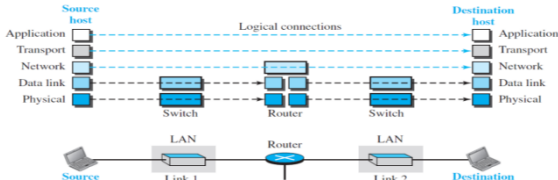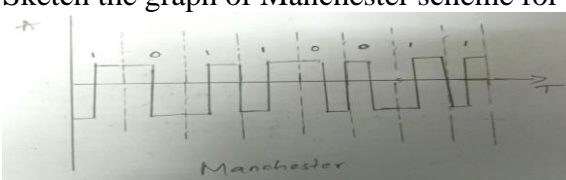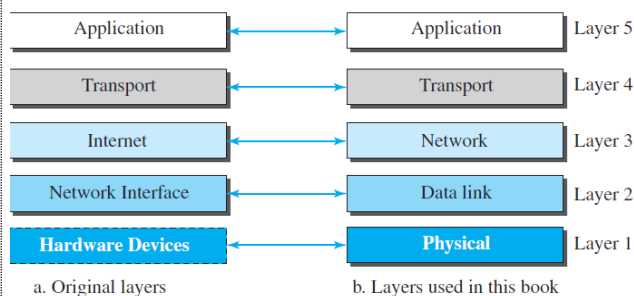| PART - A (10 × 2 = 20 Marks)		
ANSWER ALL THE QUESTIONS		
1.	Find out the characteristics of data communication. Delivery.Accuracy.Timelessness.Jitter.	CO1	K1
2.	A signal carrying data in which a data element is encoded as one signal element (Y = 1). If the bit rate is 10 Kbps, what is the average value of baud rate if C= ½? 5kbaud	CO2	K2
3.	What are the advantages of a multipoint connection over a point-to-point one? cost-effectiveness, scalability, better resource sharing, easier management, and increased reliability.	CO1	K1
4.	Show the layers associated with a router. 	CO1	K1
5.	Identify the given link layer address types. i)A7:40:34:13:93:F1- unicast link-layer addresse ii)A4:40:34:12:93:F1- Multicast Address	CO2	K2
6.	Differentiate between parallel and serial transmissions (any two points)	CO1	K2

S.no	serial transmissions	parallel transmissions
1.	a single communication link is used to transfer data from one end to another	multiple parallels links used to transmit the data
2.	In serial transmission, data(bit) flows in bi-direction.	data flows in multiple lines.
3.	one bit transferred at one clock pulse.	eight bits transferred at one clock pulse.
4.	used for long-distance.	fast in comparison of Serial Transmission.
5.	full duplex as sender can send as well as receive the data	half-duplex since the data is either send or receive
6.	reliable and straightforward.	unreliable and complicated.

7.	Define Baseline wandering problem in digital signal transmission A long string of 0s or 1s can cause a drift in the baseline (baseline wandering) and make it difficult for the receiver to decode correctly (or) In decoding a digital signal, the receiver calculates a running average of the received signal power. This average is called the baseline.	CO1	K1
8.	What is the Hamming distance for each of the following codewords? a) d (10000, 00000) =1 b. d (10101, 10000) =2	CO2	K1
9.	Sketch the graph of Manchester scheme for the following data: 1 0 1 1 0 0 1 1. 	CO1	K3
10.	Tell the functions of data link layer . framing, error detection and correction, acknowledgement, flow control	CO2	K1

Part – B (3 × 10 = 30 Marks)			
ANSWER ANY THREE QUESTIONS			
11.	i)	Illustrate the responsibilities of each layer of TCP/IP protocol suite with a neat diagram.	(5)	CO1	K2

Layers in the TCP/IP protocol suite

Application	Application	Layer 5
Transport	Transport	Layer 4
Internet	Network	Layer 3
Network Interface	Data link	Layer 2
Hardware Devices	Physical	Layer 1

a. Original layers   b. Layers used in this book

Physical Layer : it deals with data in the form of bits. It defines the transmission medium and mode of communication between two devices. The medium can be wired or wireless, and the mode can be simplex, half-duplex, or full-duplex.

