



GRT INSTITUTE OF ENGINEERING AND TECHNOLOGY, Tiruttani.



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Department of Electronics & Communication Engineering

IV Year - VIIIth Semester

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MINIMUM LEARNING MATERIAL REGULATION – 2013

EC 6801- WIRELESS COMMUNICATIONS (Regulation 2013)

UNIT 1

PART-A

1. What are the advantages of wireless communication? (APR/MAY2017)

1. Flexibility (wirelesses) 2. Ease of use. 3. Durability

2. Give the equation for average large scale- path loss between the transmitter and receiver as a function of distance. . (NOV/DEC 2016)

$$P_L(\text{db}) = 40\log d - (10\log G_t + 10\log G_r + 20\log h_t + 20\log h_r)$$

3. List the three basic propagation mechanisms? (Dec 2014)

1. Reflection 2. Diffraction 3. Scattering

4. Mention the effects of fading.

1. Rapid changes in signal strength over a small travel distance or time interval.
2. Random frequency modulation due to varying Doppler shifts on different multipath signals.
3. Time dispersion caused by multipath propagation delays.

5. Define coherence bandwidth. . (MAY/JUN 2016)

The coherence bandwidth is related to the specific multipath structure of the channel. The coherence bandwidth is a measure of the maximum frequency difference for which signals are still strongly correlated in amplitude.

6. Describe the operation of free space propagation model?

It is a model which is used to predict received signal strength, when unobstructed line of sight path between transmitter and receiver.

7. Compare small scale fading and large scale fading? (May/June 2013)

S.NO	Small Scale Fading	Large Scale Fading
i)	The rapid fluctuations of the amplitudes, phases, or multipath delays of a radio signal over a short period of time or travel distance is known as small scale fading.	The rapid fluctuations of the amplitudes, phases, or multipath delays of a radio signal over a long period of time or travel distance is known as large scale fading.

8. What is flat fading? Write its conditions.

If the mobile radio channel has a constant gain and linear phase response over a bandwidth which is greater than the bandwidth of the transmitted signal, then the received signal will undergo flat fading.

Conditions: BW of signal \ll BW of channel

Symbol period \gg Delay spread

9. Distinguish time dispersion and frequency dispersion?

The received signal has a longer duration than that of the transmitted signal, due to the

different delays of the signal paths. This is known as time dispersion.

The received signal has a larger bandwidth than that of the transmitted signal, due to the different Doppler shifts introduced by the components of the multipath. This is known as frequency dispersion.

10. Define coherence time. In what way does this parameter decide the behavior of Wireless channel.

Coherence time (T_c) is the time duration over which the two received signals have a strong potential for an amplitude correlation.

$$T_c = 1/f_m$$

11. What is frequency selective fading?

If the channel possesses a constant gain and linear phase response over a bandwidth that is, smaller than the bandwidth of transmitted signal, then the channel creates frequency selective fading on the received signal.

Conditions: BW of signal > BW of channel

Symbol period < Delay

12. Predict the need for propagation model?

Propagation models have traditionally focused on predicting the average received signal strength at a given distance from the transmitter, as well as the variability of the signal strength in close spatial proximity to a particular location. Propagation models that predict the mean signal strength for an arbitrary transmitter receiver separation distance are useful in estimating the radio coverage area of a transmitter.

13. Compare Doppler shift and Doppler spread.

The shift in received signal frequency due to motion is called the Doppler shift. The Doppler spread is defined as the range of frequencies over which the received Doppler spectrum is essentially non-zero.

14. Distinguish coherence time and coherence bandwidth.

The coherence bandwidth is related to the specific multipath structure of the channel. The coherence bandwidth is a measure of the maximum frequency difference for which signals are still strongly correlated in amplitude.

This bandwidth is inversely proportional to the rms value of time delay spread.

The coherence timer is defined as the required time interval to obtain an envelope correlation of 0.9 or less.

15. Define Snell's law.

Snell's law states that the ratio of the sine of the angle of incidence and refraction is equivalent to the ratio of phase velocities in the two media, or equivalent to the reciprocal of the ratio of the indices of refraction.

16. Differentiate Fast fading & slow fading.

The channel impulse response changes rapidly within the symbol duration. This type of channel is called fast fading channel.

The channel impulse response changes at a rate much slower than the transmitted baseband

signal. This type of channel is called slow fading channel.

17. Explain frequency selective fading? Write its conditions.

If the channel possesses a constant gain and linear phase response over a bandwidth that is, smaller than the bandwidth of transmitted signal, then the channel creates frequency selective fading on the received signal.

Conditions: BW of signal > BW of channel

Symbol period < Delay

18. Interpret link budget equation.

A link budget equation: $P_{rx} = P_{tx} + G_{tx} - L_{tx} - L_{fs} - L_m + G_{rx} - L_{rx}$

PART-B

1. Outline the time variant two-path model of a wireless propagation channel.

(APR/MAY 2017).

Ref: "Wireless Communication" by S.Rappaport [Page.no:120,125]

2. Explain fading effects due to multipath time delay spread and fading effects due to Doppler spread. (APR/MAY 2017)

Ref: "Wireless Communication" by S.Rappaport [Page.no:203-205,125]

3. In free space propagation describe how the signal are affected by reflection diffraction and scattering. (MAY/JUN 2016)

Ref: "Wireless Communication" by S.Rappaport [Page.no:114,126,115].

4. Discuss in detail the various parameters involved in mobile multipath channels. (MAY/JUN 2016)

Ref: "Wireless Communication" by S.Rappaport [Page.no:203-205,125]

5. Construct the narrow band modeling methods for Short scale fading & Long scale fading. (May/June 2013)

Ref: "Wireless Communication" by S.Rappaport [Page.no:205-210]

6. Explain the free space path loss & derive the gain expression. (May/June 2012)

Ref: "Wireless Communication" by S.Rappaport [Page.no:107-205,110]

7. Describe in detail about two Ray Model propagation mechanism. (May/June 2012)

Ref: "Wireless Communication" by S.Rappaport [Page.no:120-125]

8. Discuss any two methods of diffraction by multiple screens. (Nov/Dec 2011)

Ref: "Wireless Communication" by S.Rappaport [Page.no:126-135]

UNIT 2**PART-A****1. Why is cellular concept used for mobile telephony? (APR/MAY 2017)**

A cellular network or mobile network is a communication network where the last link is wireless. The network is distributed over land areas called cells, each served by at least one fixed-location transceiver, but more normally three cell sites or base transceiver stations.

2. Define coherence time. (NOV/DEC2016)

Coherence time (T_c) is the time duration over which the two received signals have a strong potential for an amplitude correlation.

3. Distinguish forward and reverse channel?

Forward channel is a radio channel used for transmission of information from base station to mobile. Reverse channel is a radio channel used for transmission from mobile to base station.

4. Describe the function of control channel? What are the types?

The function of control channel is to transmit call setup, call request, call initiation and Control. There are two types of control channels,

- i. Forward control channel
- ii. Reverse control channel

5. What is channel assignment and list the types?

For efficient utilization of radio spectrum a frequency reuse scheme with increasing capacity and minimizing interference is required. For this channel assignment is used. The types of channel assignment are:

- i. Fixed channel assignment
- ii. Dynamic channel assignment.

6. Define hand off and mode of hand off.

A hand off refers to the process of transferring an active call or data session from one cell in a cellular network to another or from one channel in a cell to another. A well implemented hand off is important for delivering uninterrupted service to a caller or data session user. Modes of hand off are:

- i. MCHO – Mobile Controlled Hand off
- ii. NCHO – Network Controlled Hand off
- iii. MAHO – Mobile Assisted Hand off

7. What is frequency reuse ratio?

If the cell size and the power transmitted at the base stations are same then co-channel interference will become independent of the transmitted power and will depend on radius of the cell (R) and the distance between the interfering co-channel cells (D). If D/R ratio is increased, then the effective distance between the co-channel cells will increase and interference will decrease. The parameter Q is called the frequency reuse ratio and is related to the cluster size. For hexagonal geometry

8. Define sectoring?

Sectoring is a technique for decreasing co-channel interference and thus increasing the system performance by using directional antennas.

9. Write short notes on cell splitting.

Cell splitting is the process of subdividing congested cells into smaller cells each with its own base stations and a corresponding reduction in antenna height and transmitter power. It increases the capacity of cellular system.

10. What is meant by frequency reuse?

If an area is served by a single Base Station, then the available spectrum can be divided into N frequency channels that can serve N users simultaneously. If more than N users are to be served, multiple BSs are required, and frequency channels have to be reused in different locations. Since spectrum is limited, the same spectrum has to be used for different wireless connections in different locations. This method of reusing the frequency is called as frequency reuse.

11. In a cellular network, among a handoff call and a new call, which one is given priority?

Handoff call have more priority than new call. The handoff call will shift automatically from one base station to another base station.

12. Define co-channel interference.

CCI – Co-channel interference is the interference between signals from co-channel cells.

13. List the types of hand off.

Types of handoff are:

- i. Hard hand off – Mobile monitors BS and new cell is allocated to a call with strong signal.
- ii. Soft hand off – MS with 2 or more calls at the same time and find which is the Strongest signal BS, the MSC automatically transfers the call to that BS.

14. Relate Cell & Cluster.

For a large geographic coverage area, a high powered transmitter therefore has to be used. But a high power radio transmitter causes harm to environment. Mobile communication thus calls for replacing the high power transmitters by low power transmitters by dividing the coverage area into small segments, called cells. Each cell uses a certain number of the available channels and a group of adjacent cells together use all the available channels. Such a group is called a cluster.

15. What are the techniques used to expand the capacity of cellular system?

Cell splitting – Cell-splitting is a technique which has the capability to add new smaller cells in specific areas of the system. i.e. divide large cell size into small size.

Sectoring – use of directional antennas to reduce Co-channel interference.

Coverage Zone approaches – large central BS is replaced by several low power transmitters on the edge of the cell.

16. Define Grade of service.

Grade of service is defined as the measure of the ability of a user to access a trunked system during

the busiest hour.

17. Discuss in detail about multiple access techniques?

Multiple access is a signal transmission situation in which two or more users may wish to communicate simultaneously with each other using the same propagation channel.

