: A Bilingual Textbook on Gender*"** written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad**,Telangana State in the year **2015**.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS:

1.   Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012

2.   Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

(Answer in one line or one word)

Qtn No.	Description of the Question	Unit No
1.	What is Gender?	I
2.	Why should we study it?	I
3.	What's Gender based discrimination?	I
4.	Difference between Gender and Sex?	I
5.	Importance of Gender Equality in today's world.	I
6.	Schools are the best place to discuss the importance of Gender. Illustrate.	I
7.	If Feminism is empowerment then Masculism is...........	I
8.	What is Gender Sensitization?	I
9.	Can education stop Sexual offences !	I
10.	" One is not born a woman but rather becomes a woman." Define.	I
11.	According to WHO India has the largest number of sexually abused children. Agree/ Disagree. Why?	I
12.	Name few rivers of India.	I
13.	Role of patriarchy in Gender discrimination.	I
14.	The 15th Indian Census was taken in the year......	I
15.	What is meant by socialization?	I
16.	Men are better house managers than women. Why?	II
17.	" Girl," is written by	II
18.	Can girls be trained to be good and respectable?	II
19.	Men assume whereas women presume. Define.	II
20.	"Sin is done only in the name of God.Why?	II
21.	Name two agents of Gender Socialization............ &	II
22.	Name any 5 causes for Gender inequality.	II

23.	Is India a Secular country?	II
24.	Similarities between Mahatma Gandhi and Dr. B. R. Ambedkar.	II
25.	Difference between Racism and Discrimination.	II
26.	What is the full from of PC& PNDT Act.	II
27.	Name any two salient features of PC & PNDT Act 1994.	II
28.	What do we mean by Indian labour?	II
29.	Define the term 'being a women'!	II
30.	Why do we consider domestic work as menial.	II
31.	Indians don't know the meaning of 'Dignity of Labour.' Why ?	III
32.	Difference between Cultivators and Labours .	III
33.	" Man for the field and women for the hearth." Elucidate.	III
34.	Name few important laws in favour of Women.	III
35.	What is The meaning of Gender Justice?	III
36.	What is regarded as the supreme law of the land?	III
37.	What does Article 19 Promote?	III
38.	Give any one example of Gender Justice in India.	III
39.	"The world needs Gender Liberty." Explain	III
40.	Name any two provisions for women incorporated in The Factories Act of 1948.	III
41.	What are the correlations between Gender Justice and Employment?	III
42.	What are the problems fac…	III
43.	What is Sexual harassment?	III
44.	Myths about sexual harassment are based on .... and .... about sex.	III
45.	People who dress in a sexually attractive manner are asking for sexual comments. Agree/ Disagree. Why?	III
46.	Name any one Criminal provisions for sexual harassment.	IV
47.	What is Article 354 A?	IV
48.	What is Section 354D of IPC?	IV

49.	What is Section 377 of IPC?	IV
50.	Can any prevention protect a women from violence! Illustrate	IV
51.	What is homophobic bullying?	IV
52.	Who is the first female teacher of India?	IV
53.	The poem ' Chupulu' is written by...........	IV
54.	Bhanwari Devi became a .... in the year......	IV
55.	What is people's point of view?	IV
56.	What is Gender Lens?	IV
57.	Any one example of Gender Lens?	IV
58.	What is Gender Lens investing?	IV
59.	Mention any one Impact of Gender Lens on Equality.	IV
60.	Women held high status and position in........	IV
61.	What is the Importance of GLI?	V
62.	Are paternity and maternity leaves equally important for babies? Exemplify	V
63.	Imagine women-dominated society and describe it in a sentence.	V
64.	What is gender identity?	V
65.	Emotional differences between men and women.	V
66.	What are the Benefits of investing in girls' education?	V
67.	What are the Impacts of an ageing population on women's economic welfare?	V

GENDER SENSITIZATION LAB

(An Activity-based Course)

Question Bank

UNIT -1

1)   What is gender and why should we study it? In sociology, how you will describe gender?

Gender refers to the characteristics of women, men, girls and boys that are socially constructed. This includes norms, behaviours and roles associated with being a woman, man, girl or boy, as well as relationships with each other. As a social construct, gender varies from society to society and can change over time.

Gender is hierarchical and produces inequalities that intersect with other social and economic inequalities. Gender-based discrimination intersects with other factors of discrimination, such as ethnicity, socioeconomic status, disability, age, geographic location, gender identity and sexual orientation, among others. This is referred to as intersectionality.

Gender interacts with but is different from sex, which refers to the different biological and physiological characteristics of females, males and intersex persons, such as chromosomes, hormones and reproductive organs. Gender and sex are related to but different from gender identity. Gender identity refers to a person's deeply felt, internal and individual experience of gender, which may or may not correspond to the person's physiology or designated sex at birth.

Gender influences people's experience of and access to healthcare. The way that health services are organized and provided can either limit or enable a person's access to healthcare information, support and services, and the outcome of those encounters. Health services should be affordable, accessible and acceptable to all, and they should be provided with quality, equity and dignity.

Schools are the best place to discuss the idea of gender and its social implications in a friendly way that helps children and young people form a more egalitarian conception of how we construct the way we understand male and female genders. They don't have to be complex ideas or readings involving topics that might be considered sensitive, such as those handled by Beauvoir or Stroller.

Children learn at a young age that there are distinct expectations for boys and girls. Cross-cultural studies reveal that children are aware of gender roles by age two or three. At four or five, most children are firmly entrenched in culturally appropriate gender roles (Kane 1996). Children acquire these roles through socialization, a process in which people learn to behave in a particular way as dictated by societal values, beliefs, and attitudes. For example, society often views riding a motorcycle as a masculine activity and, therefore, considers it to be part of the male gender role. Attitudes such as this are typically based on stereotypes, oversimplified notions about members of a group. Gender stereotyping involves over generalizing about the attitudes, traits, or behavior patterns of women or men. For example, women may be thought of as too timid or weak to ride a motorcycle.

2)   To what extent do the term masculinity and femininity explain the differences between men and women?

Although the terms "feminine" and "masculine" are gender terms (socio-cultural categories) in everyday usage, they carry different meanings in biology. Masculinization refers to the development of male-specific morphology, such as the Wolffian ducts and male reproductive structures. Feminization refers to the development of female-specific morphology, such as the Müllerian ducts and female reproductive structures. In order to become a reproductively functioning female, for example, both feminization and demasculinization are required, and vice versa for males

"Femininities" and "masculinities" describe gender identities .They describe socio-cultural categories in everyday language; these terms are used differently in biology Because femininities and masculinities are gender identities, they are shaped by socio-cultural processes, not biology.Femininities and masculinities are plural and dynamic; they change with culture and with individuals.

● In everyday language, femininities and masculinities do not map onto biological sex. In any one culture, certain behaviors or practices may be widely recognized as "feminine" or "masculine," irrespective of whether they are adopted by women or by men. Femininities and masculinities are not descriptors of sexual orientation.

● Femininities and masculinities are plural—there are many forms of femininity and many forms of masculinity. What gets defined as feminine or masculine differs by region, religion, class, national culture, and other social factors. How femininities and masculinities are valued differs culturally.

● Any one person—woman or man—engages in many forms of femininity and masculinity, which she or he adopts (consciously or unconsciously) depending on context, the expectations of others, the life stage, and so forth. A man can engage in what are often stereotyped as "feminine" activities, such as caring for a sick parent.

● Cultural notions of "feminine" and "masculine" behavior are shaped in part by observations about what women and men do. This kind of "gender marking" tends to discourage women or men from entering "gender-inauthentic" occupations (Faulkner, 2009).

● Femininities and masculinities are learned. Messages about "feminine" and "masculine" behaviors are embedded in advertising, media, news, educational materials, and so forth. These messages are present in a range of environments, from the home to the workplace to public spaces.

3)   Write the difference between Gender Sensitization and Gender Discrimination.

Gender sensitization is the modification of behaviors so that there is greater awareness and empathy to create gender equality.[1] Sexual offences include sexual gestures, stalking, ogling, voyeurism, molestation and intercourse (rape). We like to know everything to prevent heart, lung, liver, kidney diseases etc. but we are reluctant to discuss anything about human sexuality including sexually transmitted diseases or anything related to sex because ours is a **culture of silence**. It is time to break this silence.

Sexuality is a normal part of our biological system; hence sexual awareness is imperative. We need to begin to speak out, we need to educate people about what is normal sexual behavior and what is not acceptable and clearly wrong, so that there is no guilt involved in reporting offenses. We need to inculcate **moral and ethical values** in our society about respect to women. Here are some age-old names related to the female sex such as, Prithvi (Earth), Gayatri (Sun), Devi(Goddess), Ganga, Yamuna, Saraswati, Cauvery. Are they not life givers? Then why abuse them? Even **'Adalat'** is symbolic of Goddess of Justice. We need to empower our communities and the people who are abused so that victims can report.

As per the World Health Organisation (WHO), India has the largest number of sexually abused children of both genders. Many states in India have started taking steps to sensitize the younger population and medical professionals can play a major role in eradicating sexual offenses by educating, examining, and by using their clinical instincts and acumen to suspect a sexual offense.

Gender descrimination has been a social issue in India for centuries. That in many parts of India, the birth of a girl child is not welcomed is a known fact. It is a known fact too, that discrimination starts from even before the girl child is born and sometimes she is killed as a foetus, and if she manages to see the light of day, she is killed as an infant, which makes up the highly skewed child sex ratio where for every 1000 boys in India, there are only 908 girls. In such a scenario, it is but obvious that for myriad reasons, many girls across the country are forced to drop out of school.

Patriarchal norms have marked women as inferior to men. A girl child is considered a burden and is often not even allowed to see the light of the world. It is hard to imagine this state of affairs in the 21st Century when women have proved to be strong leaders in every field possible. From wrestling to business, the world has been revolutionised by exceptional women leaders in fields that were until recently completely dominated by men.

But in spite of such progress, even today, the girl child is discriminated against in most Indian households. The birth of a baby boy is celebrated with great pomp and ardour, but the birth of a girl child is received with dismay. The practice of female foeticide through sex selective abortion continues to be practiced in spite of the Prenatal Diagnostic Technique Act of 1994. In India the child sex ratio is at the lowest it has ever been with just 914 girls for every 1000 boys (Census, 2011).

And this discrimination continues in every aspect. Be it education, health, protection or participation, the girl child is always treated unequally. Indian society still hasn't been awakened to the importance of empowering the women. The statistics still narrate a grim story of female foeticide, girl child discrimination and gender bias .

42% of married women in India were married as children (District Information System for Education (DISE) 3)

1 in every 3 child brides in the world is a girl in India (UNICEF)

India has more than 45 lakh girls under 15 years of age who are married with children. Out of these, 70% of the girls have 2 children (Census 2011)

The need of the hour is to make a change in the mindset of the society and destroy the prejudices that damage the future of the girl child . What is required is a concerted effort to sensitise the society in eradicating this issue of gender inequality. It is high time that every child is treated equally and given every opportunity required to grow to his/her full potential.

4)   What is meant by socialization? "One is not born a woman but rather become a woman. "Elaborate the sentence.

Every society is faced with the necessity of making a responsible member out of each child born into it. The child must learn the expectations of the society so that his behaviour can be relied upon. He must acquire the

group norms. The society must socialise each member so that his behaviour will be meaningful in terms of the group norms. In the process of socialisation the individual learns the reciprocal responses of the society.

Socialisation is a process with the help of which a living organism is changed into a social being. It is a process through which the younger generation learns the adult role which it has to play subsequently. It is a continuous process in the life of an individual and it continues from generation to generation.

"One is not born a woman but rather become a woman."

One is not born, but rather becomes, a woman. No biological, psychic, or economic destiny defines the figure that the human female takes on in society; it is civilization as a whole that elaborates this intermediary product between the male and the eunuch that is called feminine. Only the mediation of another can constitute an individual as an Other. In as much as he exists for himself, the child would not grasp himself as sexually differentiated. For girls and boys, the body is first the radiation of a subjectivity, the instrument that brings about the comprehension of the world: they apprehend the universe through their eyes and hands, and not through their sexual parts.1 It would be hard to imagine a sentence in feminist theory more often cited than Simone de Beauvoir's 'One is not born, but rather becomes, a woman.' To borrow an image from Beauvoir scholar Nancy Bauer, to intone this sentence at the beginning of a work of feminist theory is tantamount to genuflecting at the family pew.2 And yet, despite the reverential intonations of Beauvoir's iconic sentence, it has typically been misunderstood. Some feminist theorists trace the sex-gender distinction that would be made in later decades to originate in this claim. On such readings, Beauvoir might be said to describe the transition between two states: the state of the newborn who has a biological sex but no gender identity yet ('who is not a woman') and that of the grown person who, having been socialized, has both a sex and a gender identity ('who has become a woman'). I will dispute such readings on two grounds. First, they typically imply that Beauvoir is a social determinist and fail to recognize the place she accords to human freedom. Second, when they do not make this mistake, they nevertheless misinterpret her conception of the human body.