Data-Link Layer: It deals with data in the form of data frames. It performs the data framing in which, it adds some header information to the data packets for the successful delivery of data packets to correct destinations. For this, it performs physical addressing of the data packets by adding the source and the destination address to it.

Internet Layer: It deals with data in the form of datagrams or data packets. To provide the logical addressing of the data packets by adding the IP(Internet Protocol) address to it.It performs routing of data packets using the IP addresses. The data packets can be sent from one network to another using the routers in this layer.

Transport Layer: It deals with data in the form of data segments. It performs segmentation of the data received from the upper layers. It is responsible for transporting data and setting up communication between the application layer and the lower layers. This layer facilitates the end-to-end communication and error-free delivery of the data.

Application Layer: It deals with the communication of the whole data message. It provides an interface between the network services and the application programs. It provides services to the end-users to work over the network. For Example, file transfer, web browsing, etc. This layer uses all the higher-level protocols like HTTP, HTTPS, FTP, NFS, DHCP, FMTP, SNMP, SMTP, Telnet, etc.

	ii)	Summarize the advantage and disadvantages of star and ring topologies.	(5)	CO1	K1

STAR TOPOLOGIES: (ANY 3)

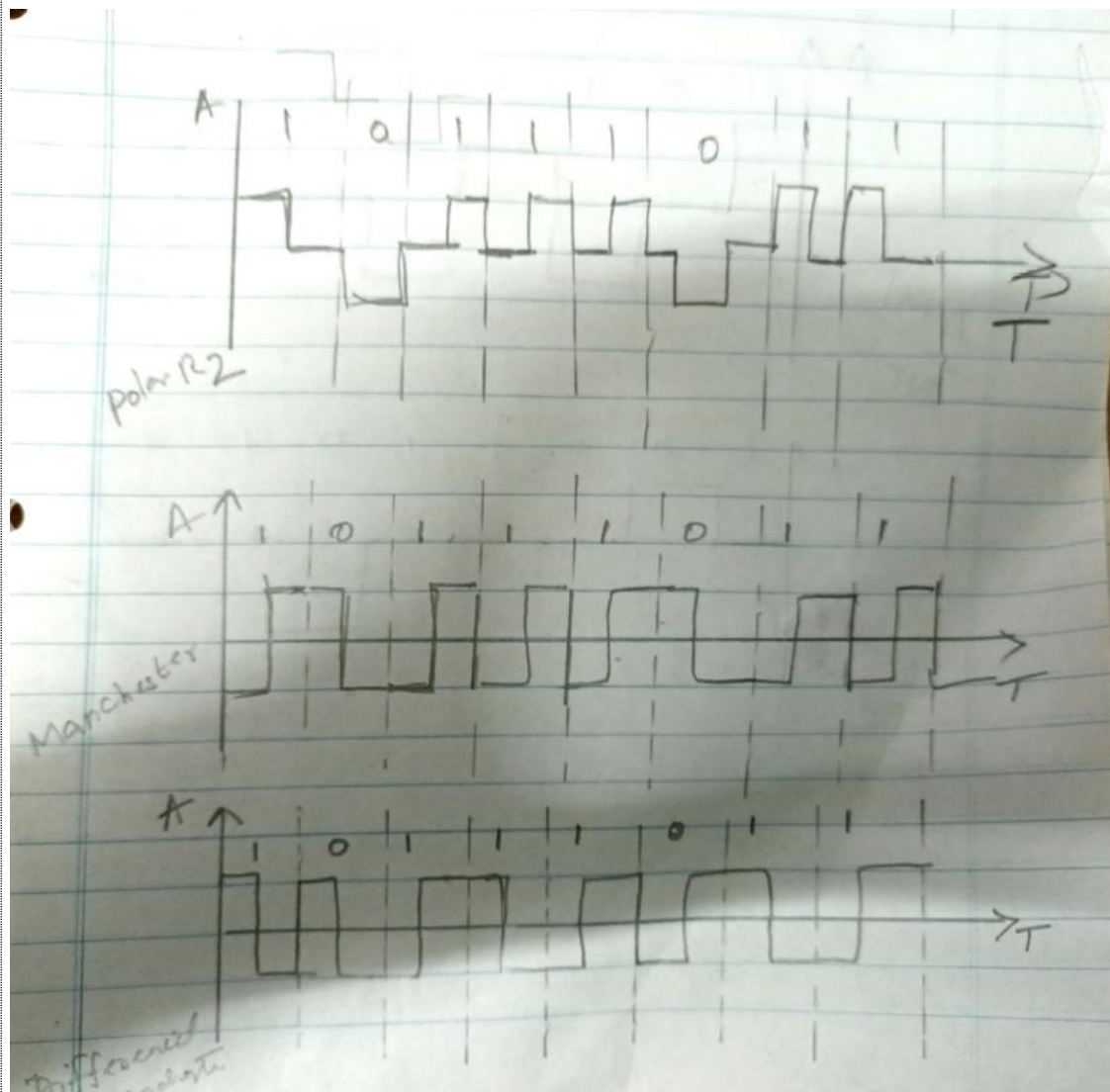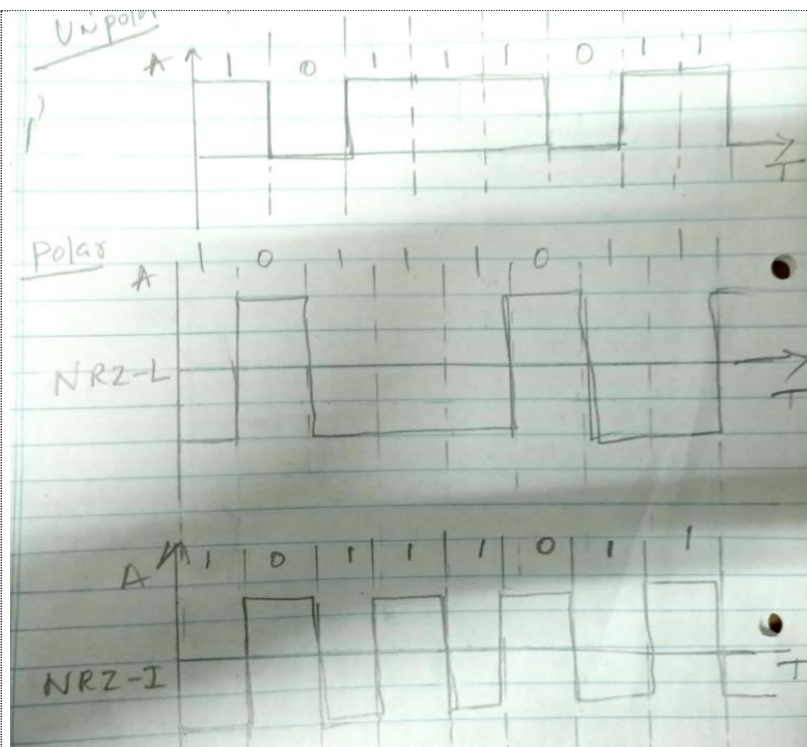| Advantages	Disadvantages
Its speed is very high.	Maintenance cost is very high
The network is highly scalable	Central device dependency
It is the most efficient.	It is very expensive
It has a centralized network management system.	It requires additional equipment
There are no point-to-point connections	Cables are wires used in this network got damaged very easily.