18. State advantages of CDMA over FDMA.

S.NO	FDMA	CDMA
1	Narrow band system	Wide band system
2	Hard handoff	Soft handoff
3	Used for voice and data transmission.	Used for digital voice signals & multimedia service

PART-B

1. Explain about co-channel interference and adjacent channel interference. Describe the techniques to avoid interference. (NOV/DEC 2016)

Ref: "Wireless Communication" by S.Rappaport [Page.no:67-77]

2. Distinguish Code Division Multiple Access (CDMA) performance with TDMA. (May/Jun 2012)

Ref: "Wireless Communication" by S.Rappaport [Page.no:455-461]

3. Illustrate in detail how to improve coverage and channel capacity in cellular systems. (MAY/JUN 2016)

Ref: "Wireless Communication" by S.Rappaport [Page.no:86-96]

4. Discuss the principle of direct sequence spread spectrum technique. (Nov/Dec2011)

Ref: "Wireless Communication" by S.Rappaport [Page.no:331-334]

5. What is orthogonal frequency division multiplexing? Explain OFDM technique and mention its merits, demerits and application. (May/Jun 2012) (May/Jun 2013)

Ref: "Wireless Communication" by Murali Babu [Page.no:6.2-6.7& 6.19]

6. Explain about co-channel interference and system capacity with neat diagram. (NOV/DEC 2015)

Ref: "Wireless Communication" by S.Rappaport [Page.no:67-77]

7. Distinguish Frequency Division Multiple Access (FDMA) performance with TDMA. (May/Jun 2012) (May/Jun 2013)

Ref: "Wireless Communication" by S.Rappaport [Page.no:451-459]

8. Summaries the features of various multiple access techniques used in wireless communication. State the advantage and disadvantages of each technique. (MAY/JUN 2016)

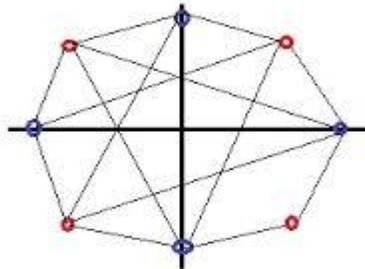
Ref: "Wireless Communication" by S.Rappaport [Page.no:451-461]

8. Explain in detail about the M-array systems.

In digital modulations instead of transmitting one bit at a time, two or more bits are transmitted simultaneously. This is called M-array systems.

9. Compare power efficiency and Bandwidth efficiency?(APR/MAY 2017)

Power efficiency describes the ability of a modulation technique to preserve the fidelity of the digital message at low power levels.

10. Plot the Constellation diagram of $\pi/4$ QPSK.

All the possible states of $\pi/4$ QPSK Constellation

11. What is windowing?

In communication window function is a mathematical function that is zero valued outside of some chosen interval and is the process of taking a small subset of a larger dataset for processing and analysis.

12. State OQPSK? Mention the advantage of OQPSK.

To improve the peak-to-average ratio in QPSK is to make sure that bit transition for in-phase and quadrature phase component different time instants. This is called OQPSK.

13. Give the function of Gaussian filter in GMSK.

The Gaussian filter that is used before the modulator to reduce the transmitted bandwidth of the signal. GMSK use as less bandwidth then conventional FSK.

14. Define PAPR in OFDM?

PAPR can be defined as the relation between the maximum power of a sample in a transmit OFDM symbol and its average power.

15. Find the 3-dB bandwidth for a Gaussian low pass filter used to produce 0.25 GMSK with a channel data rate of $R_b = 300$ Kbps.

$$\begin{aligned} \text{Ans: } T &= 1/R_b \\ &= 153.9 \text{ Khz.} \end{aligned}$$

16. Why is MSK referred to as fast FSK?

MSK is a special type of binary continuous phase frequency shift keying, where in the peak frequency deviation is equal to $\frac{1}{4}$ the bit rate and modulation index $=h=1/2$. This leads to the minimum frequency spacing that makes the two FSK signals orthogonal to each other. MSK sometimes referred to as fast fsk as the frequency spacing use is only half as much as that used in conventional non- coherent FSK.

17. What is group delay?

In signal processing, group delay is the time delay of the amplitude envelopes of the various sinusoidal components of a signal through a device under test, and is a function of frequency for each component. Phase delay, in contrast, is the time delay of the phase as opposed to the time delay of the amplitude envelope.

18. Differentiate delay dispersion and frequency dispersion.

S.no	Delay dispersion	Frequency dispersion
1	Delay dispersion are due to echoes of the transmit signal arriving with different delays.	Frequency dispersion are due to Doppler.
2	At high data rates, delay dispersion is the main reason for signal distortions errors.	At low data rates, Doppler effect is the main reason for signal distortion errors.

PART-B**1. Derive the expression for MSK signal as special type of continuous phase FSK signal. (Nov / Dec 2015)**

Ref: "Wireless Communication" by S.Rappaport [Page.no:314-318]

2. Write short notes on (i) $\pi/4$ QPSK (ii) OQPSK.

Ref: "Wireless Communication" by S.Rappaport [Page.no:305-311]

3. Draw the basic arrangement of Orthogonal FDM transceivers and discuss its overall operation. (Nov / Dec 2015)

Ref: "Wireless Communication" by S.Muralibabu [Page.no:6.1-6.8]

4. Discuss in detail about Windowing and PAPR in OFDM systems.

Ref: "Wireless Communication" by S.Muralibabu [Page.no:6.12-6.15]

5. Explain the detail about GMSK transmission and reception with necessary block diagrams. (Nov / Dec 2015)

Ref: "Wireless Communication" by S.Rappaport [Page.no:318-322]

6. A zero mean sinusoidal message is applied to a transmitter that radiates an AM signal with 10 KW power. Compute the carrier power if the modulation index is 0.6. What percentage of the total power is in the carrier? Calculate the power in each side band. (Nov / Dec 2015)

Solution:

$$\begin{aligned} \frac{1}{2}(P_{am}P_c) &= 0.5*(10-8.47) \\ &= .0765kw \end{aligned}$$

Ref: "Wireless Communication" by S.Janani Solved question [Page.no:11-12]

7. Describe the Error probability performance in all the fading channels.

Ref: "Wireless Communication" by S.Moliisch" [Page.no:232-242]

8. Discuss in detail about the structure of a wireless communication link.

Ref: "Wireless Communication" by S.Muralibabu [Page.no:5.1-5.8]

9. Compare and contrast the constellation, signal space diagram, error performance of QPSK, MSK, GMSK, OQPSK and $\pi/4$ QPSK. (NOV/DEC 2016)

Ref: "Wireless Communication" by S.Rappaport [Page.no:300-308]

UNIT 4 PART A

1. Distinguish linear and non linear equalizer? (Nov/Dec 2016)

Linear equalizer: the current and past values of the received signal are linearly Weighted by the filter coefficients and summed to produce the output. No feedback path is used. Simple and easy to implement. Not suitable for severely distorted Channel. Noise power signal is enhanced.

Nonlinear equalizer: If the past decisions are correct, then the ISI contributed by present symbol can be cancelled exactly, feedback path is used. Suitable for severely distorted channel. Noise power signal is not enhanced. Complex in structure. Channels with low SNR. Suffers from error propagation.

2. Define adaptive equalization. (May/June 2016)

To combine Inter Symbol Interference, the equalizer coefficients should change according to the channel status so as to break channel variations. Such an equalizer is called an adaptive equalizer since it adapts to the channel variations.

3. What are the factors used in adaptive algorithms? (Nov/Dec 2015)

- Rate of convergence
- Maladjustments
- Computational complexity

4. Differentiate selection diversity and combining diversity.

S.NO	SELECTION DIVERSITY	COMBINING DIVERSITY
1.	The best signal is selected and processed while all the other signals are discarded.	All signals are combined before processing and the combined signal is decoded.
2	Simple circuits are used.	At individual receiver phasing circuits are needed.
3	None of the signal is not in acceptable SNR.	It works well.

5. What is the need for diversity in multipath propagation? (Nov/Dec 2010)

Diversity is used to compensate the fading channel impairments and is usually implemented by using two or more receiving antennas. Diversity improves transmission performance by making use of more than one independently faded version of the transmitted signal. The principle of diversity is to ensure that the same information reaches the receiver on statistically independent channels.

6. Differentiate Micro diversity and Macro diversity.**Micro diversity**

- Used to reduce small scale fading effects.
- Multiple reflection causes deep fading.
- BS-MS are separated by small distance

Macro diversity

- Used to reduce small scale fading effects.
- Deep shadow caused fading.
- BS-MS are separated by small distance.

7. Explain the necessity of an equalizer?

Equalization can be used to compensate the Inter Symbol Interference created by multipath within time dispersion channel.

8. Where DFE are used?

The DFE is particularly is useful for the channel with severe amplitude distortion and has been widely used in wireless communications.

9. Define ZF equalizer.

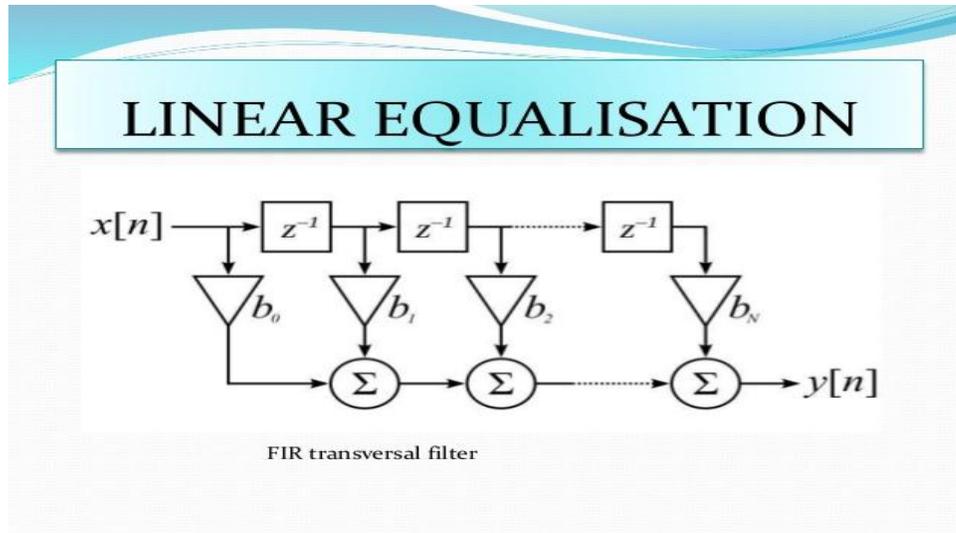
In zero forcing equalizer the equalizer co-efficient are chosen to force the samples of the combined channels and equalizer impulse response to zero.