5)   Express the irrationality from the story written by Mohan Krishna indragandti in the story "Ammayi"/ Jamaica Kincaid's "The Girl".

Indraganti Mohana Krishna was born into a Telugu speaking family in Tanuku, West Godavari district, Andhra Pradesh, India. As his parents, Indraganti Srikanth and Janaki Bala, and grandparents were writers, he had a fascination towards fiction since his childhood. His grandmother's stories were visually detailed in their narration. In addition to this, he has been an avid reader of literary works and also loved to discuss films with his uncle. In an interview, he said that these were the key reasons that contributed to his interest in filmmaking.

Jamaica Kincaid's short story *Girl* (1978) provides a glimpse of the relationship between a girl and her mother. The girl represents Kincaid in her youth. The story shows that, in this relationship, the mother tries to prescribe the behaviors that she deems appropriate for females. She expects and imposes these behaviors on the girl (Kincaid). In addition, it is apparent that the girl is constrained within these prescribed behaviors. Such constrictive condition is a result of the mother's dominant behavior toward the girl. Considering Kincaid's background as well as the cultural keywords used, the short story emphasizes how certain cultural characteristics are passed on through the generations. In this regard, the story focuses on the significance of familial relationships in shaping individual behavior.

The main points in the short story include:

• The mother gives beneficial and negative information to the daughter
• Parents can be overbearing on their children

- Society continues to impose stereotypes on children

6) What are the terrible risks faced by the girl in the excerpt "Radam".

"Radam" is written by Gogu Shyamala. Shyamala's village is a site of many contradictions: the Mala, Madiga and Sabbanda communities have a close relationship with the land and its seasonal rhythms; their oral histories and identities are inseparable from the landscape and its stories. Yet it is impossible to escape the consequences of caste unless the village is left behind.

'Raw Wound' is a story about the oppressed condition of women who are forced to become jogini by villagers. The tag of jogini may sound respectable, but these women are considered the village's common, sexual property. The protagonist's parents ensure their daughter does not have to suffer such the fate of becoming a jogini by smuggling her away to school.

The "Raw Wound" is a story of Balappa, a Madiga who risks his life and land in order to save his daughter Syamamma from becoming a jogini " (a lower-caste woman who is declared the sexual property of the whole village). He and his family are well aware of the fact that village patels have their eyes on his daughter and wants her to become a jogini. So, he sends Syamamma to a hostel to prevent her from becoming a jogini. He implores the hostel warden to take his daughter in the hostel. He says,
"The patel will take her as his woman in the name of god, with the approval of all the upper castes and the priest in the village. She will then be available to every man in the village in the god's name! I brought her here without the knowledge of the elders as soon as I heard of this decision" .). Her father leaves her at a school, and pleads with the warden of the hostel to keep his daughter safe. "This was the first time I had seen my father weep uncontrollably and I felt the village's lake flooding with sorrow. I held fast to my father and could not help but cry myself," Syamamma says.

However, previously, when the patels got to know about Balappa's decision to send his daughter away to study, they send for him and abuse him: "Balappa, you son of a bitch! Sending your daughter to study, are you? Don't you know the ways of the village, you bastard? . . . How dare you to stop a tradition that we have upheld in the village for so long, you ignorant fool?" (141). Later when the village patels come to know about Syamamma being away in a hostel they call Balappa. There they humiliate, abuse and beat him like anything and then throw him on the street to. Later they come again to see him and forcefully take his thumbprint on a paper thereby declaring that Bapalla's land now belongs to them. Finally they give him bus fare and ask him and his family to leave the village forever. The family leaves the village heartbroken. The pain of uprootedness and dislocation is heavy to bear but they are at least satisfied that they saved their daughter from the evil practice of becoming a jogini.

Gogu Shyamala's language is straightforward yet lyrical—the village lake flooding with sorrow elevates individual suffering into the entire community's suffering. In another story, The Village Tank's Lament, the tank itself speaks to a child. There are tonal shifts and changes in perspective that make each story a fresh experience.

7) "Mary and Onler were not only made to be equal but also complete each other" Explain how their relationship stays balanced.

Mary Kom and Onler:

Mary Kom is a woman of substance, self made, dedicated to her chosen field, and a winner of glory for her country. Daughter, wife, mother of three, Mary Kom has always yet been her own person, with a dream that grows bigger with every success.

Her relation with Onler was a relationship that developed slowly. At first Onler was only concerned about helping her. He saw her problems, and how she was struggling single handedly. Her parents lived in the village, they were no support at all, either financially or otherwise. And as a woman boxer, Mary had many hurdles to cross.

Onler gave her support and was her true friend.
Chungneijang Mary Kom Hmangte was born in a poor family in Churachandpur
district of Manipur, India.
Her Parents were tenant farmers & Mary Kom used to help her parents by working in the fields.
While in school, she used to play many sports like hockey, athletics & football. She got interest for boxing when she got inspired from a local boxer Dingko Singh, who won Gold Medal at the Asian Games, 1998.
Mary Kom made her way to boxing, but the way wasn't that easy. Her father wasn't in favor of boxing. He used to worry that who will marry her daughter when her face would injure in boxing. Financial arrangement was also a challenge.
Despite all challenges, Mary Kom started her boxing training under her first coach K. Kosana in Imphal. In earlier days, she had to spend many hours in traveling everyday to manage her training. It all started in very young age for Mary Kom.
When she was just 15 of age, she decided to leave her hometown and study at the sports academy in Imphal. After that, she trained under the Manipur State Boxing Coach M. Narjit Singh.
Mary Kom first career win came in 2000, when she won the 'Best Boxer Award' at the women's boxing championship in Manipur. She proceeded to win the Gold in the East India Women's Boxing Championship held in West Bengal.
After Marriage in 2015, She took a break from boxing. But, this isn't the end of her career, Kom again started training after their first two children. After that, she won a silver medal in 2008 Asian Women's Boxing Championship And a fourth successive gold medal at the AIBA Women's World Boxing Championship in China.
Mary Kom is the only Indian woman boxer to have qualified for the 2012 London Olympics. She was competing in the 51 kg category & won Bronze Medal.

She became the first Indian woman boxer to win a Gold Medal in the Asian Games in 2014 in South Korea. Mary Kom was also the first woman boxer to win Gold Medal at the Commonwealth Games 2018.
She has won many medals in many International & National Boxing championships like Summer Olympics, Asian Games, Asian Women's Championships, Commonwealth Games & so on.
She got many awards & recognitions for her dedication for the sport even in diversities. She got Indian Govt. prestigious awards Padma Bhushan, Arjuna Award & Padma Shri in 2013, 2003 & 2006 respectively.
The International Boxing Association (AIBA) awarded Mary Kom with the first AIBA Legends awards for "Promising Boxing Career". AIBA announced her as the Brand Ambassador for 2016 AIBA Women's World Boxing Championships.
On 26 April 2016, Kom was nominated by the President of India as a member of the Rajya Sabha, the upper house of the Indian Parliament. In March 2017, The Ministry of Youth Affairs and Sports, Government of India, appointed Mary Kom along with Akhil Kumar as national observers for boxing.
She became people of the year in Limca Book of Records, 2007 apart from many other awards.

8.Sex and gender are like the two faces of the same coin. Explain.
                                    (or)

Explain the terms sex and gender. Do you agree with the feminist view that they are social constructions? Give reasons for your answer.

The terms 'biological', 'chromosomes', 'hormones', and 'physiological' point to the internal human body, while the terms 'sociological', 'culture', 'psychological', and 'society' are related to the external aspects. We are clearly able to identify the differences in these terms. The terms which describe the aspects of human body come to mean as sex, while the rest of the terms describe gender.

Sex and gender are like the two faces of the same coin. While sex refers to the biological and physiological aspects, gender refers to the sociological and cultural aspects.
The following points clarify the concepts of sex and gender.

Sex   The word 'sex' comes from Latin word 'Sexus', which is determined by a person's reproductive organs.

It is a biological term; people are termed either male or female depending on their sex organs, i.e., reproductive organs and genes.

It refers to the genetic and physiological characteristics that indicate whether one is male or female.

Sex refers to the biological difference between males and females.

It relates to the observable differences between their genitals and to their psychological functions in procreation.

"There are two sexes, male and female. To determine sex, one must assay the following physical conditions: chromosomes, external genitalia, internal genitalia, gonads, hormonal states and secondary sex characteristics

One's sex is determined by an algebraic sum of all these qualities and as is obvious, most people fall under one of two separate bell curves, the one of which is called 'male' and other 'female'." – Robert Stoller

Gender

The word 'gender' comes from Latin word 'genus', which means kind or race.

Gender is a psychological and cultural term referring to one's subjective feelings of maleness and femaleness.

Gender may also refer to society's evaluation of behaviour as masculine or feminine.

The social and cultural definitions of men and women are called gender. For example, it is society that makes rules that a girl will stay in the house, while a boy can go out or that a girl be given less food to eat and less time to play than a boy. A boy should be sent to a better school, so that when he grows up, he can look after the family business or get a good job, while not much attention is paid to a girl's education. Due to these social definitions, the differences between girls and boys creates two different worlds.

8) Explain different agents of socialization.

Agents of Gender Socialisation

Parents: Parents are typically a child's first source of information about gender. From birth, parents communicate different expectations to their children depending on their sex. For example, a son may engage in more roughhousing with his father, while a mother takes her daughter shopping. The child may learn from their parents that certain activities or toys correspond with a particular gender. Even parents, who emphasise gender equality, may inadvertently reinforce some stereotypes due to their own gender socialisation.

Teachers : Teachers and school administration model roles sometimes demonstrate gender stereotypes by responding to male and female students in different ways. For example, separating students by gender for activities or disciplining students differently depending on their gender may reinforce children's developing beliefs and assumptions.

Peers: Peer interaction also contributes to gender socialisation. Children tend to play with same gender peers. Through these interactions, they learn what their peers expect of them as boys and girls. These lessons may be direct, such as when a peer tells the child that a certain behaviour is or is not appropriate for their gender. They can also be indirect as the child observes same and other gender peers' behaviour over time. These comments and comparisons may become less overt over time, but adults continue to turn to same gendered peers for information on how they are supposed to look and act as a man or a woman.

Media: Media including movies, television, and books teach children about what it means to be a boy or a girl. The media conveys information about the role of gender in people's lives and can reinforce gender stereotypes. For example, consider an animated film that depicts two female characters, a beautiful but passive heroine, and an ugly but active villain. This and countless other examples reinforces ideas about which behaviour is acceptable and valued (and which are not) for a particular gender.

9)   Elucidate various causes for gender inequality.

Over the years, the world has gotten closer to achieving gender equality. There is better representation of women in politics, more economic opportunities, and better healthcare in many places of the world.

Here are 10 causes of gender inequality:

#1. Uneven access to education

Around the world, women still have less access to education than men. ¼ of young women between 15-24 will not finish primary school. That group makes up 58% of the people not completing that basic education. Of all the illiterate people in the world, ⅔ are women. When girls are not educated on the same level as boys, it has a huge effect on their future and the kinds of opportunities they'll get.

#2. Lack of employment equality

Only 6 countries in the world give women the same legal work rights as men. In fact, most economies give women only ¾ the rights of men. Studies show that if employment became a more even playing field, it has a positive domino effect on other areas prone to gender inequality.

#3. Job segregation

One of the causes for gender inequality within employment is the division of jobs. In most societies, there's an inherent belief that men are simply better equipped to handle certain jobs. Most of the time, those are the jobs that pay the best. This discrimination results in lower income for women. Women also take on the primary responsibility for unpaid labor, so even as they participate in the paid workforce, they have extra work that never gets recognized financially.

#4. Lack of legal protections

According to research from the World Bank, over one billion women don't have legal protection against domestic sexual violence or domestic economic violence. Both have a significant impact on women's ability to thrive and live in freedom. In many countries, there's also a lack of legal protections against harassment in the workplace, at school, and in public. These places become unsafe and without protection, women frequently have to make decisions that compromise and limit their goals.

#5. Lack of bodily autonomy

Many women around the world do not have authority over their own bodies or when they become parents. Accessing birth control is frequently very difficult. According to the World Health Organization, over 200 million women who don't want to get pregnant are not using contraception. There are various reasons for this such as a lack of options, limited access, and cultural/religious opposition. On a global scale, about 40% of pregnancies are not planned and while 50% of them do end in abortion, 38% result in births. These mothers often become financially dependent on another person or the state, losing their freedom.