RING TOPOLOGIES: (ANY 3)

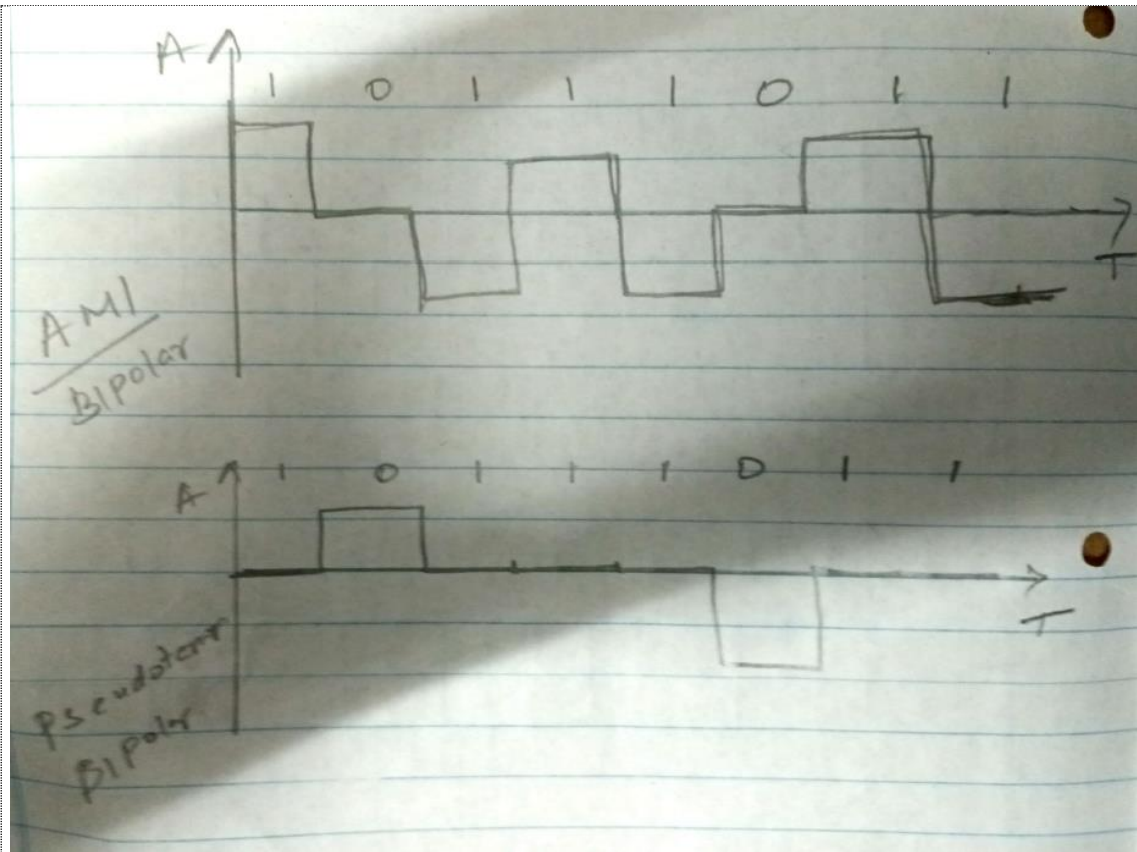| Advantages	Disadvantages
Fast Execution	Quite Expensive
Better Administration	Slow Activity Rate
Straightforward adaptability	Unprotected use
Fidelity of network	Need for Hardiness
The one-directional flow of data	Poor device Attachment
Unique Connectivity	Cable Breakdowns
Good Troubleshooting feature	Bandwidth Deficiencies