10. What is Macro diversity?

It is a kind of space diversity scheme using several antennas or transmitter antennas for transferring the same signals. The distance between the transmitters is longer than the wavelength.

11. List the benefit of RAKE receiver?

Reduces the multipath interference by combining direct and reflected signals in the receiver.

12. Draw the structure of a linear transversal equalizer.**13. Name the basic algorithm used for adaptive equalization.**

- Zero forcing algorithm.
- LMS algorithm
- RLS algorithm.

14. Name the various non linear equalization methods.

- Decision feedback equalization.
- Maximum likelihood symbol detection
- Maximum likelihood sequence estimation.

15. Mention the advantages of LMS algorithm.

- It maximizes the signal to distortion at its output within the constraints of the equalizer filter length.
- Low computational complexity.
- Simple program.

16. Write the basic principle of DFE.

The basic principle of decision feedback equalization (DFE) is that , if the vale of the

information symbols already detected are known then ISI contributed by these symbols can be cancelled exactly by subtracting the past symbol values with appropriate weighting from the equalizer output.

17. Which type of equalizer is IIR filter?

When an equalizer has both feed forward and feedback taps, its transfer function is rational function of z inverse. Then it is called an II filter.

18. What is meant by frequency diversity?

In frequency diversity the same signal is transmitted at two or more different frequencies. These carrier frequencies get un-correlated to each other, so they will not experience the same fades. To make them least correlated these carrier frequencies are separated by more than one coherence bandwidth of the channel. This will improve the overall system performance.

PART-B

- 1. Explain in detail the various factors to determine the algorithm for adaptive equalizer. Also derive the LMS algorithm for adaptive equalizer? (Nov/Dec 2016)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:359-364& 374]
- 2. Distinguish in detail about linear and non linear equalizers. (May/June 2016)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:366-372]
- 3. Discuss in detail about the frequency diversity with neat sketches. (Nov/Dec 2015)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:390]
- 4. Describe the Error probability in fading channels with diversity reception. (May/June 2016)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:268-370]
- 5. Write short notes on Space diversity, frequency diversity, Polarization diversity, Time diversity. (Nov/Dec 2014)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:387-391]
- 6. With neat block diagram, explain the principle of micro diversity and macro diversity.**
Ref: "Wireless Communication" by S.RamsehBabu [Page.no:366-372]
- 7. With relevant diagrams explain RAKE receiver. Also discuss how time diversity is achieved in a CDMA technique using RAKE receiver. (Nov/Dec 2016)**
Ref: "Wireless Communication" by S.Rappaport [Page.no:391-393]

8. Derive the mean square error for a generic adaptive equalizer. (Nov/Dec 2015)

Ref: "Wireless Communication" by S.Rappaport [Page.no:359-364]

**UNIT 5
PART A****1. Define antenna diversity. (Nov/Dec 2015)**

Antenna diversity is a transmission method using more than one antenna to receiver or transmits signals along different propagation paths to compensate for multipath interferences.

2. How does spatial multiplexing work? (Nov/Dec 2016)

Spatial multiplexing uses MEAs at the TX for transmission of parallel data streams. An original high-rate data stream is multiplexed into several parallel streams, each of which is sent from one transmit antenna element. A basic condition is that the number of receive antenna elements is at least as large as the number of transmit data streams.

3. What is transmitting diversity? (Apr/May 2016)

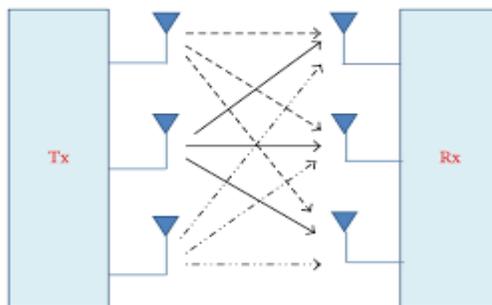
Diversity effect is achieved by transmitting signals from several transmit antenna. Two main cases are considered in transmit diversity. They are, 1. Transmitter diversity with the CSI (Channel State information) 2. Transmitter diversity without the CSI (Channel State information).

4. What is meant by CSI? (Nov/Dec 2015)

Channel state information (CSI) is information which presents the state of communication link from Transmit Source to Receiver Source.

5. Define capacity of a fading channel.

Channel capacity represents the fundamental limitation for information transmission over any communication channel.

6. Draw the structure of MIMO system model.

7. Define D-BLAST.

The symbols which are to be transmitted are arranged on the diagonals of the space-time transmission matrix where elements under diagonals are padded with zeros.

8. Write short notes on Receiver diversity.

Receiver diversity uses two separate, collocated antennas for receive functions. Such a configuration eliminates the need for a duplexer and can protect sensitive receiver components from the high power used in transmitter side.

9. Describe the operation of smart antenna systems?

Smart antennas are antenna arrays with smart signal processing algorithms used to identify spatial signal signatures such as direction as addition of arrival of the signal and used to calculate beam forming vectors to track and locate antenna beam on mobile target.

10. Define bit error rate?

The rate at which errors occur in the transmission of digital data.

11. Distinguish ergodic capacity and outage capacity of a flat fading channel?

Ergodic capacity is the expected value of the capacity taken over all realization of the channel. Outage capacity is the minimum transmission rate that is achieved over a certain fraction of time.

12. What is MIMO system?

MIMO systems are systems with Multiple Element Antennas (MEAs) at both transmitter and receiver. MIMO system offers high data rates and lower error rates.

13. Describe spatial multiplexing?

Spatial multiplexing uses MEAs at the TX for transmission of parallel data streams. An original high-rate data stream is multiplexed into several parallel streams, each of which is sent from one transmit antenna element. A basic condition is that the number of receive antenna elements is at least as large as the number of transmit data streams.

14. Define beam forming.

Beam forming or smart antenna system uses phased array of antennas for transmitter and receiver. It can be used in any antenna system to create a required antenna directive pattern to give the required performance under the given conditions.

15. Define V- BLAST.

Incoming data stream is demultiplexed into N streams each of which is encoded and modulated independently and sent on an antenna of its own.

16. Explain the concept of transmitter beam forming?

Aligning the transmit signal in the direction of the transmit antenna array pattern is called transmit beam forming.

17. Define precoding.

Precoding scheme is designed to minimize the mean-squared error between the transmitted and received data with a per-user power constraint. Precoding allows to perform many complex processing at BS or Access Point(AP).It reduces computational complexities and provides better performance.

18. What is massive MIMO?

Massive multiple-input, multiple-output, or massive MIMO, is an extension of MIMO, which essentially groups together antennas at the transmitter and receiver to provide better throughput and better spectrum efficiency

PART-B**1. Determine the capacity of frequency selective fading channels and explain the concept of water filling water pouring. (Nov/Dec 2015)**

Ref: “Wireless Communication” by S.Rappaport [Page.no:207-208]

2. Calculate the capacity of MIMO system flat fading and non fading channels. (Nov/Dec 2015)

Ref: “Wireless Communication” by S.Rappaport [Page.no:464-470]

3. What is known as CSI? Explain in detail.

Ref: “Wireless Communication” by MuraliBabu [Page.no:10.8-10.11]

4. What is mean by spatial multiplexing? Explain about receiver diversity

Ref: “Wireless Communication” by MuraliBabu [Page.no:10.4-10.8]

5. Determine the capacity of slow fading channel and prove that the outage probability for receiver diversity system with L receive antennas is

$$P_{\text{out}}(R) = (2^R - 1)^{-L}$$

 $LSNR^L$, Where R is the data rate. (NOV/DEC 2105)

Solution:

Ref: “Wireless Communication” by S.Janani Solved question. [Page.no:15]

6. With neat diagram explain the system model for multiple input multiple output system and discuss in detail the classification of algorithms for MIMO based system.(NOV/DEC 2016)

Ref: “Wireless Communication” by MuraliBabu [Page.no:9.1-9.5]

7. Differentiate the operation of transmit & receiver diversity and its types.

Ref: “Wireless Communication” by MuraliBabu [Page.no:10.1-1-8]

8. Explain the following terms i) BLAST receiver ii) Beam forming

Ref: “Wireless Communication” by MuraliBabu [Page.no:9.13-9.16]

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the types of services, requirements, spectrum limitations and noise considerations of wireless communications. (16)

Or

- (b) Explain the principle of Cellular Networks and various types of Handoff techniques. (16)
12. (a) (i) Explain the time-variant two-path model of a wireless propagation channel. (8)
- (ii) Brief about the properties of Rayleigh distribution. (8)

Or

- (b) (i) Explain the narrow band modeling methods for Short scale fading and Long scale fading. (10)
- (ii) Brief about the properties of Nakagami distribution. (6)
13. (a) (i) Briefly explain the structure of a Wireless communication link. (6)
- (ii) With block diagram, explain the MSK transmitter and receiver. Derive an expression for MSK and its power spectrum. (10)

Or

- (b) Derive an expression for :
- (i) M-ary phase shift keying and (8)
- (ii) M-ary quadrature amplitude modulation. (8)
- Also derive an expression for their bit error probability. (8)
14. (a) Explain in detail about space diversity with necessary diagrams.