#6. Poor medical care

In addition to limited access to contraception, women overall receive lower-quality medical care than men. This is linked to other gender inequality reasons such as a lack of education and job opportunities, which results in more women being in poverty. They are less likely to be able to afford good healthcare. There's also been less research into diseases that affect women more than men, such as autoimmune disorders and chronic pain conditions. Many women also experience discrimination and dismissal from their doctors, broadening the gender gap in healthcare quality.

#7. Lack of religious freedom

When religious freedom is attacked, women suffer the most. According to the World Economic Forum, when extremist ideologies (such as ISIS) come into a community and restrict religious freedom, gender inequality gets worse. In a study performed by Georgetown University and Brigham Young University, researchers were also able to connect religious intolerance with women's ability to participate in the economy. When there's more religious freedom, an economy becomes more stable thanks to women's participation.

#8. Lack of political representation

Of all national parliaments at the beginning of 2019, only 24.3% of seats were filled by women. As of June of 2019, 11 Heads of State were women. Despite progress in this area over the years, women are still grossly underrepresented in government and the political process. This means that certain issues that female politicians tend to bring up – such as parental leave and childcare, pensions, gender equality laws and gender-based violence – are often neglected.

#9. Racism

It would be impossible to talk about gender inequality without talking about racism. It affects what jobs women of color are able to get and how much they're paid, as well as how they are viewed by legal and healthcare systems. Gender inequality and racism have been closely-linked for a long time. According to Sally Kitch, a professor and author, European settlers in Virginia decided what work could be taxed based on the race of the woman performing the work. African women's work was "labor," so it was taxable, while work performed by English women was "domestic" and not taxable. The pay gaps between white women and women of color continues that legacy of discrimination and contributes to gender inequality.

#10. Societal mindsets

It's less tangible than some of the other causes on this list, but the overall mindset of a society has a significant impact on gender inequality. How society determines the differences and value of men vs. women plays a starring role in every arena, whether it's employment or the legal system or healthcare. Beliefs about gender run deep and even though progress can be made through laws and structural changes, there's often a pushback following times of major change. It's also common for everyone (men and women) to ignore other areas of gender inequality when

there's progress, such as better representation for women in leadership. These types of mindsets prop up gender inequality and delay significant change.

10) Write a short notes on Dr. B. R.Ambedkar.

Ambedkar tells us that he was asked to sit separately in class without touching anyone else. Have you ever heard of such incidents in your school or anywhere else? Is untouchability still practiced in India?

Dr Bhimrao Ramji Ambedkar reminded the Indian population that only political clarity or administrative reforms could not shape a country that is so diverse in culture and social spectrum.

1. Born into a poor, low Mahar caste family on April 14, 1891, in Mhow, in the Central   Provinces, now Madhya Pradesh, Babasaheb Ambedkar had a tough childhood. His family was treated as untouchables and was subjected to socio-economic discrimination.

2. Hailing from the 'untouchable' caste of Mahars in Maharashtra, Ambedkar was a social outcast in his early days. Even in his school, he was treated as an 'untouchable.'

3. His schoolmates would not eat beside him, his teachers did not touch his copies as he came from a family that was considered 'unclean' by the orthodox Hindus.

4. Later in life, Ambedkar became the spokesperson of the backward classes and castes in India.

5. Much like African-American reformers such as Martin Luther King Jr and Frederick Douglas in the United States, Ambedkar expounded the importance of a social reform that would abolish caste discrimination and the concept of untouchability in India.

6. He also joined hands with Gandhi in the Harijan movement, which protested against the social injustices faced by people belonging to backward castes in India.

7. Babasaheb also pointed out that the principal problem of the Indian society was the perennial fight between Buddhism and Brahmanism.

8. Babasaheb Ambedkar and Mahatma Gandhi were two of the most prominent personalities who protested against the untouchability in India.

9. Gandhi had published three journals to support the underprivileged class, namely Harijan in English, Harijan Bandu in Gujarati and Harijan Sevak in Hindi. This led to the Harijan Movement in India.

10. Gandhi primarily concentrated on the social and economic stability of people belonging to the untouchable groups and reformed the society's outlook towards them.

11. But all went in vain!Unfortunately, even after about 70 years of Independence, India is still trapped under the claws of class and caste discrimination.

Dalits are still prohibited from entering temples, attending mass ceremonies, using resources and working alongside with people of other castes.

11."We were prepared to pay double the fare but we found money did not work", says Ambedkar.Why? Explain his journey from Dapoli to Guregaon.

B.R. Ambedkar was a man of many parts—a scholar, a social reformer, a politician, a religious thinker and the moving spirit of the Indian constitution. He wrote prolifically over his nearly four decades in public life.

Ambedkar shares his journey from Dapoli to Guregaon as follows :

"As is usual among the Hindus, the station-master asked us who we were. Without a moment's thought I blurted out that we were Mahars. He was stunned. His face underwent a sudden change. We could see that he was overpowered by a strange feeling of repulsion. As soon as he heard my reply he went away to his room, and we stood where we were. Fifteen to twenty minutes elapsed; the sun was almost setting. Our father had not turned up, nor had he sent his servant; and now the station-master had also left us. We were quite bewildered, and the joy and happiness which we had felt at the beginning of the journey gave way to a feeling of extreme sadness.

After half an hour, the station-master returned and asked us what we proposed to do. We said that if we could get a bullock-cart on hire, we would go to Koregaon; and if it was not very far, we would like to start straightway. There were many bullock-carts plying for hire. But my reply to the station-master that we were Mahars had gone round among the cartmen, and not one of them was prepared to suffer being polluted, and to demean himself carrying passengers of the untouchable classes. We were prepared to pay double the fare, but we found that money did not work.

The station-master who was negotiating on our behalf stood silent, not knowing what to do. Suddenly a thought seemed to have entered his head and he asked us, "Can you drive the cart?" Feeling that he was finding out a solution of our difficulty, we shouted, "Yes, we can." With that answer he went and proposed on our behalf that we were to pay the cartman double the fare and drive the cart, and that he should walk on foot along with the cart on our journey. One cartman agreed, since it gave him an opportunity to earn his fare and also saved him from being polluted.

It was about 6:30pm when we were ready to start. But we were anxious not to leave the station until we were assured that we would reach Koregaon before it was dark. We therefore questioned the cartman about the distance, and the time he would take to reach Koregaon. He assured us that it would be not more than three hours. Believing in his word, we put our luggage in the cart, thanked the station-master, and got into the cart. One of us took the reins and the cart started, with the man walking by our side.

Not very far from the station there flowed a river. It was quite dry, except at places where there were small pools of water. The owner of the cart proposed that we should halt there and have our meal, as we might not get water on our way. We agreed. He asked us to give a part of his fare to enable him to go to the village and have his meal. My brother gave him some money and he left, promising to return soon. We were very hungry, and were glad to have had an opportunity to have a bite... We opened the tiffin basket and started eating."

We needed water to wash things down. One of us went to the pool of water in the river basin nearby. But the water really was no water. It was thick with mud and urine and excreta of the cows and buffaloes and other cattle who went to the pool for drinking. In fact that water was not intended for human use. At any rate the stink of the water was so strong we could not drink it. We had therefore to close our meal before we were satisfied, and wait for the arrival of the cartman…

"On his advice I went to the toll-collector's hut and asked him if he would give us some water. 'Who are you?' he inquired. I replied that we were Musalmans. I conversed with him in Urdu (which I knew very well), so as to leave no doubt that I was a real Musalman. But the trick did not work and his reply was very curt. 'Who has kept water for you? There is water on the hill, if you want to go and get it; I have none.' With this he dismissed me. I returned to the cart, and conveyed to my brother his reply. I don't know what my brother felt. All that he did was to tell us to lie down.

The bullocks had been unyoked, and the cart was placed sloping down on the ground. We spread our beds on the bottom planks inside the cart, and laid down our bodies to rest. Now that we had come to a place of safety we did not mind what happened. But our minds could not help turning to the latest event. There was plenty of food with us. There was hunger burning within us; with all this we were to sleep without food; that was because we could get no water, and we could get no water because we were untouchables."

UNIT -2

1)   Explain the term patriarchy. Discuss the reasons for women's subordinate status.
The sociologist Sylvia Walby defines **patriarchy** as "a system of social structures and practices in which men dominate, oppress, and exploit **women**". Social stratification along gender lines, in which power is predominantly held by men, has been observed in most societies.

Patriarchy is the prime obstacle to womens advancement and development. Despite differences in levels of domination the broad principles remain the same, i.e. men are in control. The nature of this control may differ. So it is necessary to understand the system, which keeps women dominated and subordinate, and to unravel its workings in order to work for womens development in a systematic way. In the modern world where women go ahead by their merit, patriarchy there creates obstacles for women to go forward in society. Because patriarchal institutions and social relations are responsible for the inferior or secondary status of women. Patriarchal society gives absolute priority to men and to some extent limits womens human rights also. Patriarchy refers to the male domination both in public and private spheres. In this way, feminists use the term patriarchy to describe the power relationship between men and women as well as to find out the root cause of womens subordination. This article, hence, is an attempt to analyse the concept of patriarchy and womens subordination in a theoretical perspective.

2)   What are gender roles and how do gender roles effect people?

Gender roles in society means how we're expected to act, speak, dress, groom, and conduct ourselves based upon our assigned sex. For example, girls and women are generally expected to dress in typically feminine ways and be polite, accommodating, and nurturing. Men are generally expected to be strong, aggressive, and bold.

Every society, ethnic group, and culture has gender role expectations, but they can be very different from group to group. They can also change in the same society over time. For example, pink used to be considered a masculine color in the U.S. while blue was considered feminine.

Gender stereotypes affect people:

A stereotype is a widely accepted judgment or bias about a person or group — even though it's overly simplified and not always accurate. Stereotypes about gender can cause unequal and unfair treatment because of a person's gender. This is called sexism.

There are four basic kinds of gender stereotypes:

Personality traits — For example, women are often expected to be accommodating and emotional, while men are usually expected to be self-confident and aggressive.

Domestic behaviors — For example, some people expect that women will take care of the children, cook, and clean the home, while men take care of finances, work on the car, and do the home repairs.

Occupations — Some people are quick to assume that teachers and nurses are women, and that pilots, doctors, and engineers are men.

Physical appearance — For example, women are expected to be thin and graceful, while men are expected to be tall and muscular. Men and women are also expected to dress and groom in ways that are stereotypical to their gender (men wearing pants and short hairstyles, women wearing dresses and make-up.

Hyperfemininity is the exaggeration of stereotyped behavior that's believed to be feminine. Hyperfeminine folks exaggerate the qualities they believe to be feminine. This may include being passive, naive, sexually inexperienced, soft, flirtatious, graceful, nurturing, and accepting.

Hypermasculinity is the exaggeration of stereotyped behavior that's believed to be masculine. Hypermasculine folks exaggerate the qualities they believe to be masculine. They believe they're supposed to compete with other

men and dominate feminine folks by being aggressive, worldly, sexually experienced, insensitive, physically imposing, ambitious, and demanding.

These exaggerated gender stereotypes can make relationships between people difficult. Hyperfeminine folks are more likely to endure physical and emotional abuse from their partners. Hypermasculine folks are more likely to be physically and emotionally abusive to their partners.

Extreme gender stereotypes are harmful because they don't allow people to fully express themselves and their emotions. For example, it's harmful to masculine folks to feel that they're not allowed to cry or express sensitive emotions. And it's harmful to feminine folks to feel that they're not allowed to be independent, smart or assertive. Breaking down gender stereotypes allows everyone to be their best selves.

3)What is sex ratio? Why do you think there is a gender imbalance? If there was no practice of dowry,

would our society be kinder to girls ?

Sex ratio is used to describe the number of females per 1000 of males. Sex ratio is a valuable source for finding the population of women in India and what is the ratio of women to that of men in India. In the Population Census of 2011 it was revealed that the population ratio in India 2011 is 940 females per 1000 of males. The Sex Ratio 2011 shows an upward trend from the census 2001 data. Census 2001 revealed that there were 933 females to that of 1000 males. Since decades India has seen a decrease in the sex ratio 2011, but since the last two of the decades there has been in slight increase in the sex ratio. Since the last five decades the sex ratio has been moving around 930 of females to that of 1000 of males.

The major cause of the decrease of the female birth ratio in India is considered to be the violent treatments meted out to the girl child at the time of the birth. The Sex Ratio in India was almost normal during the phase of the years of independence, but thereafter it started showing gradual signs of decrease. Though the Sex Ratio in India has gone through commendable signs of improvement in the past 10 years, there are still some states where the sex ratio is still low and is a cause of concern for the NGO organizations. One of the states which is showing a decreasing trend in the population of women 2011 and is a cause of concern is Haryana. The state of Haryana has the lowest rate of sex ratio in India and the figure shows a number of 877 of females to that of 1000 of males.