12.		Apply the unipolar, polar and Bipolar line coding schemes for the given data 10111011.	(10)	CO1	K3

Unipolar

Polar

NRZ-L

NRZ-I

Polar RZ

Manchester

Differential Manchester

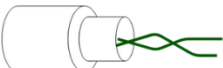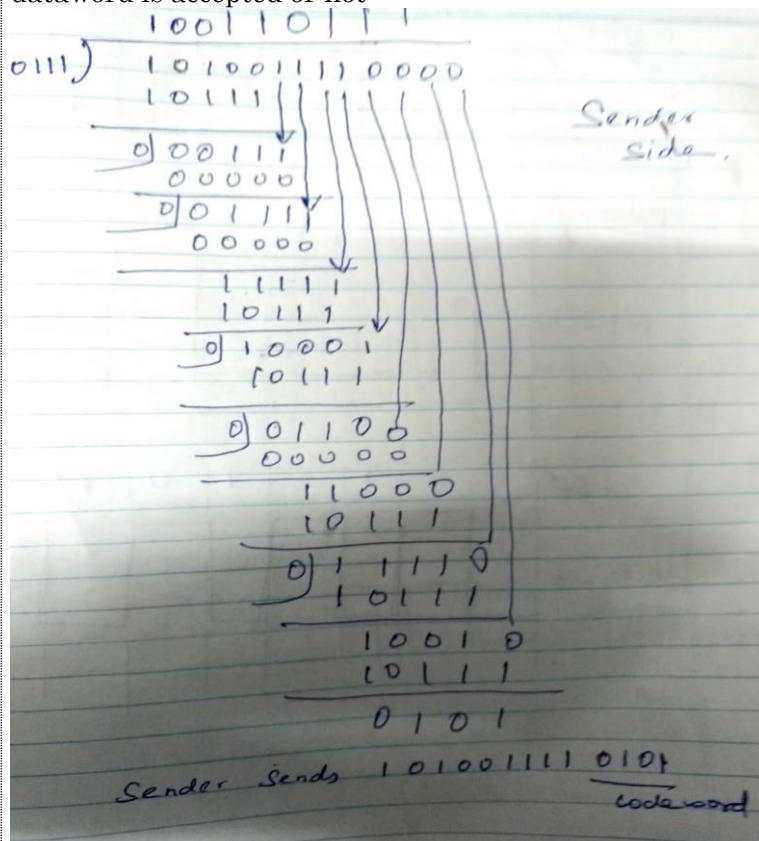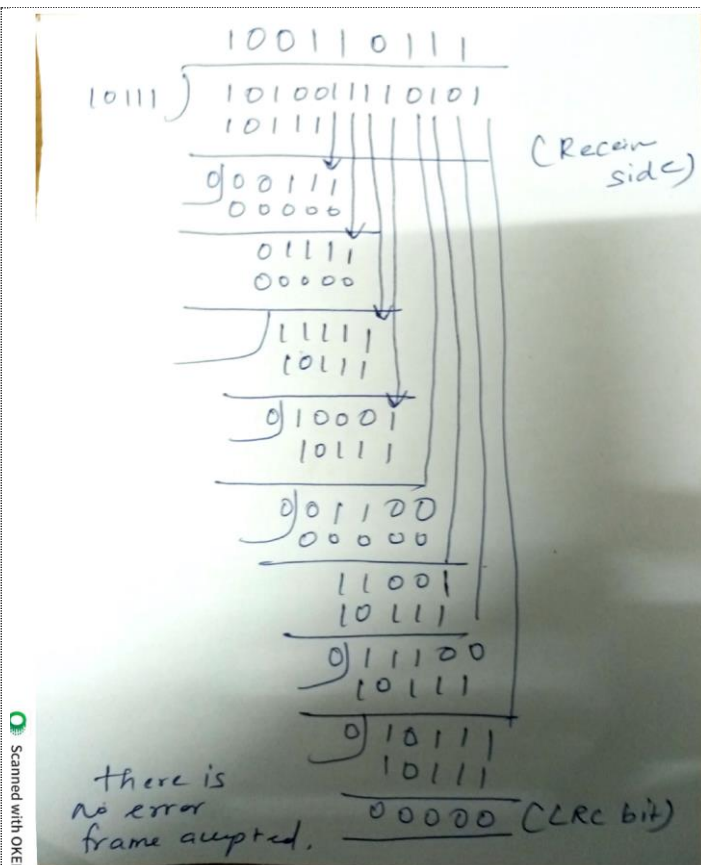The signal diagrams for AMI/Bipolar and Pseudoternary/Bipolar encoding of the data sequence.

| 13. | i) | Given the dataword 101001111 and the divisor 10111, show the generation of the CRC codeword at the sender site (using binary division) and Check whether the given dataword is accepted or not | (5) | CO2 | K2 |

Sender Sends 101001111 0101
codeword

	ii)	Describe the functions of Block Coding techniques	(5)	CO2	K2
		In block coding, we divide our message into blocks, each of k bits, called data words. We add r redundant bits to each block to make the length n = k + r. The resulting n-bit blocks are called code words.			
		For example, we have a set of data words, each of size k, and a set of code words, each of size of n. With k bits, we can create a combination of 2k data words, with n bits; we can create a combination of 2n code words. Since n > k, the number of possible code words is larger than the number of possible data words.			
14.		Elaborate the different types of transmission medium. Give a short note on any three of them with neat diagrams. (**ANY 3**)	(10)	CO1	K2

i) **Twisted Pair Cable** – It consists of 2 separately insulated conductor wires wound about each other. Generally, several such pairs are bundled together in a protective sheath. They are the most widely used Transmission Media. Twisted Pair is of two types:
Unshielded Twisted Pair (UTP): UTP consists of two insulated copper wires twisted around one another. This type of cable has the ability to block interference and does not depend on a physical shield for this purpose. It is used for telephonic applications.