Or

- (b) Derive the LMS Algorithm for an Adaptive Equalizer.
15. (a) Examine about the effects of multipath propagation on CDMA. (16)

Or

- (b) (i) Illustrate the block diagram of IS-95 transmitter. (8)
- (ii) Give a detailed description of OFDM transceiver. (8)

PART B — (5 × 16 = 80 marks)

11. (a) (i) If a transmitter produces 50W of power, which is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100m from the antenna. What is received power at a distance of 10 km? Assume unity gain for the receiver antenna. (5)
- (ii) Derive the path loss considering a Two-Ray Model for the propagation mechanism in a wireless channel. Is considering just two rays alone sufficient? Why? (11)
- Or
- (b) (i) Determine the proper spatial sampling interval required to make small-scale propagation measurements which assume that consecutive samples are highly correlated in time. How many samples will be required over 10 m travel distance if $f_c = 1900$ MHz and $v = 50$ m/s. How long would it take to make these measurements, assuming they could be made in real time from a moving vehicle? What is the Doppler spread B_D for the channel? (5)
- (ii) Describe in detail, the parameters of mobile multipath channels with their significance. (6)
- (iii) Compare and contrast fast fading and slow fading. "In practice fast fading only occurs for very low data rate (communications)". Why? (5)
12. (a) (i) Describe Channel assignment strategies and Hand-off strategies. (10)
- (ii) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (1) four-cell reuse (2) seven-cell reuse and (3) twelve-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine the equitable distribution of control channels and voice channels in each cell of each of the three systems. (6)

Or

- (b) (i) Derive the expressions for Cellular CDMA schemes for both noise limited and interference limited scenarios. (10)
- (ii) Consider Global System for Mobile, which is a TDMA/FDD system that uses 25 MHz for the forward link, which is broken into radio channels of 200 MHz. If 8 speech signals are supported on a single radio channel and if no guard band is assumed find the number of simultaneous users that can be accommodated in GSM. (2)
- (iii) If GSM uses a frame structure where each frame consists of eight time slots, and each time slot contains 156.25 bits, and data is transmitted at 270.833 kbps in the channel, find (1) the time duration of a bit (2) the time duration of a slot (3) the time duration of a frame and (4) how long must a user occupying a single time slot wait between two successive transmissions? (4)
13. (a) (i) Why are constant envelope modulation schemes such as MSK and GMSK used in a wireless communication system? Compare and contrast these two modulation techniques. (8)
- (ii) Describe OFDM scheme and state the reason behind using cyclic prefix in OFDM scheme. What is PAPR? Why is it normally larger in a OFDM technique? (8)
- Or
- (b) (i) Discuss the error performance of different modulation schemes in fading channels. (10)
- (ii) What is Offset-QPSK? What is its advantage? Describe the Offset-QPSK scheme. (6)
14. (a) (i) Describe the role played by Equalisation and diversity as Multipath mitigation techniques. Compare and contrast these two techniques. (10)
- (ii) Consider the design of the US Digital Cellular equalizer, where $f = 900$ MHz and the mobile velocity $v = 80$ km/hr, determine the maximum Doppler shift, the coherence time of the channel and the maximum number of symbols that could be transmitted without updating the equalizer assuming that the symbol rate is 24.3 k symbols/sec. (6)
- Or
- (b) (i) With a sketch, describe RAKE receiver. (6)
- 3 71747

(ii) Assume four branch diversity is used, where each branch receives an independent Rayleigh fading signal. If the average SNR is 20 dB, determine the probability that the SNR will drop below 10 dB. Compare this with the case of a single receiver without diversity. (4)

(iii) Derive an expression for performance improvement due to Maximal Ratio combining. (6)

15. (a) Discuss in detail, the capacity in fading and non-fading channels. (16)

Or

(b) (i) Describe MIMO systems with emphasis on their requirement in a wireless communication environment. (8)

(ii) Describe the concepts of Pre-coding and Beam forming. (8)

EC 6802- WIRELESS NETWORKS (Regulation 2013)

UNIT 1

PART-A

1. What is DSSS? Mention the characteristics of DSSS.

Direct sequence spread spectrum (DSSS) is the alternative spread spectrum method separating by code and not by frequency. The key characteristics of this method are its robustness against interference and its insensitivity to multipath propagation (time delay spread).

2. State the MAC management functions.

NOV'17

- Synchronization
- Power management
- Roaming
- Management information base

3. Illustrate about Spread spectrum.

Spread spectrum involves spreading the bandwidth needed to transmit data. The main advantage of using spread spectrum is the resistance to narrow interference.

4. Describe BRAN.

The broadband Radio access networks (BRAN) is standardized by European telecommunications standards institute (ETSI). The primary motivation of BRAN is the deregulation and privatization of the telecommunication sector. The radio access gains its advantages for its high flexibility and quick installation.

5. What is the functionality of L2CAP?

NOV'17

The logical link control and adaptation protocol (L2CAP) is a data link control protocol on top of baseband layer offering logical channels between Bluetooth devices with QoS properties.

The different types of logical channels are,

- Connectionless
- Connection-oriented
- Signaling

6. What is HIPERLAN? List any four differences between HIPERLAN1 and HIPERLAN 2.

The HIPERLAN stands for High Performance Radio LAN is an initiation of RES-10 group of the ETSI as a PAN European standard for high speed wireless local networks.

	HIPERLAN 1	HIPERLAN 2
Application	Wireless LAN	Access to ATM fixed networks
Range	50 m	50 – 100 m

Data rate	23.5 M bits/ sec	> 20 M bits / s
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7. Examine the features of Wireless LAN.

- Global operation
- Low power
- License free operation
- Robust transmission technology
- Simplified spontaneous cooperation
- Easy to use
- Protection of investment
- Safety and security
- Transparency for applications

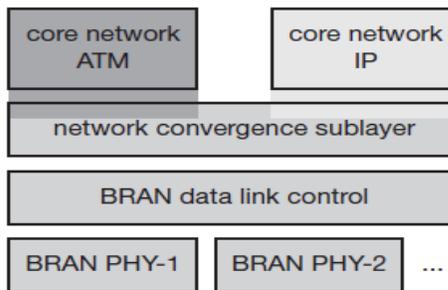
8. Identify the different phases of HIPERLAN1.

Prioritization: Determine the highest priority of a data packet ready to be sent by competing nodes.

Contention: Eliminate all but one of the contenders, if more than one sender has the highest current priority.

Transmission: Finally, transmit the packet of the remaining node.

9. Draw the architecture of BRAN layered model.



10. Illustrate the principle behind FHSS.

Frequency hopping spread spectrum (FHSS) is a spread spectrum technique which allows for the coexistence of multiple networks in the same area by separating different networks using different hopping sequences.

11. State the significance of Radio transmission over infrared.

APR'17

Radio transmission can cover larger areas and can penetrate walls, furniture, etc., Additional coverage is gained by reflection.

12. Evaluate and describe the piconet and scatternet.

A piconet is a collection of Bluetooth devices which are synchronized to the same hopping sequence. One device in the piconet can act as master (M), all other devices connected to the master must act as slaves(s).

Group of piconet's is called scatternet. Only those units really must exchange data share the same piconet.

13. What is WIMAX? What is the need for WIMAX?

WiMAX (Worldwide Interoperability for Microwave Access) is a family of wireless communication standards based on the IEEE 802.16 set of standards, which provide multiple physical layer (PHY) and Media Access Control (MAC) options.

The main reason for the development of WIMAX is the demand of high data rates not only the faster download but also for the use of new applications like VOIP, video streaming, multimedia conferencing and interactive gaming.

14. Identify the functions of Link manager protocol.

The link manager protocol (LMP) manages various aspects of the radio link between a master and a slave and the current parameter setting of the devices. The functions are,

- Authentication, pairing and encryption
- Synchronization
- Capability negotiation
- Quality of service negotiation
- Power control
- Link supervision

15. What are the advantages of infrared technology?

Simple and extremely cheap senders and receivers which is integrated into nearly all mobile devices available today

No license is needed for infra red technology and shielding is very simple.

Electrical devices do not interfere with infrared transmission.

16. Define DIFS.

DCF inter-frame spacing (DIFS): This parameter denotes the longest waiting time and has the lowest priority for medium access. This waiting time is used for asynchronous data service within a contention period. DIFS is defined as SIFS plus two slot times.

17. Define SIFS.

Short Inter Frame Spacing (SIFS): The shortest waiting time for medium access (so the highest priority) is defined for short control messages, such as acknowledgements of data packets or polling responses.

18. Discuss about Bluetooth and describe the states of Bluetooth.

Bluetooth technology so-called ad-hoc piconets, which are local area networks with a very limited coverage and without the need for an infrastructure. This is a different type of network is needed to connect different small devices in close proximity (about 10 m) without expensive wiring or the need for a wireless infrastructure. The envisaged gross data rate is 1 Mbit/s, asynchronous (data) and synchronous (voice) services should be available.

PART-B**1. Explain and compare the medium access mechanism of DCF methods adapted in IEEE 802.11 WLAN. APR'17**

Ref: "Mobile Communications" by Jochen Schiller [Page.no:214-222]

2. Define HIPERLAN-2. Discuss about the various operation modes and protocol stack in HIPERLAN-2. NOV'17

Ref: "Mobile Communications" by Jochen Schiller [Page.no:257-269]

3. Explain the concept of HIPERLAN-1.

Ref: "Mobile Communications" by Jochen Schiller [Page.no:240-244]

4. Explain in detail about the IEEE 802.11 protocol architecture and bridging with other networks? NOV'17

Ref: "Mobile Communications" by Jochen Schiller [Page.no:210-211]

5. Explain in detail about WIMAX technology.

Ref: "Wireless Networks" by L.Gopinath [Page.no: 1.92-1.99]

6. Write short notes on (i) WATM (ii) BRAN

Ref: "Mobile Communications" by Jochen Schiller [Page.no:244-257]

7. Explain about basic Wireless LAN technologies and spread spectrum.

Ref: "Mobile Communications" by Jochen Schiller [Page.no:204-214]

8. Explain the concepts of Bluetooth with neat diagrams?

Ref: "Mobile Communications" by Jochen Schiller [Page.no:269-293]

9. Describe the user scenario architecture and protocol stack of Bluetooth technology. APR'17

Ref: "Mobile Communications" by Jochen Schiller [Page.no:271-282]

UNIT 2**PART-A**

- 1. When the agent solicitation message has to be sent by mobile node? NOV'17**

If no agent advertisements are present or the inter-arrival time is too high, and an MN has not received a COA by other means, the mobile node must send agent solicitations.
- 2. Define mobile node.**

A mobile node is an end-system or router that can change its point of attachment to the internet using mobile IP. The MN keeps its IP address and can continuously communicate with any other system in the internet as long as link-layer connectivity is given. Mobile nodes are not necessarily small devices such as laptops with antennas or mobile phones; a router onboard an aircraft can be a powerful mobile node.
- 3. What is care of address in mobile IP? APR'17**

The COA defines the current location of the MN from an IP point of view. All IP packets sent to the MN are delivered to the COA, not directly to the IP address of the MN.
- 4. Illustrate the applications of MANET.**
 - Military applications
 - Commercial sector.
 - Sensor networks.
 - Industrial applications
 - Education sector
- 5. What is Encapsulation in mobile- IP? APR'17**

Encapsulation is the mechanism of taking a packet consisting of packet header and data and putting it into the data part of a new packet.
- 6. Why is routing in multi-hop ad-hoc networks complicated? NOV'17**

While in wireless networks with infrastructure support a base station always reaches all mobile nodes, this is not always the case in an ad-hoc network. A destination node might be out of range of a source node transmitting packets. Routing is needed to find a path between source and destination and to forward the packets appropriately.
- 7. What is binding request?**

Any node that wants to know the current location of an MN can send a binding request to the HA. The HA can check if the MN has allowed dissemination of its current location. If the HA is allowed to reveal the location it sends back a binding update.