There are also states such as Puducherry and Kerala where the number of women is more than the number of men. Kerala houses a number of 1084 females to that of 1000 males. While Puducherry and Kerala are the only two states where the number of female is more than the number of men, there are also states in India like that of Karnataka, Andhra Pradesh and Maharashtra where the sex ratio 2011 is showing considerable signs of improvement. Some facts related to the Sex Ratio in India follows, the main cause of the decline of the sex ration in India is due to the biased attitude which is meted out to the women. The main cause of this gender bias is inadequate education. Pondicherry and Kerala houses the maximum number of female while the regions of Daman and Diu and Haryana have the lowest density of female population.

In 2020, the sex ratio of the total population in India is 108.18 males per 100 females. There are 717,100,970 or 717.10 million males and 662,903,415 or 662.90 million females in India. The percentage of the female population is 48.04 percent compared to 51.96 percent male population.

4)   What are some of the negative effects of sex selection? Why do you think the number of girl children is declining in India?

In India, because of incomplete birth registration, sex ratios in young children are used as a proxy measure. The sex ratio in children under age 6 rose from 106 in 1991 to 108 in 2001 , showing that improved health care and general conditions for females have been offset by increased recourse to sex-selective abortion . However, distinct

geographical differences in sex ratio have appeared across the country; several states in the north and west have very high population sex ratios. For example, in the Punjab, Delhi, and Gujarat, ratios are between 114 and 126, but in the south and east, several states such as Kerala and Andhra Pradesh have sex ratios of ≈105. The underlying reasons for this divide are unclear and are not explained by any of the more obvious factors, such as income level, availability of medical resources, variations in economic growth, religion, or differences in female education . What is clear is that where sex selection occurs it is strongly influenced by the gender of the preceding child; for second births with one preceding girl the ratio is 132, and for third births with two previous girls the ratio is 139. In cases where the previous child was a boy, sex ratios are normal.

Parents' preference for sons is common in countries in East Asia through South Asia, to the Middle East and North Africa. Sons are preferred because they have a higher wage-earning capacity (especially in agrarian economies), they continue the family line and they usually take responsibility for care of parents in illness and old age.[1] There are also specific local reasons for son preference: in India, the expense of the dowry; and in South Korea and China, deep-rooted Confucian values and patriarchal family systems.[2]

For centuries, son preference has led to postnatal discrimination against girls; this has resulted in practices ranging from infanticide to neglect of health care and nutrition, often ending in premature mortality.[3] But in the 1980s, ultrasound technology started to become available for diagnostic purposes in many Asian countries, and the opportunity to use the new technology for sex selection was soon exploited. In countries where there is a combination of son preference, a small-family culture and easy access to sex-selective technologies, very serious and unprecedented sex-ratio imbalances have emerged. These imbalances are already affecting the reproductive age groups in a number of countries, most notably China, South Korea and parts of India

What are the sailent features of PC& PNDT Act 1994?

Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act, 1994 is an Act of the Parliament of India enacted to stop female foeticides and arrest the declining sex ratio in India. The act banned prenatal sex determination. Every genetic counselling centre, genetic laboratory or genetic clinic engaged in counselling or conducting pre-natal diagnostics techniques, like in vitro fertilisation (IVF) with the potential of sex selection (Preimplantation genetic diagnosis) before and after conception comes under preview of the PCPNDT Act and are banned.

This process began in the early 1990 when ultrasound techniques gained widespread use in India. There was a tendency for families to continuously produce children until a male child was born. Foetal sex determination and sex selective abortion by medical professionals has today grown into a Rs. 1,000 crore industry (US$ 244 million). Social discrimination against women and a preference for sons have promoted female foeticide in various forms skewing the sex ratio of the country towards men. According to the decennial Indian census, the sex ratio in the 0–6 age group in India went from 104.0 males per 100 females in 1981, to 105.8 in 1991, to 107.8 in 2001, to 109.4 in 2011. The ratio is significantly higher in certain states such as Punjab and Haryana (126.1 and 122.0, as of 2001).

Objectives

The main purpose of enacting the act is to ban the use of sex selection techniques after conception and prevent the misuse of prenatal diagnostic technique for sex selective abortions.

A sign in an Indian hospital stating that prenatal sex determination is a crime.

Offences under this act include conducting or helping in the conduct of prenatal diagnostic technique in the unregistered units, sex selection on a man or woman, conducting PND test for any purpose other than the one mentioned in the act, sale, distribution, supply, renting etc. of any ultra sound machine or any other equipment capable of detecting sex of the foetus. Main provisions in the act are[8]

1.   The Act provides for the prohibition of sex selection, before or after conception.

2.   It regulates the use of pre-natal diagnostic techniques, like ultrasound and amniocentesis by allowing them their use only to detect :

1.   genetic abnormalities
2.   metabolic disorders
3.   chromosomal abnormalities
4.   certain congenital malformations
5.   haemoglobinopathies
6.   sex linked disorders.

3.   No laboratory or centre or clinic will conduct any test including ultrasonography for the purpose of determining the sex of the foetus.

4.   No person, including the one who is conducting the procedure as per the law, will communicate the sex of the foetus to the pregnant woman or her relatives by words, signs or any other method.

5.   Any person who puts an advertisement for pre-natal and pre-conception sex determination facilities in the form of a notice, circular, label, wrapper or any document, or advertises through interior or other media in electronic or print form or engages in any visible representation made by means of hoarding, wall painting, signal, light, sound, smoke or gas, can be imprisoned for up to three years and fined Rs. 10,000.

Compulsory registration

The Act mandates compulsory registration of all diagnostic laboratories, all genetic counselling centres, genetic laboratories, genetic clinics and ultrasound clinics.

UNIT -3

1. Importance of Gender Justice and Indian Labour.

Ans-

A)Women constitute half the population of the society and it is presumed that best creation belong to the women.

B) But it is a harsh reality that women have been ill-treated in every society for ages and India is no exception.

C) From tribal to agricultural , industrial societies to organised states, the division of labour has primarily stemmed from physiological differences between the sexes, leading to the power resting with the men, resulting in the established gender hierarchies.

D) We have been gifted with a history of discrimination, subjugation and suppression.

2. Women The Less known Labour. Why?

Ans-

A) Women are deprived of economic resources and are dependent on men for their living.

B) Women works are often confined to domestic sphere, she had to do all house hold works, which are not recognized and unpaid.

C) In modern times many women are coming out to work but have to shoulder the double responsibility. D)Moreover, she is last to be considered and first to be fired as she is considered to be less productive than her counterpart.

E) Her general status in the family and in the society has been low and unrecognized.

3. Gender Justice and Indian Labour: A Critical Analysis.

Ans-

A) "Man for the field and women for the hearth."

B) Man for word and for needle she !!!

C) In India, it is believed that women enjoyed an equal status as men in the Vedic Period.

D) The Upanishads and the Vedas have cited women sages and seers.

E) But the condition declined considerably afterwards. Historical practices such as Sati and child marriage are a few traditions reflective of the gender imbalance in Indian Society.

F) Though these practices are largely defunct now, due to legal reform, the essence of the dysfunctional gender equity still is rampant and manifested today through domestic violence, trafficking, dowry deaths, female infanticide, female foeticide, sexual objectification, violence and sexual harassment at work place.

G) Man with the head and women with the heart.

H) Man to command and women to obey.

4. Gender injustice is a problem that is seen all over the world. Discuss.

Ans-

Technological progress in agriculture and the shift from subsistence to a market economy have had a dramatic negative impact on women, cutting them out of employment as many women are unskilled and lack education. Child labour among girls and unequal wages for women for similar work are common. Working women of all segments of society face various forms of discrimination.

From the cradle to grave, females are under the clutches of numerous evils such as discriminations, oppressions, violence, within the family, at the work places and in the society. But unless there are certain attitudinal changes, women will continue to get a raw deal.

5. Name some Important Laws In favour of Women.

Ans-

In order to ameliorate the condition of women in India, Legislature enacted the large volume of enactments and many of these legislations were enacted in colonial period like: Abolition of Sati Act, 1829; Widow Remarriage Act, 1856; Child Marriage Restraint Act, 1929; Dowry Prohibition Act, 1961; etc.

Apart from these laws there are some enactments pertaining to industry or work which contain special provisions for women such as: The Workmen Compensation Act, 1923; Payment of Wages Act, 1936; Factories Act, 1948; Maternity Benefit Act, 1961; Minimum Wages Act, 1948; Employees State Insurance Act 1948 and Pensions Act, 1987; etc.

6. What is Meaning of Gender Justice?

Ans-

It is said that "justice" is primarily a problem of discovering the right course of action. Since ancient times, political thinkers have been trying to formulate the concept of justice.

With the rise and growth of modern world and modern consciousness, especially under the effective influence of the principles of democracy and socialism, this very concept has been thoroughly transformed.

"Gender justice" is often used with reference to emancipator projects that advance women's rights through legal change, or promote women's interests in social and economic policy. However, the term is rarely given a precise definition and is often used interchangeably with notions of gender equality, gender equity, women's empowerment, and women's rights. Gender justice in the spirit of social justice is about more than simply questioning the relationship between men and women.

It involves crafting strategies for corrective action toward transforming society as a whole to make it more just and equal and it means "a place in which women and men can be treated as fully human

7. Gender Justice and Constitution.

Discuss

Ans-

The framers of the constitution bestowed sufficient thought on the position of women in Indian social order, which is quite evident from the provisions of the constitution.

The Constitution of India which is regarded as the supreme law of the land, gives special protection to women's such as Article 15 guarantees the right against discrimination.

The prejudice and bias against women is rampant an issue to be countered by the right to equality, hence the right against discrimination.

Article 15(3) talks about the special protection for women. Article 16 provides the right to equal opportunity in terms of public employment irrespective of the sex of the person. This provision aids women to start participating in elections and the decision making process. In this regard it is important to mention the 74th amendment, made for the reservation for women in Panchayats.

Article 19 guarantees freedom of speech and expression, to assemble peaceably and without arms, to forms associations and unions, to move freely throughout the territory of India, to reside and settle in any part of the territory of India; to practise any profession, or to carry on any occupation, trade or business.

This fosters the right to equality, by providing the necessary freedoms needed to live in society.

Without the right to equality, the purpose of gender justice cannot be achieved.

Article 39 talks about the certain principles of policy that need to be followed by the state which are securing adequate means of livelihood equally for men and women, equal pay for equal work among men and women, and the health and strength of workers, men and women are not abused.

Article 42 requires the state to make provision for securing humane conditions of work and maternity relief.

8. Give two Examples of Gender Justice in India.

1) In C.B. Muthamma v. Union of India [1979 AIR 1868; 1979 SCC (4) 260] the validity of the Indian Foreign Service (Conduct an discipline) Rules of 1961 was challenged which provided that a female employee to obtain a written permission of the Government in writing before her marriage is solemnized and at any time after a marriage a women member of the service may be required to resign from service. The Supreme Court held that such provision is discriminatory against women and hence unconstitutional.

2) In Vishakha and others v. State of Rajasthan [1997 (6) SCC 241], the Supreme Court held that sexual harassment of working women at her place of an employment amounts to violation of rights of gender equality and right to life and liberty which is clear violation of Article 14, 15 and 21 of the Indian Constitution. The Court further observed that the meaning and content of the fundamental rights guaranteed in the Constitution of India are of sufficient amplitude to encompass all the facts of gender equality including prevention of sexual harassment or abuse.

9. Importance of Gender Justice in Labour Law.

Ans-

Under the Industrial laws the women have been bestowed the special position in the view of their unique characteristics, physically, mentally and biologically.

Some of the Acts related to employment were enacted during British period as well as after independence.

These Acts not only regulated the hours of work but also contained provisions of health, safety and welfare of women workers and guarantees equality before law and equal treatment to women workers.

Most of these laws have been inspired by the Conventions and recommendations adopted by the International labour Organization.

The main objectives for passing these laws are to enable the women to increase their efficiency, to increase their participation in useful services, to ensure their infant welfare and to provide equal pay for equal work.

10. What's The Factories Act of1948?

Ans-

The Factories Act is a part of labour welfare legislations wherein measures have been laid down to be adopted for the health, safety, welfare, working hours, leave and employment of young persons and women.

Exclusive provisions for women have also been incorporated in the Act keeping in view their soft and tender personalities.

Provisions for welfare of women:

· Prohibition of employment of women during night hours

· Prohibition of work in hazardous occupations.

· Prohibition of employment of women in pressing cotton where a cotton opener is at work

· Fixation of daily hours of work at nine.

· Fixation of maximum permissible load.

· Provision for crèche

In every factory where more than 30 women workers are ordinarily employed, there shall be a suitable room for the use of children under the age of six years of such women.

· Provision for washing and bathing facilities.

The Act provides for separate and adequately screened washing and bathing facilities for women.