Advantages: **Unshielded Twisted Pair**
⋯→ Least expensive
⋯→ Easy to install
⋯→ High-speed capacity
Disadvantages:
⋯→ Susceptible to external interference
⋯→ Lower capacity and performance in comparison to STP
⋯→ Short distance transmission due to attenuation
Applications:Used in telephone connections and LAN networks
Shielded Twisted Pair (STP): This type of cable consists of a special jacket (a copper braid covering or a foil shield) to block external interference. It is used in fast-data-rate Ethernet and in voice and data channels of telephone lines.

Advantages: **Shielded Twisted Pair**
⋯→ Better performance at a higher data rate in comparison to UTP
⋯→ Eliminates crosstalk

5

⇢ Comparatively faster

Disadvantages:

⇢ Comparatively difficult to install and manufacture

⇢ More expensive

⇢ Bulky

Applications:

The shielded twisted pair type of cable is most frequently used in extremely cold climates, where the additional layer of outer covering makes it perfect for withstanding such temperatures or for shielding the interior components.

(ii) Coaxial Cable –

It has an outer plastic covering containing an insulation layer made of PVC or Teflon and 2 parallel conductors each having a separate insulated protection cover. The coaxial cable transmits information in two modes: Baseband mode(dedicated cable bandwidth) and Broadband mode(cable bandwidth is split into separate ranges). Cable TVs and
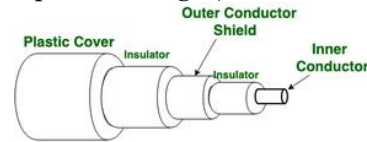
Figure of Coaxial Cable

analog television networks widely use Coaxial cables.

Advantages:

High Bandwidth

Better noise Immunity

Easy to install and expand

Inexpensive

Disadvantages:

Single cable failure can disrupt the entire network

Applications:Radio frequency signals are sent over coaxial wire. It can be used for cable television signal distribution, digital audio (S/PDIF), computer network connections (like Ethernet), and feedlines that connect radio transmitters and receivers to their antennas.

(iii) Optical Fiber Cable – It uses the concept of refraction of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for the transmission of large volumes of data.
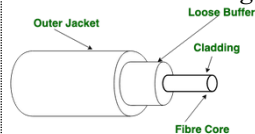
Figure of Optical Fibre Cable

The cable can be unidirectional or bidirectional. The WDM (Wavelength Division Multiplexer) supports two modes, namely unidirectional and bidirectional mode.

Advantages:

Increased capacity and bandwidth

Lightweight

Less signal attenuation

Immunity to electromagnetic interference

Resistance to corrosive materials

Disadvantages:

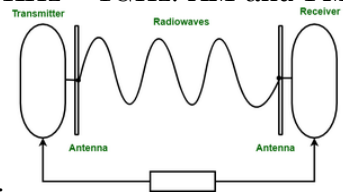Difficult to install and maintain

High cost

Fragile

Applications:

2. **Unguided Media**:

(i**) Radio waves** –

6

These are easy to generate and can penetrate through buildings. The sending and receiving antennas need not be aligned. Frequency Range:3KHz – 1GHz. AM and FM

radios and cordless phones use Radio waves for transmission.

(ii) Microwaves – It is a line of sight transmission i.e. the sending and receiving antennas need to be properly aligned with each other. The distance covered by the signal is directly proportional to the height of the antenna. Frequency Range:1GHz – 300GHz. These are majorly used for mobile phone communication and television distribution.
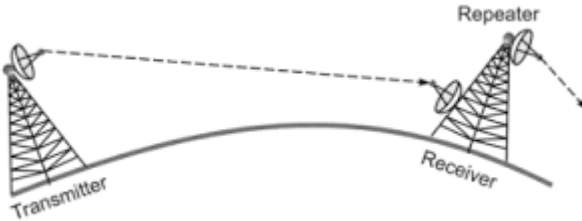
Fig: Microwave Transmission

(iii) Infrared – Infrared waves are used for very short distance communication. They cannot penetrate through obstacles. This prevents interference between systems. Frequency Range:300GHz – 400THz. It is used in TV remotes, wireless mouse, keyboard, printer, etc.
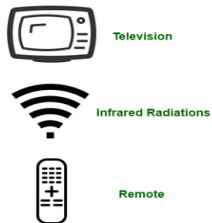
Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	28	52	20	-	-	-