8. Illustrate the advantages and disadvantages of DSDV.**Advantages**

- Less Delay is involved in route setup process.
- DSDV protocol guarantees loop free paths.
- Incremental updates with sequence number tags make the existing wired network protocols adaptable to ad-hoc wireless networks.
- Count to infinity problem is reduced in DSDV.
- Path Selection: DSDV maintains only the best path instead of maintaining multiple paths to every destination. With this, the amount of space in routing table is reduced.

Disadvantages

- Updates due to broken links lead to heavy control overhead during mobility.
- The control overhead is directly proportional to the number of nodes.
- Small network with high mobility or large network with low mobility can choke the available bandwidth.
- Wastage of bandwidth
- Delay in obtaining information about a node could result in stale routing at the nodes.

9. Describe triangle routing in detail.

The inefficient behavior of a non optimized mobile IP is called triangular routing. The data is sent in three steps, CN to HA, HA to COA/MN, and MN to CN. Even if the MN is in nearby area the packets are forwarded to MN, this consumes a lot of time.

10. Compare proactive with reactive routing protocols.

S.No	Proactive	Reactive
1	Route is pre-established	Route establishment is on-demand
2	Continuously discover the routes	Route discovery by some global search
3	Updates topology information(table) periodically	No information update is done
4	No latency in route discovery	longer delay due to latency of route discovery
5	Large capacity is needed to update network information	Large capacity is not needed
6	A lot of routing information may never be used	May not be appropriate for real-time communication

7	Eg: DSDV, WRP	Eg: AODV, ABR
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11. What is reactive protocol? Mention some of the reactive routing protocols.

This type of protocol finds a route on demand by flooding the network with Route Request packets.

Some of the reactive routing protocols are,

- Dynamic source routing
- Ad hoc On-demand Distance Vector(AODV)
- ABR - Associativity-Based Routing
- Temporarily Ordered Routing Algorithm (TORA)

12. How routing is divided in DSR?

Route discovery: A node only tries to discover a route to a destination if it has to send something to this destination and there is currently no known route.

Route maintenance: If a node is continuously sending packets via a route, it has to make sure that the route is held upright. As soon as a node detects problems with the current route, it has to find an alternative.

13. Discuss about MANET and its advantages.

A Mobile Ad-Hoc Network (MANET) is an infrastructure less collection of mobile nodes that can arbitrarily change their geographic locations such that these networks have dynamic topologies which are composed of bandwidth constrained wireless links.

Advantages:

- Instant infrastructure
- Disaster relief
- Can be used in Remote areas
- High effectiveness

14. What is mobile IP? Mention its benefits.

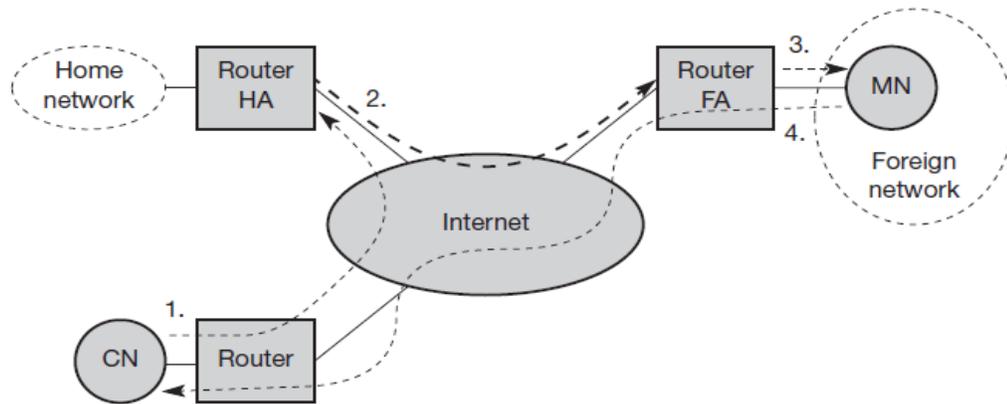
Mobile IP is a protocol developed to allow internetwork mobility for wireless nodes without them having to change their IP addresses.

The major benefit of Mobile IP is that it frees the user from a fixed location. Mobile IP makes invisible the boundaries between attachment points, it is able to track and deliver information to mobile devices without needing to change the device's long-term Internet Protocol (IP) address.

15. Identify the need for registration.

The main purpose of the registration is to inform the HA of the current location for correct forwarding of packets.

16. Explain the process of IP packet delivery with a neat diagram.



17. Explain encapsulation and decapsulation.

Encapsulation is the mechanism of taking a packet consisting of packet header and data and putting it into the data part of a new packet. The reverse operation, taking a packet out of the data part of another packet, is called decapsulation.

18. What is tunneling?

A tunnel establishes a virtual pipe for data packets between a tunnel entry and a tunnel endpoint. Packets entering a tunnel are forwarded inside the tunnel and leave the tunnel unchanged.

PART-B

1. Illustrate the concept of DHCP.

Ref:” Mobile Communications” by Jochen Schiller [Page.no:328-330]

2. Explain and compare the working mechanism of both DSDV and DSR routing protocols when applied on a mobile ad-hoc network scenario. **APR’17**

Ref:” Mobile Communications” by Jochen Schiller [Page.no:335-339]

3. How does DSR handle routing? What is the motivation behind DSR compared to other routing algorithms for fixed networks? **NOV’17**

Ref:” Mobile Communications” by Jochen Schiller [Page.no:336-339]

4. Write short notes on (i) Optimizations (ii) Micro mobility support.

Ref:” Mobile Communications” by Jochen Schiller [Page.no:319-321,324-328]

5. Explain the following terms: (i) IPV6 (ii) Agent discovery and Agent registration.

Ref:” Mobile Communications” by Jochen Schiller [Page.no:310-315,323-324]

6. Discuss the basic concepts of Mobile IP and write short notes on IP Packet delivery.

Ref:” Mobile Communications” by Jochen Schiller [Page.no:304-310]

- 7. Explain how tunneling works in general and especially for mobile IP using IP in IP, minimal and generic routing encapsulation respectively. Discuss the advantages and disadvantages of these three methods.** NOV'17

Ref:” Mobile Communications” by Jochen Schiller [Page.no:315-319]

- 8. Explain the mobile session initiation protocol.**

Ref:” Wireless Networks” by L.Gopinath [Page.no:2.46-2.47]

- 9. State the entities and terminologies used in Mobile IP and explain the concepts of tunneling.** APR'17

Ref:” Mobile Communications” by Jochen Schiller [Page.no:307-309,315-319]

UNIT-3

PART-A

- 1. What is mobile TCP?**

M-TCP splits the TCP connection into two parts as I-TCP does. An unmodified TCP is used on the standard host-supervisory host (SH) connection, while an optimized TCP is used on the SH-MH connection.

The supervisory host is responsible for exchanging data between both parts similar to the proxy in ITCP. The M-TCP approach assumes a relatively low bit error rate on the wireless link. Therefore, it does not perform caching/retransmission of data via the SH. If a packet is lost on the wireless link, it has to be retransmitted by the original sender. This maintains the TCP end-to-end semantics.

- 2. Mention the advantages and disadvantages of snooping TCP.**

ADVANTAGES:

- The end-to-end TCP semantic is preserved.
- The correspondent host does not need to be changed.
- It does not need a handover of state as soon as the mobile host moves to another foreign agent.

DISADVANTAGES:

- Snooping TCP does not isolate the behavior of the wireless link as well as ITCP.
- Using negative acknowledgements between the foreign agent and the mobile host assumes additional mechanisms on the mobile host.
- All efforts for snooping and buffering data may be useless if certain encryption schemes are applied end-to-end between the correspondent host and mobile host.

- 3. What are the algorithms used for congestion control in TCP?**

- Slow start

- Congestion avoidance
- Fast retransmit
- Fast recovery

4. Explain need for I-TCP.

NOV'17

Indirect TCP is a split connection solution that utilizes the resources of Mobility Support Routers (MSRs) to transport layer communication between mobile hosts and fixed hosts.

It uses the standard TCP for its connection over the wireless hop and like other split connection protocols, attempts to separate loss recovery over the wireless link from the wired link.

5. What is slow start mechanism?

Slow start is a mechanism used by the sender to control the transmission rate. The sender always calculates a congestion window for a receiver. The start size of the congestion window is one TCP packet.

6. Explain selective retransmission.

TCP acknowledgements are cumulative, i.e., they acknowledge in-order receipt of packets up to a certain packet. If a single packet is lost, the sender has to retransmit everything starting from the lost packet (go-back-n retransmission). This obviously wastes bandwidth.

In selective retransmission the receiver can acknowledge single packets, not only trains of in-sequence packets. The sender can now determine precisely which packet is needed and can retransmit it.

7. Define traditional TCP.

TCP (Transmission control protocol) is a standard that defines how to establish and maintain a network conversation via which application programs can exchange data.

TCP works with the Internet Protocol (IP), which defines how computers send packets of data to each other. Together, TCP and IP are the basic rules defining the internet. It is a connection oriented protocol.

8. List the advantages and disadvantages of Mobile TCP.**Advantages:**

- M-TCP maintains the TCP end-to-end semantics. The Supervisory Host (SH) does not send any ACK itself but forwards the ACKS from the MH.
- If the MH is detached, it avoids useless transmissions, slow starts or breaking connections by simply shrinking the sender's window to zero.

Disadvantages:

- As the SH does not act as proxy as in I-TCP, packet loss on the wireless link due to bit errors is propagated to the sender. M-TCP assumes low bit error rates, which is not always a valid assumption.

- A modified TCP on the wireless link not only requires modifications to the MH protocol software but also new network elements like the bandwidth manager.

9. What is timeout freezing?

The MAC layer informs the TCP layer about an upcoming loss of connection or that the current interruption is not caused by congestion.

TCP then stops sending and freezes the current state of its congestion window and further timers. When the MAC layer notices the upcoming interruption early enough, both the mobile and correspondent host can be informed.

10. What are the reasons for sudden increase in latency?

Main reasons for sudden increase in latency are,

- Link outages due to temporal of radio coverage
- Blocking due to high priority traffic
- Handovers

11. How does fast retransmit works?

Two things lead to a reduction of the congestion threshold. One is a sender receiving continuous acknowledgements for the same packet. It informs the sender of two things. One is that the receiver got all packets up to the acknowledged packet in sequence and also the receiver continuously receives something from the sender.