· Provisions for toilets.

The factories Act must make it obligatory for any factory owner to maintain an adequate number of latrine and urinals separate for women.

· Provisions for rest rooms and canteens.

· Provisions for mandatory benefits.

All the above provisions are simultaneously provided under The Plantations labour Act 1951, The Mines Act 1952, The Beedi and Cigar workers (conditions of Employment) Act 1966, The Contract Labour (Regulation and Abolition) Act 1970 and The Interstate Migrant Workmen (Regulation of Employment and condition of services) Act 1979.

The important labour legislations covering the women are:

11. What is The Equal Remuneration Act, 1976?

Ans-

Equal pay for equal work for women and men is a vital subject of great concern to society in general and employees in particular.

There was a common belief that women are physically weak and should be paid less than their male counter parts for the same piece of work. Women all over the world, had till recently been very much in articulate and were prepared to accept lower wages even when they were employed on the same jobs as men.

Even in the economically and socially advanced countries where remarkable progress has been made, discrimination still exists.

In India, in the initial stages when legislation for the protection of workers was hardly thought of, factory owners taking advantage of the backwardness and poverty, recruited women on a large scale at lower wages and made them work under inhuman condition.

International Labour Organization has evolved several conventions to provide protection to employed women.

A number of ILO conventions have been ratified by India and some of these though not ratified have been accepted in principle.

The principle of ILO has been incorporated in the constitution of India in the form of Article 39, which directs the states to secure equal pay for equal work for both men and women.

To give effect to this constitutional provision the parliament enacted the Equal Remuneration Act, 1975.

The Equal Remuneration Act was passed in 1976, providing for the payment of equal remuneration to men and women workers for same or similar nature of work.

Under this law, no discrimination is permissible in recruitment and service conditions except where employment of women is prohibited or restricted by the law.

The situation regarding enforcement of the provisions of this law is regularly monitored by the Central Ministry of Labour and the Central Advisory Committee.

12. Role of Judiciary in the welfare of Women / Labour.

Ans-

Judiciary has played an active role in enforcing and strengthening the constitutional goal of "equal pay for equal work".

In respect of occupational hazards concerning the safety of women at workplaces, in 1997 the Supreme Court of India in the case of Vishakha v. State of Rajasthan[1997 (6) SCC 241] held that sexual harassment of working women amounts to violation of rights of gender equality.

As a logical consequence it also amounts to violation of the right to practice any profession, occupation, and trade.

The judgment also laid down the definition of sexual harassment, the preventive steps, the complaint mechanism, and the need for creating awareness of the rights of women workers. Implementation of these guidelines has already begun by employers by amending the rules under the Industrial Employment (Standing Orders) Act, 1946.

13. What are the reasons for the decline of Women Employment?

Ans-

There are various reasons why the employment of women has not been up to the mark, in a developing country like India.

The economic reason involving additional cost is an impediment to women employment.

There is statutory obligation on the employer to pay maternity benefit and it is considered as burden by the employer and affects the employment of women.

Some employers recruit only married women on condition to resign their post on getting married.

This has been discriminatory, unfair and unjust.

Prohibition of night work of women also affects the employment of women.

14. What is The National Rural Employment Guarantee Act, 2005?

Ans-

Recently, the Government of India enacted National Rural Employment Guarantee Act whereby anyone who is willing to provide manual unskilled labour will be offered wage employment for 100 days.

This Act provides the enhancement of the livelihood security of the households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work.

Priority is given to women in the allocation of work.

Gender equality is one of the core elements of this poverty reduction plan which stipulates that at least one third of the labour force should be women with equal wages for both men and women.

Various gender related objectives such as provision of hygienic work environments, safe drinking water, and childcare facilities at the work-site, distance of work-place not exceeding two miles from home, health care and nutrition are emphasized.

Women engaged in agricultural farming have to spend long hours under the hot sun but are invariably paid less than their male counterparts. Women's participation in the labour force with no wage discrimination and direct control of resources and assets can substantially enhance her health, child welfare and socioeconomic status.

This employment policy if properly implemented can certainly bring momentous changes in the lives of women.

The employment scheme undoubtedly has a positive impact on gender equity and power equation within the household.

An alternative model of development must focus on the enhancement of living standards of rural India where majority of the population resides.

15. Importance of Empirical Evidence Related to Female Work Participation. Discuss.

Ans-

According to 2001 census, the total number of women in the country is 494.82 million out of the total population of 1, 025, 25 million.

This means that women accounted for 48.26% of the total population.

Out of the total women in the country, the work participation rate was only 25.67% while the work participation rate of men was 51.93% in the year 2001.

However there is rise in the percentage of women workers through the years.

According to another survey, in the year 2004, the total employed force in the public and private sector was 49.34 lakh.

Women working in organized sector constitute only 10 percent whereas 90 percent are in unorganized sector.

In 2003, the number of women in central govt. employment was 7.51 percent.

The percentage of educated women seeking employment has shown an upward trend from 68.7 percent of Indian population.

Census of India, 2001 defined work as an economically gainful activity, and as a result of this, ninety percent of women are recorded as non-worker in the census report of Indian states. Eighty percent women population in rural areas are physically active but being poor and literate they face enormous problems in labour market.

16. Correlation between Gender Justice and Employment.

Ans-

Sexual division of labour is highly prevalent in the society.

But, there is nothing "natural" about the sexual division of labour.

The fact that men and women perform different kinds of work both within the family and outside has little to do with biology.

Only the actual process of pregnancy is biological, all the other work within the home that women must do-cooking, cleaning, looking after children and so on, can equally be done by men.

Unfortunately this work is considered to be "women's work".

This sexual division of labour is not limited to the home; it extends even to the "public" arena of paid work.

Certain kinds of work are considered to be "women's work", and other kinds, men's.

The most important is the fact that whatever work a women does they are under paid with lower wages, and are valued less.

For example, nursing and teaching, particularly at lower levels, are predominantly female professions and are also comparatively low paid in relation to other white collar jobs which the middle classes take up.

17. Women Work goes Unrecognised in some sectors of India. Elaborate.

Ans-

Employment of women in the unorganized sector has still not ensured them support services like child care, health care, equal remuneration and most of all promotional avenues.

Women pre-dominate the lower hierarchies of employment and rarely move up to managerial and decision making positions.

These are areas of concern.

Even for women employed in the organized sector, child care service is very conspicuous by its absence.

Very scanty service is available in some urban areas.

The reproductive role of women and the frequency of child bearing push them out of the labour market in a substantial part of their productive period.

This hampers their economic contribution very significantly.

The increasing awareness of family planning will be a measure of empowerment for women, releasing them for activities of their choice for a longer period of their lives.

In India, women comprise about one third of the working force.

The number of women workers employed in the unorganized sector is higher in rural areas than in urban areas, majority of them in the agriculture sector.

In urban areas women are engaged in a variety of occupations such as vegetables sellers, flowers sellers, ironing, construction workers, domestic maids etc.

Since most of the activities in the unorganized sector generally require less skill and education, and are of a traditional nature, a significant proportion of women workers in India are in this sector.

In urban areas, over 80 per cent are working in the unorganized informal economy where earnings are extremely low, hours of work long, no paid leave, no medical insurance or pension or any other social security benefits.

18. Role of a women.

Ans-

Working in the informal economy often becomes hazardous for undernourished women workers. Working as home based workers in household industries, domestic workers, petty trades, services, construction sector, etc. women contribute significantly to the national economic growth as also to family welfare.

Yet, their contribution is not adequately recognized; neither their gender specific problems adequately addressed.

They remain largely unorganized, unheard, underpaid and under-represented.

Although today every panchayat has a significant number of women, yet it is true that many of them are timid, mere alibis for their husbands or brothers, the fact that their presence is required in a panchayat and they possess the power to decide on village concerns, have enabled the more articulate women actually to participate in the democratic process.

It is possible that women's sense of themselves, their roles and functions may undergo a gradual transformation in the near future.

The complexity, challenges, violence and extra requirements had convinced the women that they can never come up under the existing process of nominations and they needed some compulsion like quota and reservation.

19. An overview of Gender Justice

Ans-

Global view of Gender Justice:

Gender Justice, simply put refers to equality between the sexes. Gender justice is a correlation of social, economic, political, environmental, cultural and educational factors; these preconditions need to be satisfied for achieving gender justice.

In these days of globalization, the global picture of women is most ignorable and inequitable.

Women constitute 50 per cent of the world's population, and account for 66 per cent of the work done, but they have only a share of 10 per cent in the world's income and own one per cent of the world's property.

Globally, gender justice as a cause has gained in strength over the years, as it has been realised that no state can truly progress if half of its population is held back.

Globally, the United Nations has established a strong mandate for gender justice.

The focus on gender equality and gender justice has been there since the inception of the UN.

In 1946, a separate body was formed to work on the "advancement of women".

The Commission on the Status of Women worked from its inception to collect and compile data on women's situation around the world, to promote women's human rights and raise awareness of, and support for, their contribution to development.

The Decade for Women (1976-1985) and four world conferences on women (between 1975 and 1995) contributed significantly to raising awareness and commitment to gender equality and gender justice.

In 1995, the Beijing Declaration and Platform for Action had been framed for guiding work at national level.

The human rights treaty on gender equality – The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) has been ratified by 185 states and the optional protocol by 90 states.

Since 1995 and the adoption of gender mainstreaming as a critical strategy for achieving gender equality, intergovernmental bodies – such as the General Assembly, the ECOSOC and the Commission on the Status of Women - have worked to mainstream gender perspectives as an integral part of all policy areas.

At the 2005 World Summit, world leaders reiterated that "progress for women is progress for all".

The UNIFEM is another agency of the UN. It is the development fund for women at the United Nations.

It provides technical and financial assistance to innovative programmes and strategies to foster women's empowerment and gender equality. The United Nations Development Programme (UNDP) also has the Gender Development Index (GDI).

It is an indication of the standard of living in a country, developed by the UN.

It aims to show the inequalities between men and women: long and healthy life, knowledge and decent standard of living.

India is ranked 128th in the Gender Development Index, while USA is 12th and UK is 16th.

The nineteenth amendment to the United States Constitution in 1920 giving women equal rights as men with respect to voting was the first constitutional recognition of gender rights.

20. What are the problems faced by Women?

Ans-

· Female feticide, infanticide, child marriage, domestic violence, sexual violence, and sexual harassment at the work place to the treatment meted out to elderly women makes any thinking person to wonder at the nature of the society.

Participation of women in the decision making bodies be they within the home, workplace or community is marginal, never reaching even 25% of the total population of women in India.

· Women are forced to change their jobs or seek transfers on account of Sexual Harassment.

· Most of the women's work, inside the house goes unnoticed and unremunerated.

Even outside the family they remain underpaid.

· In terms of horizontal segregation, women are concentrated in low –paying positions such as secretary, typist, beautician, nurse, caregiver and assembly – line worker.

 "Equal work but unequal pay" is still a common practice in India's private sector.

· According to statistics from the United Nations "Women constitute 50% of the World population, do two third of the work, get 10% of the total income and own 1% of the total assets".

While this is a global fact, the picture is much more pathetic in India.

· Children living in this environment and witnessing the differential role pattern of the man and the woman learn the lessons of gender inequality right from their childhood and the pattern is bound to continue generation after generation.

· Women constitute a significant part of the workforce in India but they lag behind men in terms of work participation and quality of employment.

According to Government sources, out of 407 million total workforce, 90 million are women workers, largely employed (about 87 percent) in the agricultural sector as labourers and cultivators.

In urban areas, the employment of women in the organised sector in March 2000 constituted 17.6 percent of the total organised sector.

· The existence of discriminatory laws, the fact that the laws fail to take account of rural women's special situation, and the adherence to paternalistic and male-oriented customs which hinder the implementation of, or fill the gaps in, non-discriminatory legislation, have helped to keep rural women in a subordinate position.

21. Improvising Women Employment.

Remedies

> It is now empirically established that women's education is a single cure for a thousand societal ills.

> Increasing women's voice in decision-making; full participation of women in society, starting from autonomy in the household, to voice in all political processes at community, national and international levels.

> Quotas have been shown to rapidly increase female representation in corporate decision-making, as well as politics.

> Special rules governing women's reproductive work and aimed, in any event, at achieving equal working conditions for rural men and women should also be established.

> Legislation should be passed entitling domestic workers to a minimum wage, social security and social services.

> To ensure that the principle of non-discrimination is observed, express provision should be made for fines as a penalty for contravention of the rules, and monitoring and inspection bodies should be established to ensure compliance.

> Legislation expressly stipulating that rural women be included in organizations and provided technical assistance and training should be introduced.

> The State should guarantee women's access to formal and informal education, technical training and new technologies.

> The big financial institutions find the small business of the poor to be too petty to justify their involvement. Many of their enterprises (particularly by women) are not recognised as productive enough to be creditworthy.

22. Analysis of Gender Justice. Illustrate.

Reasons-

Enacting gender just laws will not mean an end to the exploitation of and discrimination against women.

Using law and the legal system can only be one of the many remedies to be used to change the unequal status of women.

In spite of having so many enactments dealing with women and judgments of the Supreme Court protecting women the downtrodden and poor conditions of women has not been improved and she still faces all types of atrocities and legislature and judiciary somewhat fails to provide respect to women in society.

After independence the founder fathers of the nation, wanted to reform the society and were keen to establish an egalitarian society.

To achieve this end they used law as an instrument to check the gender discrimination, number of laws, were enacted to meet this end but due to strong patriarchal mentality and unfavourable social environment they failed to accomplish their goal.

The social engineering through law was not fully achieved, while some rights enshrined under the enactments were enjoyed and accepted by the society most of them remained only in papers due to lack of public support.

As it rightly said; by Wendell Phillips: "Law is nothing unless close behind it stands a warm living public opinion"

It is said that the law without the public opinion is nothing but a bundle of papers.

The gap between the men and women cannot be bridged by just enacting laws without any public support as social engineering laws are different from penal laws which are just related to punishment and are deterrent in nature but social engineering laws enacted to uplift the norms of the society are progressive in nature and therefore it should be backed by the will of the people for whom it is enacted.

It must be remembered that guaranteeing a right in law does not ensure the ability to access the right in reality.

23. How would you conclude The Gender Justice.. Justify.

Ans-

Conclusion

"Just as a bird could not fly with one wing only, a nation would not march forward if the women are left behind." - Swami Vivekananda

Gender equity emphasizes that all human beings be it men or women are free to develop their personal abilities and make choices without the limitations set by stereotypes, rigid gender roles, political and other prejudices.

Their different aspirations should be valued equally and they would be treated fairly according to their respective needs.

But the law alone cannot do much. All sections of society have to work for this transformation and this is where NGOs, the media and the people's representatives have to play a major role.

Gender justice is genuine equality among human beings where neither man is superior nor is a woman inferior.

24. Housework is invisible and unpaid work. Housework is physically demanding./ Housework is time consuming Write, in your own words what is meant by the terms 'invisible,' physically demanding', and 'time consuming'? /Give one example of each based on the household tasks undertaken by women in your home.

Answer:

The term 'invisible' means the work that women generally do inside the home is not given due recognition. Example - looking after the family members and cooking food for them. The term 'physically demanding' means the various works women do for their families require great physical labour. Example - cooking by standing in front of gas-stoves. The term 'time consuming' in housework means that women spend long hours in doing different household chores. Example - taking care of the children and the old are time consuming.

25.Activity

1) If you have someone working as a domestic help in your house or locality talk to her and find out a little bit more about her life – who are her family members ? Where is her home? How many hours does she work? How much does she get paid? Write a small story based on these details.

Answer:

There is a domestic helper in my locality. Her name is Geeta. There are six members in her family including herself. She has to look after his old parents, two brothers and a sister. Being the eldest among her siblings, the responsibility of the family falls on his shoulders. She is from a small village of Orissa. She works for fifteen to eighteen hours every day She gets fifteen hundred per month along with feeding and lodging. Geeta is a domestic helper in the house of Mr. Sharma, She has been working there for five years. Mr. Sharma is an executive engineer. He has five members in his family Geeta wakes up at 5 o'clock every day without failure. After sweeping and dusting she prepares breakfast and tiffins. She washes clothes and iron them. She also goes to the bus-stop to pick up the children. At 2 o'clock she starts preparing midday meal. She cooks delicious dishes for the family. In the evening she serves light meal like snacks, etc. along with tea to the family members. Sometimes Geeta doesn't want to get up so early. But she has to wake up because she is very much afraid of her Memsahib, who always shouts at her. Even children do not behave with her politely. Sometimes she feels hurt. But she keeps silence. She has to cam money at all cost to look after her family.

26:Activity

2. Make a list of toys and games that boys typically play and another for girls. If there is a difference between the two lists, can you think of some reasons why this is so? Does this have any relationship to the roles children have to play as adults?

Answer:

Discrimination of Toys & Games

Boys: Aeroplane, helicopter, gun, car, jeep, train, video-games etc.   cricket, football, hockey, shooting, kite-flying, etc.

Girls: dolls, musical instru- ments, gudda-guddiya, etc.   table - tennis, kabaddi, hide and seek, badminton, swimming, etc.

Boys prefer hard or tough toys. They are very conscious of their manliness from the very beginning. Toys like helicopter, gun, aeroplane, etc. satisfy their instinct of being boys. On the other hand girls choose those toys which are soft and can be played indoors. Their feministic nature does not allow them to play with toys perferred by boys. Yes, the toys and games, the boys and girls play with have relationship to the roles they have to play as adults. Boys begin to give protection to the girls while girls take care of the boys.

27. The invisible workers

A Case To Study - Discuss

The horrific case of the young girl tortured by her employer in Delhi forces us to ask why there is no law to protect the rights of the people who work in our homes.

Household work has never been considered work in India.

It has always been the 'duty' of the woman: wife, mother, daughter or sister to do the chores and expect no pay.

Any wonder then that the domestic worker is so blatantly underpaid. Cooking, cleaning, caring for children, these are all skilled jobs but they fall under the unorganised sector, with no law to protect rights, no health cover and no pension.

The absence of a targeted law for domestic workers also means that in the case of abuse or exploitation, they have no recourse to justice.

Some laws can be invoked for specific instances, such as the Sexual Harassment of Women at Workplace Act, the Unorganised Workers' Social Security Act, 2008 and the Juvenile Justice Act. But that's it.

A National Policy on Domestic Workers has been formulated by the Labour Ministry but is yet to be notified. Karnataka and Kerala have notified minimum wages for domestic labour while Tamil Nadu includes domestic workers in the Manual Workers Act. Some attempts were made to extend the Rashtriya Swasthya Bima Yojana to domestic workers but they have fallen short of implementation.

In 2011, the International Labour Organisation (ILO) adopted the Domestic Workers Convention.

India supports the Convention but is yet to ratify it.

One big reason for the absence of a targeted law, say activists, is that the law-makers — the babus in Delhi and elsewhere — are themselves employers and a law protecting the rights of domestic workers could be antagonistic to their interests.

Belonging to the unorganised sector means that in case of a dispute with the employer, the worker cannot go to a labour court, as she is not technically recognised as a 'worker'.

 "All laws since Independence are formulated for the organised sector, which is hardly 5 per cent in this country," says Subhash Bhatnagar of Nirmala Niketan, which organises domestic workers.

The National Platform for Domestic Workers, which includes 20 organisations from 15 states, recently submitted a petition demanding comprehensive legislation.

They proposed an autonomous statutory body or Tripartite Board, with compulsory registration of employer, employee and agency.

"A full-time worker is more vulnerable to abuse behind closed doors.

The responsibility must be pinned on the employer as well who can give one month's salary annually to the Board. The Board can, in turn, take care of the workers' quarterly health check-up, shelter, maternity and accident costs, pension and other benefits," says Bhatnagar.

The details of a person checking into a hotel room for one day are sent to the police, so where is the problem in registering domestic workers, he asks.

28.Why housework is invisible undervalued and poorly appreciated?

Ans-

Their contribution to the family and society is not valued as most of their work is considered as household work which as women and the role given to them by society they are obliged to perform. It remains unseen, invisible and unrecognised and in conventional terms, yielding no economic benefits.

29. What is the quantum of work done by a woman in a household?

Ans-

The quantum of work done by a woman in household is more than the work done by any working professional. They work 24 X 7 for 365 days without any holidays and special rewards. They have to variety of tasks from cooking, cleaning, decoration, stitching, etc.

30. Why is it that a woman who takes care of the household activities is not considered to be working?

Ans-

True – It is considered that household work comes naturally to women and hence they need not be paid for it.

31. What do we call the Labour without payment?

Ans-

Unpaid labor is defined as labor that does not receive any direct remuneration. Contributing so much time to unpaid domestic work has major effects on women and their participation in the labor market, which consequently affects children, society, and the state.

32. What is the quantum of work done by a woman in a household can it be reduced How?

Ans-

The women in a household perform almost all activities of the house from cooking till child nourishment. Yes, it can be reduced at a great extent. The men in the house should be highly cooperative with the women so that they can genuinely perform the work with less distress.

33. Why do you think housework is given less value than other jobs?

Ans-

Housework is not a economic activity it does add income to the nation and its main aim is to serve people without seeking for money while other jobs such as cooking in hotel, Teaching in institute and etc. ... therefore housework is less valued as compared to other jobs.

34. What are the political rights of a woman in India?

Ans-

Equality in decision making, economic and social freedom, equal access to education and right to practice an occupation of one's choice.In order to promote gender equality , we need to the empowerment of women,and concentrate on areas which are most crucial to her well being.

35. What is the status of women's representation in India?

Ans-

The status of women's representation in India's legislative bodies: (i) Central Legislature: Less than 10% of its total strength are women. (ii) State Legislature: Less than 5% of its total strength are women. (iii) Panchayati Raj: One-third of the seats are reserved for women.

36. When did women's rights start in India?

Ans-

15 December 1917

When it was approved, on 15 December 1917, Sarojini Naidu led a deputation of 14 leading women from throughout India to present the demand to include women's suffrage in the new Franchise Bill under development by the Government of India.

UNIT-4

1.   What is Sexual Harassment?

The determination of whether conduct is sexual harassment depends on the specific facts and context of the situation. Sexual harassment can occur between coworkers, between workers of the same sex, between the general public or clients and an employee. Sexual harassment may be very subtle and can be in the form of physical, verbal, and/or visual harassment. Examples of behavior which may constitute sexual harassment include but are not limited to:

Acts from male to female, female to male and between or among individuals of the same sex which are sexual in nature and unwelcome sexual harassment may be directed against a particular person, persons or group.

Verbal behavior which is sexual in nature and unwelcome, e.g., epithets, jokes, comments or slurs, repeated requests for dates which are unwelcome.

Nonverbal behavior which is sexual in nature and unwelcome, e.g., staring, leering, lewd gestures.

Physical conduct which is sexual in nature and unwelcome, e.g., assaults, sexual advances such as touching, patting, or pinching, impeding or blocking, movement or any physical interference with normal work or movement;

Visuals which are sexual in nature and unwelcome, e.g., posters or signs, letters, poems, graffiti, faxes, cartoons or drawings, pictures, calendars, electronic mail and computer programs.

2. *Why is sexual harassment such a problem?*

Sexual harassment is an issue that affects all of us at the workplace, when it occurs. Many individuals who experience sexual harassment suffer physically and psychologically from the harassment. Many are forced to quit their jobs or take sick leave to escape from the harassment. Turnover is expensive, as are investigations and lawsuits. Not only is the individual harmed, but all of his or her coworkers are harmed either by the pervasive feeling that one cannot get ahead in the workplace without giving sexual favors or by creating an environment where co-workers are forced to tolerate offensive conduct and their work suffers.

Reported sexual harassment greatly underrepresents the extent of the difficulty because most individuals are afraid to report the harassment. A recent federal study indicates that sexual harassment is pervasive, especially amongst coworkers but that only 6% of the individuals who experience sexual harassment file a formal complaint. The very real fear of retaliation or being labeled a troublemaker keeps many individuals from reporting an incident and the fear offending the harasser, who is either a boss or a colleague, keeps the great majority of both men and women from directly confronting the harasser.

California and federal courts have sent a clear message that sexual harassment should not be tolerated and that employers must take positive steps to prevent sexual harassment from occurring. An employer who knows of the sexual harassment of an employee and does not take prompt, appropriate action will be held responsible for the harassment. Likewise, even if an employer does not know of the harassment, *but should have known,* the employer will be held responsible. Therefore, all employers and supervisors have a responsibility to prevent sexual harassment from occurring.

3. *What is the reality behind the myths about sexual Harassment?*

Following is a list of myths and their corresponding realities. Myths about sexual harassment are based on prevailing attitudes and stereotypes about sex, sexuality and other compounding factors such as age, race, sexual orientation and disability. Myths about sexual harassment deny the harmful nature of its conduct. They shift the blame to the victim and obscure the motivation of the harasser which is to achieve power and control over the person harassed.

Myth: Sexual harassment is simply an expression of sexual desire.
Reality: Sexual harassment is an expression of hostility and aggression. It is an abuse of power using sexual behavior as the vehicle and it is against the law.

Myth: It's no big deal if a person is harassed; it's all done in "good fun."
Reality: Sexual harassment is abusive. It is not done in jest or "good fun"; rather, it is done to intimidate and hurt others. All people have a right to be treated professionally with respect, decency and consideration.