The gap in the packet stream is not due to severe congestion, but a simple packet loss due to a transmission error. The sender can now retransmit the missing packet(s) before the timer expires. This behavior is called fast retransmit.

12. What is snooping TCP?

In this approach, the foreign agent buffers all packets with destination mobile host and additionally 'snoops' the packet flow in both directions to recognize acknowledgements.

The main function is to buffer data close to the mobile host to perform fast local retransmission in the case of packet loss.

13. Define fast recovery.

NOV'17

Without FRR, the TCP uses a timer that requires a retransmission timeout if a packet is lost. No new or duplicate packets can be sent during the timeout period. With FRR, if a receiver receives a data segment that is out of order, it immediately sends a duplicate acknowledgement to the sender. If the sender receives three duplicate acknowledgements, it assumes that the data segment indicated by the acknowledgements is lost and immediately retransmits the lost segment. With FRR, time is not lost waiting for a timeout in order for retransmission to begin.

14. Mention the advantages and disadvantages of indirect TCP.

APR'17

Advantages:

- No changes in the fixed network necessary, no changes for the hosts necessary, all current optimizations to TCP still work
- Simple to control
- It is easy to use different protocols for wired and wireless networks

Disadvantages:

- Loss of end to end semantics
- Higher latency
- Security issues

15. List the services of TCP.

- Stream data transfer
- Reliability
- Flow control
- Multiplexing
- Logical connections
- Full duplex

16. Write short notes on I-TCP.

Indirect TCP (I-TCP) segments a TCP connection into a fixed part and a wireless part. It is a split connection solution that utilizes the resources of Mobility support routers to provide transport layer communication between mobile hosts and fixed hosts.

It uses the standard TCP for its connection over the wireless hop and like other split connection protocols, attempts to separate loss recovery over the wireless link from the wired link.

17. List the issues with 2.5G/3G wireless networks.

- Low data rates
- High latency
- Jitter
- Packet loss

18. Mention the advantages of Mobile TCP.

APR'17

Advantages

- M-TCP maintains the TCP end-to-end semantics. The Supervisory Host (SH) does not send any ACK itself but forwards the ACKS from the MH.
- If the MH is detached, it avoids useless transmissions, slow starts or breaking connections by simply shrinking the sender's window to zero.
- Lost packets will be automatically retransmitted to the new SH.

PART –B

- 1. Write short notes on TCP enhancements for wireless protocols.**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:355-366]

- 2. Describe the basic concepts of congestion control. What are the implications on mobility in traditional TCP?** **NOV’17**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:352-355]

- 3. What is meant by snooping TCP? Explain in detail about the basic concepts of TCP over 2.5/3.G wireless networks.** **NOV’17**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:358-360 & 366-368]

- 4. Write your understanding on indirect TCP, snooping TCP, Mobile TCP and transaction oriented TCP.** **APR’17**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:355-362 & 364-366]

- 5. Discuss about TCP over 2.5/3G wireless network.**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:366-368]

- 6. Explain about M-TCP in detail. Mention its advantages and disadvantages.**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:360-362]

- 7. Write short notes on:**
 - (i) Timeout freezing**
 - (ii) Selective retransmission**
 - (iii) Transaction oriented TCP**
 - (iv) TCP over 3G wireless networks.**Ref:” Mobile Communications” by Jochen Schiller [Page.no:363-368]

- 8. Describe the working mechanism of traditional TCP.** **APR’17**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:352-355]

- 9. In classical TCP improvements how fast retransmit/ fast recovery transmission and selective retransmission is obtained?**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:362-364]

- 10. Write short notes on Transaction oriented TCP.**
Ref:” Mobile Communications” by Jochen Schiller [Page.no:364-366]

UNIT 4
PART A**1. How is isolation between users in the downlink accomplished in a WCDMA system. NOV'17**

In a WCDMA system, isolation between users in the downlink is accomplished through the combination of user-specific channelization codes and cell-specific scrambling codes.

2. What are the planes of UTRAN?

There are three planes

- Control plane
- User plane
- Transport network control plane.

3. Name the 3G radio access schemes identified to support different spectrum scenario. APR'17

3G mobile telecommunications systems are intended to provide worldwide access and global roaming for wide range of services. UMTS Universal Mobile Telecommunications System is the third generation (3G) successor to the second generation GSM based cellular technologies which also include GPRS, and EDGE. UMTS uses Wideband CDMA (WCDMA / W-CDMA) to carry the radio transmissions, and often the system is referred to by the name WCDMA.

4. What are the types of DPCH?

There are two types of DPCH:

- **Dedicated Physical Data Channel (DPDCH)** to carry user data and signaling information generated at layer 2 (there may be none, one, or several DPDCHs)
- **Dedicated Physical Control Channel (DPCCH)** to carry control information generated at layer 1 (pilot bits, transmit power control (TPC) commands, feedback information (FBI) commands, and optional transport format combination indicator (TFCI)).

5. What is meant by firewall?**NOV'17**

Firewall is used to protect the service providers' backbone data networks from attack from external packet data networks. The security of the backbone data network can be ensured by applying packet filtering mechanisms based on access control lists or any other methods deemed suitable.

6. What is UMTS? Mention its layers.

Universal Mobile telecommunications Services (UMTS) is a new radio access network based on 5 MHz WCDMA and optimized for efficient support of 3G services. UMTS can be used in both new and existing spectra. The UMTS terrestrial radio access network (UTRAN) has an access layer and non access layer.

- The access layer includes air interface and provides functions related to OSI layer 1, layer 2, and the lower part of layer 3.

- The non-access layer deals with communication between user equipment (UE) and core network (CN) and includes OSI layer 3 (upper part) to layer 7.

7. Name some of the wireless technology services.

Some of the wireless technology services are

- General Packet Radio Services (GPRS)
- Enhanced Data for GSM evolution (EDGE) service
- Wideband Code Division Multiple access (WCDMA)
- Universal Mobile telecommunications Services (UMTS)
- High-Speed Downlink Packet Access (HSDPA)

8. Illustrate the purpose of firewall used in UMTS network.

APRIL 2017

Firewall is used as security of the backbone data network can be ensured by applying packet filtering mechanisms based on access control lists or any other methods deemed suitable.

9. Illustrate the functions provided by 3G-MSC.

The following functionality is provided by the 3G-MSC:

Mobility management

Call management

Supplementary services

Short message services (SMS)

OAM (operation, administration, and maintenance) agent functionality.

10. Discuss about 3G-SGSN.

The 3G-SGSN is the main CN element for PS services. The 3G-SGSN provides the necessary control functionality both toward the UE and the 3G-GGSN. It also provides the appropriate signaling and data interfaces including connection to an IP-based network toward the 3G-GGSN, SS7 toward the HLR/EIR/AUC and TCP/IP or SS7 toward the UTRAN.

11. Discuss about the applications of 3G.

Applications for a 3G wireless network range from simple voice-only communications to simultaneous video, data, voice, and other multimedia applications. One of the main benefits of 3G is that it allows a broad range of wireless services to be provided efficiently to many different users.

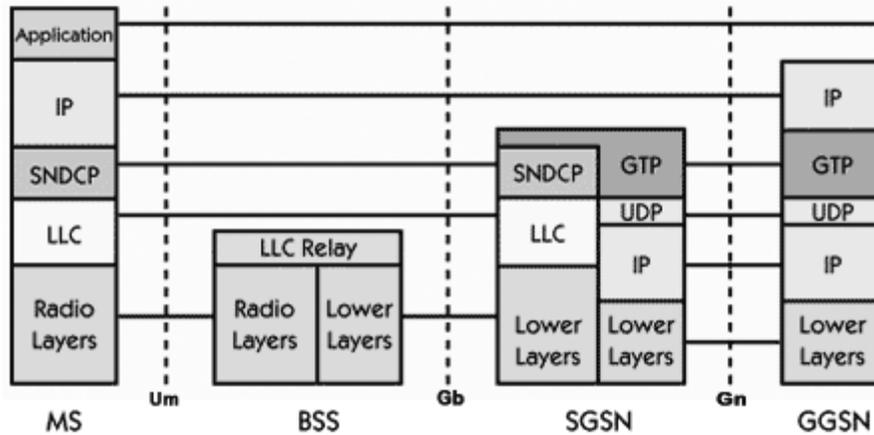
12. Can you recall about the components of LTE.

- The User Equipment (UE).
- The Evolved UMTS Terrestrial Radio Access Network (E-UTRAN).
- The Evolved Packet Core (EPC)

13. Define in detail SMS-GMSC?

The SMS-GMSC is an MSC capable of receiving a terminated short message from a service center, interrogating an HLR for routing information and SMS information, and delivering the short message to the SGSN of the recipient UE.

14. Draw the protocol stack for GPRS.



15. Explain Iu, Iups, Iucs, Iur terms in detail.

- The UMTS **Iu** interface is the open logical interface that interconnects one UTRAN to the UMTS core network (UCN). On the UTRAN side the Iu interface is terminated at the RNC, and at the UCN side it is terminated at U-MSC.
- The connection between two RNCs (serving RNC (SRNC) and drift RNC (DRNC)) is the **Iur** interface. Communication between one RNC and one Node B of two different RNCs are realized through the Iur interface.
- **Iu-CS:** Radio access network application protocol (RANAP)
- **Iu-PS:** RANAP

16. What is Transport Network Control Plane (TNCP)?

Transport Network Control Plane (TNCP) carries information for the control of transport network used within UCN.

17. Describe about radio resource control (RRC).

The radio resource control (RRC) layer broadcasts system information, handles radio resources (i.e., code allocation, handover, admission control, and measurement/control report), and controls the requested QoS.