Myth: There is a profile of a typical harasser.
Reality: Harassers are found in all types of occupations, at all organizational levels, among businesses, academic and all ethnic and religious groups. Those who sexually harass are not distinguishable from their colleagues who do not harass with respect to gender, age, marital status, rank, job title, occupation or national origin.

Myth: Men can't help themselves when they are sexually aroused.

Reality: Men are capable of and responsible for controlling their behavior and acting professional in workplaces and educational institutions, just as women are.

Myth: If you ignore sexual harassment, it will stop.
Reality: Generally, simply ignoring sexual harassment will not stop it. Ignoring such behavior may be taken as a sign of encouragement or tacit consent. Many report that when they directly tell the harasser to stop, the harassment often, but not always, ends.

Myth: Some people just interact in a physical way and are accustomed to touching others, nothing is meant by this.
Reality: Family and social interactions differ from individual to individual, community to community, and ethnic and racial group to ethnic and racial group. However, unwanted and unwelcome physical gestures such as hugging, pinching, or brushing up against a person's body may be forms of sexual harassment. Everyone must conform to the law.

Myth: People who dress in a sexually attractive manner are asking for sexual comments.
Reality: The harasser is always responsible for having committed the harassment regardless of an individual's appearance, behavior, judgement, or previous actions. Professional dress codes, if they exist, should be enforced for both sexes.

Myth: Only men can sexually harass women.
Reality: Both men and women may be targets or perpetrators of sexual harassment. Many times men may not realize that they are sexually harassed because society has unwritten rules that men are supposed to enjoy conversations, attention or behaviors of a sexual nature. As such, it may be difficult for an individual man to recognize his discomfort in these situations or to vocalize this discomfort. Also, women can harass other women and men can harass other men. It is unwelcome sexual behavior or attention regardless of who is perpetrating, or who is the target of the behavior.

Myth: There is nothing that can be done about sexual harassment.
Reality: On the contrary, there are many steps that can be taken to prevent sexual harassment, and to respond appropriately when it does occur. Strong policies and effective procedures articulated by the head of an organization or institution that are communicated to and understood by all employees are critical for prevention.

4. **What are the Criminal Provisions for Sexual Harassment?**

Physical contact and advances involving unwelcome and explicit sexual overtures, demand or request for sexual favours, showing pornography against the will of a woman, making sexually coloured remarks are all offences under the Indian Penal Code.
A victim of sexual harassment can use the provisions under the Prevention of Sexual Harassment Act and simultaneously file a first information report with the police. When a victim lodges a police complaint, she's asked to visit the magistrate's office where the state registers the complaint. A notice is sent to the accused after that, she said.
"Post this, the trial commences. A sexual harassment trial is conducted like a rape case trial—with a lot of sensitivity. During the trial process, the victim could demand a monetary compensation or mention any other relief that she's looking for."

5. **How Law works against Sexual Harassment of women at the Workplace?**

In 1997, the Supreme Court introduced the Vishaka Guidelines. "Gender equality includes protection from sexual harassment and right to work with dignity, which is a universally recognised basic human right," the court said.

However, the guidelines failed to explicitly address sexual harassment of women in the informal sector—a group now numbering some 195 million.

The 2013 Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act widened the definition of the workplace and covered the informal sector, including domestic workers. Popularly known as the POSH Act, it provides protection to all workers in the public and private sectors including health, sports, education, or government institutions, and any place visited by the employee during the course of her employment, including transportation.

The law defines sexual harassment as physical contact and advances, or a demand or request for sexual favors, or making sexually colored remarks, or showing pornography, or any other unwelcome physical, verbal, or non-verbal conduct of sexual nature. Any of these acts whether direct or implied, constitute sexual harassment under the law. It provides an alternative to filing a criminal complaint with police, instead mandating employers to set up committees in case of a private company, or local government officials in case of the informal sector, to hear complaints, conduct inquiries, and recommend action to be taken against perpetrators. This can range from a written apology to termination of employment.

Women can still file police complaints under the Indian Penal Code dealing with sexual harassment or assault. But unlike a criminal case that could drag on for years, the complaints committees are expected to offer quick and effective remedy.

Under the POSH Act, every employer is required to constitute an Internal Committee (IC) at each office with 10 or more employees. For establishments where the IC has not been constituted because they have fewer than 10 employees, or if the complaint is against the employer, or for women working in the informal sector, the state government's district officer or collector is required to form a Local Committee (LC) in each district and, if required, at the block level. The government is also responsible for developing training and educational materials, organizing awareness programs, monitoring implementation of the law, and maintaining data on the number of cases of sexual harassment filed and resolved in the workplace.

6.   Enumarate some key recommendations to vanish sexual harassment at workplace and in the society.

The Indian government should take urgent action—in collaboration with state governments, civil society organizations, women's rights activists, trade unions, private sector, and national and state commissions for women—to raise awareness about and ensure implementation of laws and policies that address sexual harassment in the workplace. The government should:

•   Enforce the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013, including monitoring the creation and effective operation of committees, carrying out inspections and investigations, sanctioning employers who fail to comply, and ensuring access to remedies for victims, including complaints mechanisms, and compensation.

•   Publish data on an annual basis on the number of sexual harassment cases filed and resolved by Internal and Local Committees, including the types of cases and resolution. Publish data on the number of employers sanctioned for non-compliance with the law.

•   Ratify and implement the ILO Convention on Violence and Harassment, 2019, No. 190 and take steps toward effective prevention measures, including special attention to sectors with heightened risk of violence and harassment, such as domestic work.

•   Conduct a nationwide audit on Local Committees and publish the results. The audit should assess how many Local Committees have been set up, their composition, nature of complaints received, orders issued, time taken for issuing orders, what kind of training and awareness raising programs, campaigns, and workshops they have held, and other related aspects of their responsibilities.

- Increase cooperation and dialogue with workers' organizations and civil society groups to address sexual harassment as a key workplace issue, and partner in information campaigns and reporting on effective enforcement of the law.

7. Explain the offences against women which are incorporated in Indian penal code along with sections and punishment.

Section	Offence	Punishment	Notes
326A	Acid attack	Imprisonment not less than ten years but which may extend to imprisonment for life and with fine which shall be just and reasonable to meet the medical expenses and it shall be paid to the victim	Gender neutral
326B	Attempt to Acid attack	Imprisonment not less than five years but which may extend to seven years, and shall also be liable to fine	Gender neutral
354A	Sexual harassment	Rigorous imprisonment up to three years, or with fine, or with both in case of offence described in clauses (i), (ii) or (iii) Imprisonment up to one year, or with fine, or with both in other cases	Only protects women. Provisions are: i. physical contact and advances involving unwelcome and explicit sexual overtures; or ii. a demand or request for sexual favours; or iii. forcibly showing pornographys; or iv. making sexually coloured remark; or v. any other unwelcome physical, verbal or non-verbal conduct of sexual nature.
354B	Act with intent to disrobe a woman	Imprisonment not less than three years but which may extend to seven years and with fine.	Only protects women against anyone who "Assaults or uses criminal force to any woman or abets such act with the intention of disrobing or compelling her to be naked."
354C	Voyeurism	In case of first conviction, imprisonment not less than one year, but which may extend to three years, and shall also be liable to fine, and be punished on a second or subsequent conviction, with imprisonment of either description for a term which shall not be less than three years, but which may extend to seven years, and shall also be liable to fine.	Only protects women. The prohibited action is defines thus: "Watching or capturing a woman in "private act", which includes an act of watching carried out in a place which, in the circumstances, would reasonably be expected to provide privacy, and where the victim's genitals, buttocks or breasts are exposed or covered only in underwear; or the victim is using a lavatory; or the person is doing a sexual act that is not of a kind ordinarily done in public."
354D	Stalking	Imprisonment not less than one year but which may extend to three years, and shall also be liable to fine	Only protects women from being stalked by men. The prohibited action is defined thus: "To follow a woman and contact, or attempt to contact such woman to foster personal interaction repeatedly despite a clear indication of disinterest by such woman; or monitor the use by a woman of the internet, email or any other form of electronic communication. There are exceptions to this section which include such act being in course of preventing or detecting a crime authorised by State or in compliance of certain law or was reasonable and justified."

8. What are the necessary measures to be taken to prevent violence against women?

While both men and women can be victims of violence, violence against women, often at the hands of men, is a unique category of violence that relies on the historical and current unequal balance of power between men and women, boys and girls. Violence against women is the crucial element that reinforces men's power and control over women throughout the world. On some level, most of us participate in the culture that supports and encourages violence against women and girls, in both small ways (like telling our friends to "man up" when they have to do something difficult) to large ways (beating and raping women and girls). Here are some small and big ways we can work to end it, or at least interrupt it, every single day.

For everyone:

- Educate yourself on violence against women; learn the facts and the prevalence

- Believe survivors

- Contact your local legislators and political leaders and advocate for tougher laws against perpetrators of violence against women

- Know that dating violence & sexual assault affects 1 in 3 girls and 1 in 6 boys by the time they are 18

- Understand that putting boys and men down by calling them "ladies" and "girls" hurts everyone

- Speak out against the media's portrayal of violence

- Learn how racism, sexism and homophobia are connected

- Acknowledge that it does happen in your own community

- Learn about power and control tactics

- Attend Take Back the Night events

- Ask permission before pursuing physical or sexual contact with someone

- Realize that sexual violence is about power and control, not sex

- Teach kids that respect is the minimum in a relationship, and lead by example

- Advocate for victim's rights

- Ask your priest, rabbi, pastor, cleric, or spiritual leader to hold a special service to raise awareness and promote safety for victims and accountability for perpetrators.

- Avoid engaging in, supporting or encouraging sexual harassment by speaking up when you see or hear it

- Speak out against racist, sexist or homophobic jokes

- Advocate for more youth violence prevention programs

- Encourage your local college and universities to offer prevention education to students

- Hold perpetrators accountable for disrespecting their partners when you see it or hear it

- Engage others in discussions about violence against women

- Learn about healthy boundaries and don't be afraid to voice your feelings in your relationship

- Report it if you witness sexual harassment in your school or workplace

- Post awareness materials in restrooms and break rooms for easy & confidential accessibility

- Celebrate all aspects of masculinity, including compassion and sensitivity

For men:

- Choose your words carefully and respectfully when speaking of women in your life

- Show your strength by speaking up to men who are using their strength for hurting

- Refuse to let TV, movies, music or other people define what it means to be a man for you

- Understand that it takes more than just not being a batterer or a rapist to be a good guy

- Treat all women and girls with respect

- Don't patronize sex workers or strip clubs

- Ask, don't assume you know what your partner wants

- Get involved with the Men Can Stop Rape movement at www.mencanstoprape.com

- Refuse to coerce or manipulate your partner in order to get your way; be willing to compromise

9. Illustrate homophobic bullying?

Homophobic bullying is any hostile or offensive action relating to one's sexual orientation. These actions might be:

- verbal, physical or emotional harassment (social exclusion)
- insulting or degrading comments
- name calling, gestures, taunts, insults or "jokes"
- offensive graffiti
- humiliating, excluding, tormenting, ridiculing or threatening
- refusing to work or co-operate with others because of their sexual orientation or identity.

Homophobic bullying is often present in an environment that fails to challenge and respond to homophobia.

Example: A grade 9 male student who has many female friends and is more interested in the arts than athletics is repeatedly called "fag," "homo," "queer," etc. by a group of boys in the school.

10. What is Domestic violence? Explain.

Domestic violence directed against women by their intimate partners (current or former spouses or boyfriends) is an epidemic of global proportions that has devastating physical, emotional, financial and social effects on women, children, the family and the community. Critical to efforts to combat domestic violence has been the growing recognition of domestic violence as a violation of women's human rights.

The consequences of domestic violence, both physical and psychological, are so devastating that some consider it a form of torture. Domestic violence affects not only battered women and their children, but also the entire community. Due to the prevalence and pervasiveness of domestic violence in nearly every part of the world, communities must react with a comprehensive strategy incorporating advocacy, legal reform, and education to combat the problem.

11. Elucidate the violence against women in India.

Violence against women typically means the crimes committed against women of any age, caste, and creed. The crimes can be of any kind; usually, they include murders, abuse, molestation, rape, and infanticide. The number of crimes committed against women in India keeps rising every year. In 2012, the crimes against women in India accounted for 6.4%, which meant in an average within three minutes, a woman fell victim to violence.

The crimes against women in India take several forms. Mostly, these crimes result in lifelong trauma or death. Dowry deaths are one such example of a crime committed against Indian women. According to the age-old Indian tradition, the bride's family is supposed to reward the groom with a considerable sum of money; this is the concept of dowry.

In rural areas, the bride, usually belonging to a poor household, is unable to meet the groom's high demand for the dowry money. They fail to fulfill and pay the amount the groom asks for. In such cases, often, the bride falls victim to verbal and physical abuse of the groom. The woman is beaten, abused, and regularly molested, for her family's incapability to fulfill the dowry. Dowry deaths are mostly seen in the rural parts of India and form an accountable part of the crimes committed against women.

Rapes and nonconsensual sexual activities form a large portion of the violence committed against Indian women. Statistics reveal that women are the most prone to rare in the Indian subcontinent; it is the most dangerous country as far as the number of rape cases is concerned. Rape is typically the sexual intercourse carried on with the woman without her consent. As of 2016, 10.9% of the crimes committed against women were for rape. It is indeed true that women are now becoming more aware and open about the topic of rape; they are opening up about their own stories of sexual assault etc. However, the numbers in India keep rising. The perpetrators often go unpunished.

Marital rape is yet another prominent example of violence against women. Marital rape is the nonconsensual sexual intercourse carried on between a married couple. Husbands often impose and force themselves upon their wives without their consent. This leads to a great deal of abuse and physical molestation committed upon the female body. Women trafficking and forced prostitution are two other kinds of violence to which Indian women victims. Other forms of violence committed against Indian women include child marriage, domestic abuse, sex trafficking, and abduction.

Men perpetrate nine out of every ten crimes committed against women; this proves how the origin of crimes against women stems from the deep-rooted patriarchal ideology in the minds of the Indian men. Their belief that the male is physically superior to the female leads them to force themselves on their female counterparts and inflict pain on the female community. As per the National Crime Records Bureau, 12.7% of the female population in West Bengal reported having been victims of violence, and 11.5% of the same in the state of Andhra Pradesh.

12. Describe the work done by Savitribai phule, a women revolutionary social reformer of 19ᵗʰ century.

Savitribai Phule (3 January 1831 – 10 March 1897) was an Indian social reformer, educationalist, and poet from Maharashtra. She is regarded as the first female teacher of India. Along with her husband, Jyotirao Phule, she played an important role in improving women's rights in India during British rule. Phule and her husband founded the first Indian run girls' school in Pune, at Bhide wada in 1848. She worked to abolish the discrimination and unfair treatment of people based on caste and gender. She is regarded as an important figure of the social reform movement in Maharashtra.

She is the first woman teacher in modern Indian history

When she walked to school where she taught "low" caste girls , she was pelted with stones because she violated three societal norms:women should not step out, women from "low" castes should not study , and women from "low"castes should not be educated.

13.Write a short note on the poem "Chupulu"(Stares)which is written by Jayaprabha.

Poem is about how insensitive men are and how uncomfortable they make women feel by staring at them, scanning through them ruthlessly. Women have gone through this 'ordeal' of being stared at without any mercy. The Blank Noise Project may have had their way and stared right back at these animals but isn't there a better solution to this than just stare back? Why do what they are doing? all for staring back; in fact we think it is one of the best ways to punish these gentlemen. But women have always wondered if there was a better way of dealing with this.
As a woman, blood literally boils when see a man staring right at female. It happens everywhere, all the time. In buses especially, the men just have nothing to do. In spite of staring back at them, they continue staring at female. It just makes women want to hold them by their collars and give them a piece of mind. When are they going to learn? What is going on in their minds? What do they get out of staring at women

It is just plain insanity. Why can't a girl or a woman be able to walk on the road without being stared at? How much ever we try to fight against letching, it is not going to stop. It is their eyes after all. They can look where they want to. There is not much we can do about that. We can sit all day and all night and talk about etiquette and every other possible thing. And these guys would have stared the life out of a hundred other girls by then.

Being a girl may not be the easiest task in this world because you are constantly under the scanner not just by people who know you but also strangers. The one thing women would like to do is extend a request to all the male members of society and tell them to do their bit to make women feel at least a little more comfortable in their own skin.

14.Write the story of Bhanwari Devi In your own words.

Bhanwari is a woman belonging to a caste *kumhar* (potter) family and living in Bhateri, a village in the Indian state of Rajasthan, located 55 kilometres (34 mi) from Jaipur, the state's capital. Most people of the village belonged to the Gurjar community of milkmen, which is higher in the caste hierarchy than Bhanwari's. In the 1990s and even now child marriages are common in the village, and the caste system is dominant. Bhanwari was married to Mohan Lal Prajapat when she was around five or six years old and her husband eight or nine, before coming to live in Bhateri while still in her early teens. They have four children together; two daughters and two sons: the eldest daughter has not been educated; two sons, who live in Jaipur, do menial jobs, while the youngest daughter Rameshwari graduated with Bachelor of Education degree and teaches English language in a school.

In 1985, Bhanwari Devi became a *saathin* ("friend"), a grassroots worker employed as part of the Women's Development Project (WDP) run by the Government of Rajasthan. As part of her job, she took up issues related to land, water, literacy, health, Public Distribution System, and payment of minimum wages at famine relief works. In 1987, she took up a major issue of the attempted rape of a woman from a neighbouring village. All of these activities had the full support of the members of her village. However, in 1992, Bhanwari found herself alienated, when she took up the issue of child marriagewhich is still widely practiced in India despite being illegal.

In 1992, the state government of Rajasthan decided to launch a campaign against child marriage during the fortnight preceding the festival of Akha Teej, which is considered an auspicious date for marriages. Many child marriages take place during this festival. WDP members were tasked with convincing local villagers not to conduct child marriages, a task that Bhanwari took up, along with *prachetas* and members of the District Women's Development Agency (DWDA). The campaign was largely ignored by the villagers and faced disapproval from local leaders, including the village headman or *pradhan*.

One family which had arranged such a marriage was that of Ram Karan Gurjar, who had planned to marry off his nine-month-old daughter. Bhanwari made attempts to persuade the family against carrying out their wedding plans. Since many Gujar families seemed determined to go ahead with child marriages. Bhanwari complaint this to police but No police action was taken against this. However, the villagers associated the police visits with Bhanwari Devi's efforts. This resulted in social and economic boycott of Bhanwari and her family. The villagers stopped selling milk to the family or buying the earthen pots they made. Bhanwari was forced to leave her job when her employer was roughed up, while her husband was beaten up by another Gujar.

According to Bhanwari Devi, at dusk on 22 September 1992, while her husband and she were working in their field, five men from the dominant and affluent Gurjar caste from her village attacked her husband with sticks, leaving him unconscious.In her complaint with the police she named the five men: brothers Ram Sukh Gujjar, Gyarsa Gujjar and Ram Karan Gujjar, the latter whose daughter's child marriage she attempted to stop, and their uncle Badri Gujjar, along with one Shravan Sharma. She claimed that while Ram Sukh held her, Badri and Gyarsa took turns in raping her. She added that the rape occurred shortly after the said incident happened. The accused of Gurjar caste were arrested and tried in the court, but they were backed by the local MLA, Dhanraj Meena. Meena hired a lawyer called Purohit to defend the accused.

Moved by her plight, some women groups together filed a PIL in the Supreme Court. The result: in 1997, the Supreme Court laid down formal guidelines for dealing with sexual harassment at the workplace. These came to be known as the Vishakha Guidelines.

Later, it would form the foundation for India's law on prevention of sexual harassment at workplace.

But this milestone development had no bearing on Bhanwari's case, which was weakened by shoddy investigation and delayed medical checkups. Two of the accused have already died.

This is just one grave side of her struggle. On the other side is her life and family that slowly fell apart.

UNIT-5

1. People's point of view varies from time to time, Why ?

Ans- People's point of view usually has two meanings. It refers to a person (in a position) looking at what can be seen by him/her (being in that position). It also refers to that person's interests. In other words, we choose to see the world in a manner that suits us best.

Domination often makes a person believe that they are doing things freely or on their own. Usually an elite/ male point of view is taken to be the truth and other points of view appear less true or even false.

2. What is a Gender Lens?

Think of a gender lens as putting on spectacles. Out of one lens of the spectacles, you see the participation, needs and realities of women. Out of the other lens, you see the
 participation, needs and realities of men. Your sight or vision is the combination of what each eye sees. Gender is about relationships between men and women. Gender equality is about equal valuing of women and men - of their similarities and their differences. We need equal, respectful partnerships between men and women to have happy, healthy families and communities in the same way that we need both eyes to see well.

3. What are the forms of Gender Lens?
Ans-
A gender lens can be many things. A form of gender lens that is gaining popularity is a tool that governments and NGOs can use in their regular operations. (e.g. A gender lens for training programs would be used every time you develop training. A gender lens for planning could be used for developing each annual work plan. A gender lens for research and surveying can be routinely used in data collection.)

4. What Is Gender-Lens Investing?

Ans- The Global Impact Investing Network defines gender-lens investing as a set of strategies that either "seek to intentionally and measurably address gender disparities" or "examine gender dynamics to better inform investment decisions."

In practice, gender-lens investing takes many shapes. Beyond simply screening out companies or industries with poor records on gender equality, investors may actively fund women-owned companies or those working to advance women and girls through their internal governance or products and services. Investors also use shareholder engagement strategies to advance gender parity. The Pax Ellevate Global Women's Index Fund, for example, brought a shareholder resolution to Apple in 2016 that prompted the company to audit and address its gender pay gap.

 5. Why Is Gender- lens investing Important?

Ans- Recent data may help gender-lens investing gain momentum. For example, women represent just 5% of Fortune 500 CEOs, receive only 2.2% of venture capital funding, and earn as little as 49 cents for every dollar

made by a man. In some areas of the world, women and girls face obstacles to political representation, educational attainment, economic participation, and basic health and safety.

Research points toward the positive effect a focus on gender can have. Gender equality is one of the Sustainable Development Goals, and UN Women have found that closing inequality gaps would allow for trickle-down progress to be made on the other goals. Additionally, researchers are suggesting that diversity and inclusion…

6. Who Are the Major Players Driving the Growth of Gender Lens?

Ans- More than 100 public and private funds have launched gender-lens investing products or initiatives, including well-known firms. They're also using their position as large shareholders to demand change. Few companies have also begun to vote against companies with no plans to add women to their all-male boards.

It's also easier than ever for retail investors to apply a gender lens when choosing assets for their portfolios. Resources have provided reliable information to investors, helping them make more educated investment decisions.

7. What Challenges Does Gender Lens Face?
Ans- Even with new tools, gender-lens investors need additional data—both to determine whether investments are making an impact and to establish the scope of issues to according to Researchers annual Gender Equality Global Report And Ranking reports do help to fill gaps, but it's still important to view available data critically. Some investors also believe that gender-lens investment must involve negative screening, limiting opportunities.

8. Gender Lens Future Moves .

Ans-Gender-lens investment products within the public markets have amounted to over $2.4 billion—but they could grow to $30 billion in the next five years, with the potential to expand to more than 10 times that amount. Broader investment trends point to the growing prominence of diversity and inclusion in investment analysis, a cause that appears poised to expand as resources grow, gender equality continues to occupy public discourse, and more women will begin to take control of capital. Already, more than 80% of women have full or joint responsibility for overseeing the family investment portfolio.

Gender-lens investing leaders across the world are excited to see more detailed strategies where investors can target specific…

9. Impact of Gender Lens on Equality.

Ans- Applying a gender lens to civic engagement programs and materials will make a positive impact on the content and curriculum decisions. With particular emphasis on gender imbalances or biases should be presented and exemplify it's importance. Using a gender lens reveals the ways in which content and approaches are gendered – informed by, shaped by, or biased toward men's or women's perspectives or experiences.
It is often useful to question the assumptions and observations implicit in textbooks and other classroom material that may present a gender bias. Too often, history, political, and civic education courses reflect the prevailing gender power dynamics that have historically favored men and masculinity, perhaps even rendering women's perspectives and experiences invisible.

10. History of the deterioration of Women.

Ans- Women held high status and position in Ancient times. In later ages, her status deteriorated. Evidently, a majority of the women still do not enjoy equal status.
Women's position in the family very much depends upon the level of their education. Higher the level of her education, greater equality she enjoys in the family.

It appears that Indian woman is still not treated at par with man in social and family life. The educated women even today though earning, are in acquiescence with the doctrine of the male domination. The education may have made them economically independent, but they still lack the needed self-confidence.

The reason seems to be that they have been brought up under the old cultural atmosphere…

11. What did The Global Gender Gap Report 2020 state?

Ans-   In recent years, mainstream investors have been incorporating a gender lens while making investment decisions and have started recognizing the strength of women as a market force.

However, a Global Gender Gap Report 2020 by the World Economic Forum said gender parity would not be attained for nearly a century, globally.

Speaking at the Global Trends Festival 2020, leading women business leaders have raised the need to break barriers and bring about faster, sustainable change to empower more women.

Gender lens investing is gaining ground across emerging economies over the past few years, but it still has a long way to go when it comes to India. A relatively new concept introduced around a decade ago…