18. What is 3G-GGSN? What are the functions provided by 3G-GGSN?

The GGSN provides interworking with the external PS network. It is connected with SGSN via an IP-based network. The GGSN may optionally support an SS7 interface with the HLR to handle

mobile terminated packet sessions. The 3G-GGSN provides the following functions:

- Maintain information locations at SGSN level (macro-mobility)
- Gateway between UMTS packet network and external data networks (e.g. IP, X.25)
- Gateway-specific access methods to intranet (e.g. PPP termination)
- Initiate mobile terminate Route Mobile Terminated packets
- User data screening/security can include subscription based, user controlled, or network controlled screening.
- User level address allocation: The GGSN may have to allocate (depending on subscription) a dynamic address to the UE upon PDP context activation. This functionality may be carried out by use of the DHCP function.
- Charging: The GGSN collects charging information related to external data network usage by the user.
- OAM functionality

PART B

1. Discuss Iu, Iur and Iub interfaces in the UMTS.

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:510-16]

2. Explain in detail about HSDPA.

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:530-36]

3. Explain the UMTS network architecture with GSM,3G and also explain the reference architecture. APR’17

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:495-97]

4. Explain the functions performed by 3G-SGSN and 3G-GGSN.

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:520-22]

5. Write a short note on 3G-MSC, DNS/DHCP.

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:520,522-23]

6. Explain UMTS core network architecture.

APRIL 2017

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:518-523]

7. Explain the LTE architecture and its protocol model in detail.

Ref:” 3G Evolution HSPA and LTE for Mobile Broadband” by Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming [Page.no:299-301]

8. Write a short note on Distribution of UTRAN functions.

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:516-17]

9. Discuss the role of the access link control application part (ALCAP) in the UMTS. NOV’17

Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:519-20]

**UNIT 5
PART A****1. Define multi carrier modulation.****APRIL 2017**

Multicarrier modulation (MCM) is a derivative of frequency-division multiplexing. It is not a new technology. Forms of multicarrier systems are currently used in DSL modems and digital audio/video broadcast (DAB/DVB). MCM is a baseband process that uses parallel equal bandwidth subchannels to transmit information and is normally implemented with fast Fourier transform (FFT) techniques.

2. What are the features of 4G Wireless Systems?

- High usability: anytime, anywhere, and with any technology
- Support for multimedia services at low transmission cost
- Personalization
- Integrated services

3. Write a short note on security challenges in 4G

The heterogeneity of wireless networks complicates the security issue. Dynamic reconfigurable, adaptive, and lightweight security mechanisms should be developed.

4. What is Smart Antenna?

Smart antenna techniques, such as multiple-input multiple-output (MIMO) systems, can extend the capabilities of the 3G and 4G systems to provide customers with increased data throughput for mobile high-speed data applications.

5. Explain in detail about LTE.

Long Term Evolution (LTE) has been designed to support only packet-switched services. It aims to provide seamless Internet Protocol (IP) connectivity between user equipment (UE) and the packet data network (PDN), without any disruption to the end users’ applications during mobility.

6. Define 4G. What are the goals of 4G?

4G can defined as MAGIC

MAGIC

- a. Mobile Multimedia

- b. Anytime Anywhere
- c. Global Mobility Support
- d. Integrated Wireless Solution
- e. Customized Personal Services

Also known as Mobile Broadband Everywhere

The ambitious goal of 4G is to allow everyone to access the Internet anytime and everywhere. The provided connection to Internet will allow users to access all types of services including text, databases and multimedia. Unlike 3G, 4G is IP based, that is every user connected to the Internet will have an IP address.

7. Mention the features and challenges of 4G.

APRIL 2017

- High usability: anytime, anywhere, and with any technology
- Support for multimedia services at low transmission cost
- Personalization
- Integrated services
- The main challenges are
 - a. Multimode user terminals
 - b. Wireless System Discovery and Selection
 - c. Terminal Mobility
 - d. Network Infrastructure and QoS Support
 - e. Security and Privacy
 - f. Fault tolerance and Survivability
 - g. Multiple Operators and Billing Systems
 - h. Personal Mobility

8. What are the main issues in terminal mobility of 4G?

To locate and update the locations of the terminals in various systems. Also, to perform horizontal (within the same system) and vertical (within different systems) handoff as required with minimum handover latency and packet loss.

9. Write a short note on time slot scheduler.

The time slot scheduler shares the spectrum efficiently between users by satisfying the QoS requirements. When the channel quality for each radio link can be predicted for a short duration into the future and accessible by the link layer, then ARQ with an adaptive modulation and coding system can be selected for each user to satisfy the Bit Error Rate(BER) requirement and offer throughput.

10. What are the various technologies used in 4G?

The technologies used in 4G are

- a. Multi Carrier Modulation (MCM)

- b. Smart Antenna Techniques
- c. OFDM – MIMO Systems
- d. Adaptive Modulation and Coding with Time Slot Scheduler
- e. Cognitive Radio.

11. Describe in detail cognitive radio.

NOV 2017

The Federal Communications Commission FCC defined Cognitive Radio as “A radio that can change its transmitter parameters based on interaction with the environment in which it operates.

12. Mention the main functions and goal of Cognitive Radio.

Main Functions of Cognitive Radio

- Spectrum sensing: Detecting unused spectrum
- Spectrum management : Capturing the best available spectrum ,,
- Spectrum mobility: Maintaining seamless communication during the spectrum transition
- Spectrum sharing: ,, Providing fair spectrum scheduling method

Cognitive radio is considered as a goal towards which a software-defined radio platform should evolve: a fully reconfigurable wireless transceiver which automatically adapts its communication parameters to network and user demands.

13. Discuss about MIMO.

MIMO systems can be viewed as a combination of MISO and SIMO channels. MIMO means Multiple Input and Multiple Output that represents multiple individual, parallel data streams that are carried on the air interface.

14. Compare 3G with 4G.

Content	3G	4G
Major requirement driving architecture	Predominantly voice driven, data was always add on	Converge data and voice over IP
Network architecture	Wide area cell-based	Hybrid-integration of WLAN (WiFi, Bluetooth)
Speeds	384 kbps to 2 Mbps	20 to 100 Mbps in mobile mode
Frequency band	Dependent on country or continent (1.8 to 2.4 GHz)	Higher frequency bands (2 to 8 GHz)
Bandwidth	5 to 20 MHz	100 MHz or more
Switching design basis	Circuit and packet	All digital with packetized voice

Access technologies	WCDMA, cdma2000	OFDM and multicarrier (MC)-CDMA
Component design	Optimized antenna design, multiband adapters	Smart antenna, software defined multiband and wideband radios
Internet protocol (IP)	Number of air link protocol including IPv5.0	All IP (IPv6.0)
Mobile top speed	200 km/h	200 km/h
Forward error correction	Convolution codes rate 1/2, 1/3	Concatenated coding schemes

15. What are the benefits of Smart Antenna Technology?

The benefits of Smart Antenna Technology are:

- a. Reduction in Co – Channel Interference
- b. Range Improvement
- c. Increase in Capacity
- d. Reduction in Transmitted Power
- e. Reduction in Handoff

16. Define Multi Carrier Modulation (MCM).What are the advantages of MCM?

Multicarrier modulation (MCM) is a derivative of frequency-division multiplexing. It is not a new technology. Forms of multicarrier systems are currently used in DSL modems and digital audio/video broadcast (DAB/DVB). MCM is a baseband process that uses parallel equal bandwidth sub-channels to transmit information and is normally implemented with fast Fourier transform (FFT) techniques.

The advantages of MCM are :

- a. Better performance in the Inter Symbol Interference environment
- b. Avoidance of single frequency interference

17. List out the applications of 4G technologies.

NOV 2017

- Virtual presence — 4G will provide user services at all times, even if the user is off-site.
- Virtual navigation — 4G will provide users with virtual navigation through which a user can access a database of streets, buildings, etc., of a large city.
- This requires high speed transmission.
- Tele-medicine — 4G will support the remote health monitoring of patients via video conference assistance for a doctor at anytime and anywhere.
- Tele-geo-processing applications — 4G will combine geographical information systems (GIS) and global positioning systems (GPS) in which a user will get location querying.
- Education — 4G will provide a good opportunity to people anywhere in the

world to continue their education on-line in a cost-effective manner.

18. What is meant by receiver diversity?

The Single Input Multiple Output (SIMO) configuration of the radio channel is known as receiver diversity. The input the channel is single transmitter signal that feeds two receiver paths. Depending on multipath fading and the correlation between two receiver gain is achieved in the form of fading resistance.

PART-B

- 1. What is a Multi-Input –Multi-Output (MIMO) system? Explain in detail. Nov'17**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.12-14]
- 2. Explain in detail about Cognitive Radio.**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.20-21]
- 3. Describe the basic concept of Adaptive Modulation and Coding Time-Slot scheduler. Nov'17**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.14-15]
- 4. Explain the various technologies used in 4G.**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.7-20]
- 5. Explain in detail about the Multi carrier modulation (MCM).**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.7-10]
- 6. Explain adaptive modulation and coding with time slot scheduler along with cognitive radio concept. APRIL'17**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.14-15]
- 7. Explain in detail, the 4G vision, features and challenges of 4G with applications.**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.2-3]
- 8. Write your understanding on behavior of smart antenna techniques. APRIL'17**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.10-14]
- 9. Explain in detail about the key challenges faced by 4G networks and also explain about the motivation behind the evolution of 4G technology .**
Ref:” Wireless Communications and networking” by Vijay Garg [Page.no:23.1-7]

B.E./B.Tech. Degree Examinations, November/December 2017

Regulations 2013

Eighth Semester

Electronics and Communication Engineering

EC6802 Wireless network

(Eighth Semester ECE - Regulations 2013)

Time: Three Hours

Maximum: 100 Marks

Answer ALL Questions

Part A - (10 x 2 = 20 Marks)

1. State the MAC management functions.
2. What is the functionality of L2CAP? list the different types of logical channel
3. When the agent solicitation message has to be sent by mobile node?
4. Why is routing in multi-hop ad-hoc networks complicated?
5. What is the need for I-TCP?
6. Define fast recovery?
7. How is isolation between users in the downlink accomplished in a WCDMA system?
8. What is meant by firewall?
9. List some of the applications of 4G system.
10. What is cognitive radio?

PART B-(5 x16=80 Marks)

11. a) Explain in detail about the IEEE 802.11 protocol architecture and bridging with other networks?

(Or)

- b) Define HiperLan-2. Discuss about the various operation modes and protocol stack in HiperLan-2.

12. a) Explain how tunneling works in general and especially for mobile IP using IP in IP, minimal and generic routing encapsulation respectively. Discuss the advantages and disadvantages of these three methods.

(Or)

- b) How does dynamic source routing handle routing? What is the motivation behind dynamic source routing compared to other routing algorithms for fixed networks?

13. a) Describe the basic concepts of congestion control. What are the implications on mobility in traditional TCP?

(Or)

- b) What is meant by snooping TCP? Explain in detail about the basic concepts of TCP over 2.5/3.G wireless networks.
14. a) Discuss the role of the access link control application part (ALCAP) in the UMTS.
(Or)
b) Discuss two evolution paths for the GSM to offer 3G services.
15. a) What is a Multi-Input –Multi-Output (MIMO) system? Explain in detail.
(Or)
b) Describe the basic concept of Adaptive Modulation and Coding Time-Slot scheduler.

**B.E./B.Tech. Degree Examinations, April/May 2017
Regulations 2013
Eighth Semester**

**Electronics and Communication Engineering
EC6802 Wireless network
(Eighth Semester ECE - Regulations 2013)**

Time: Three Hours

Maximum: 100 Marks

Answer ALL Questions

Part A - (10 x 2 = 20 Marks)

1. State the significance of Radio transmission over infrared.
2. OFDM uses a set of orthogonal sub-carriers for transmission of data . OFDM is used in WLANs. Consider an OFDM systems that uses 52 sub-carriers out of which 48 are pilot sub-carriers. System bandwidth is 20MHz and OFDM symbol duration including cyclic prefix is $4\mu\text{s}$. If the code rate is $\frac{3}{4}$ and 64 QAM is used. Find the data rate.
3. What is care of address in mobile IP?
4. What is Encapsulation in mobile IP?
5. Mention the advantages of Mobile TCP?
6. List out the disadvantages of indirect TCP?
7. What is the purpose of firewall used in UMTS network?
8. Name the 3G radio access schemes identified to support different spectrum scenario.
9. Mention the features and challenges of 4G.
10. Define multi carrier modulation.

PART B-(5 x16=80 Marks)

11. a) Explain and compare the medium access mechanism of DCF methods adapted in IEEE 802.11 WLAN?
(Or)
b) Describe the user scenario architecture and protocol stack of Bluetooth technology.
12. a) Explain and compare the working mechanism of both destination sequenced distance vector and dynamic source routing protocol when applied on a mobile adhoc network scenario?
(Or)
b) State the entities and terminologies used in Mobile IP and explain the concepts of tunneling and also explain the three types of encapsulation mechanisms used in mobile IP.
13. a) Write your understanding on indirect TCP, snooping TCP, Mobile TCP and transaction oriented TCP?

(Or)

b) Describe the working mechanism of traditional TCP?

14. a) Explain the UMTS network architecture with GSM,3G and also explain the reference architecture.

(Or)

b) Explain UMTS core network architecture.

15. a) Write your understanding on behavior of smart antenna techniques.

(Or)

b) Explain adaptive modulation and coding with time slot scheduler along with cognitive radio concept.

GE6075 PROFESSIONAL ETHICS IN ENGINEERING L T P C 3 0 0 3**UNIT I HUMAN VALUES 10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of „Engineering Ethics“ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility

TOTAL: 45 PERIODS**TEXTBOOKS:**

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata Mc Graw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
6. World Community Service Centre, “Value Education”, Vethathiri publications, Erode, 2011

UNIT - I

PART - A

1. Define human values (May 16 ,Nov-17)

Values decide the standard of behavior. Some universally accepted values are freedom justice and equality. Other principles of values are love, care, honesty, integrity, self respect.

2. Define ethical values

Trustworthiness, respect, responsibility, fairness, caring is ethical values.

3. Distinguish values from ethics and culture

Values are mainly related to individuals and since they are related to justice, they remain the same for everyone. E.g. truth, honesty, empathy, self respect. Values do not change from individual to individual. Ethics is common to a group of individuals; the group may be religious or professional. Ethics is mostly based on some code or law and judgment of any action is based on code of conduct or law. Ethics change from individual to individual. Culture commonly refers to conduct of a group. E.g. system of worship, It may differ from society to society, nation to nation or religion to religion.

4. Explain briefly integrity

Integrity is the unity of character based on moral values. Consistency in attitudes, emotions and conduct in relations to morally justified actions and values are also the part of integrity of individual. It implies honesty, trustworthiness.

5. Define work ethics

By one's work one cannot harm others. Any worker cannot escape accountability. Worker has the moral responsibility to see that no other person's right, private or freedom is impaired or transgressed.

6. Describe What is service learning (Apr 17)

Service learning tells that one has moral responsibility to increase the desirable effects and to decrease the harmful effects. Any service should increase the desirable result.

7. List out some civic virtues

Good citizen demand civic virtue. It is the principle of not harming the surroundings. It also includes living peacefully, respect for others, protecting the environment and being normally and ethically good.

8. Discuss briefly on caring and sharing

Caring is the essence of moral life. Caring involves feelings, relationship, contends with other persons and protecting others and causing least damage to others. Sharing means sharing of

feelings, ideas thoughts, resources and profits. Sharing is always mutually beneficial. Sharing morally acceptable feelings, resources and materials is a value.

9. Describe What is honesty

Any human being should imbibe honesty -honesty in acts, honesty in speech and honest in beliefs. Honesty is the fundamental virtue in human relationship even though in may be difficult to follow some times.

10. Express courage as a value

Courage implies self respect and governs confrontations with danger and risk. It is not excessive rashes or cowardice, but it is the middle ground. Taking calculated risks and boldness in facing crises are the hallmarks of courage as a human value. It defines the mental make up of an individual in taking bold decisions even under adverse situations.

11. Examine the meaning of cooperation

Co -operation means extending help to others, for a good cause. Co -operation may be through an idea, a suggestion, an assistance or physical work which extends to others for common benefit.

12. Illustrate empathy

Empathy means putting self in a position of someone else and thinking as the later and reasoning suitable action.

13. Point out the importance of integrity

Integrity is the bridge between responsibility in private and professional life.

14. Analyze briefly compromise

In a negative sense it means to undetermined integrity by violating one 's fundamental moral principles. In a positive sense, however, it means to settle differences by mutual concessions or to reconcile conflicts through adjustments in attitude and conduct.

15. List out any two aspects of honesty

Truthfulness – Meeting responsibilities concerning truth -telling. Trustworthiness – Meeting responsibilities concerning trust.

16. Define self-respect and self esteem

Self-respect: It is a moral concept; refers to the virtue properly valuing oneself. Self- esteem : It is a psychological concept; means having a positive attitude toward oneself, even if the attitude is excessive or otherwise unwarranted .

17. Generalize What is meant by self confidence (Nov15,May16)

For undertaking and completing any worthwhile job ,self confidence is very necessary while undertaking team work, in addition to self confidence, confidence in fellow human beings or colleagues is also necessary.

18. Formulate What is stress management and commitment

Yoga an ancient practice and meditation has become increasingly popular in today's busy society for stress management technique. Isolate the mind of all thoughts, worries and fears, it improves efficiency of lungs and reduce blood pressure.

PART - B

- 1) Describe moral and values and their importance (Apr -17)
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.10]
- 2) Describe the importance of ethics in engineering (Apr -17)
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.19]
- 3) Identify the meaning of integrity and importance in Ethics
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.20]
- 4) Identify the meaning of work ethics and importance in ethics (Nov -17)
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.24]
- 5) Identify in detail the importance of service learning
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.26]
- 6) Discuss about how respect for others play important role in ethics
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.34]
- 7) Summarize the importance of caring
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.36]
- 8) Summarize the importance of sharing (Nov -15)
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.38]
- 9) Discuss the importance of honesty in detail (Nov -15)
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.39]
- 10) Discuss the importance of courage in detail
Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 1.42]

- 11) Examine the importance of co-operation
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.48]

- 12) Examine the importance of commitments
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.49]

- 13) Examine the importance of empathy (Nov -17)
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.51]

- 14) Explain character and its importance (Nov -15)
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.56]

- 15) Explain self-confidence and its importance (Nov -15)
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.54]

- 16) Explain spirituality in detail (May -16)
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.58]

- 17) Explain importance of yoga Formulate how yoga and meditation are useful for stress management and professional excellence (Nov -15), (Apr -17),
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 1.61,62]

PART - C

- 1) Discuss in detail about engineering as consultant
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran Unit -1

- 2) Understand about yoga, meditation and stress management and in what way it helps engineers
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran Unit -1

UNIT - II**PART - A****1) List the senses of Engineering Ethics**

Study of right or wrong.

Good and evil.

Obligations & rights.

Justice.

Social & Political deals.

2) Define Moral Dilemma and moral autonomy (Nov -15)

The moral dilemmas cannot easily be addressed or resolved always. It requires an elaborate searching which sometimes causing extreme suffering and reflection of a situation. The modern engineering practice compels that all the engineers have to face boldly about the moral dilemmas in their careers. For example, suppose one gives a promise to his friend that he will meet him on the evening of a particular day, but unfortunately on the same day his brother has met with an accident and he has to take him to hospital. The dilemma here consists of a conflict between the duty to keep promise and obligations to his brother. In this situation, to solve his moral problem, he can make a phone call to his friend and make apology for his inability to come. So, from the above it is clear that the duty to keep promise always has two different and conflicting applications.

3) Identify Kohlbergs theory

Kohlberg's theory of moral development is very much related to the goals of studying ethics at college level. To become morally responsible, an individual must be able and willing to undergo with moral reasoning. Moral responsibility comes out of the foundation of early moral training given by an individual's parents and culture. This early training helps to complete the above said three levels of moral development by an individual.

4) Examine Gilligans theory

Autonomy requires independent reasoning on the basis of moral concern and not separated from other people. As per Gilligan's theory, moral autonomy should be consistent with context-oriented and also with an awareness of general moral principles and rights.

5) What is meant by consensus (May -16)

Consensus means agreement and controversy means disagreement. The consensus and the controversies are playing the vital roles while considering the moral autonomy. When an individual exercises the moral autonomy, he cannot get the same results as others get in applying moral autonomy. Surely there must be some moral differences the results or verdicts will be of controversy. This kind of disagreement is unavoidable. These disagreements require some tolerances among individuals those who are autonomous, reasonable and responsible.

6) Give the two aspects of honesty

Truthfulness – meeting responsibilities concerning truth telling

Trustworthiness – Meeting responsibilities concerning trust.

7) Describe few steps in confronting Moral Dilemma

Identify the relevant moral factors and reasons

Gather all available facts that are pertinent to the moral factors involved.

Get suggestions and alternative perspectives on the dilemma

By weighing all the relevant moral factors and reasons in light of the facts ,produce a reasoned judgment

8) Discuss the models of professional roles

Self direction virtues

Public spirited virtues

Team work virtues

Proficiency virtues

9) Express the theories about right action

Theory of utilitarianism

Theory of duty ethics

Kants theory

10) Demonstrate the significance of Self Interest

Self respect is a moral concept whereas self-esteem is a psychological concept. Self respect refers to the virtue of properly valuing oneself, whereas self-esteem refers to having a positive attitude towards oneself, the attitude may be excessive or unwanted.

11) Examine the significance of Customs

Customs are considered to have a great significance in deciding ones moral values like ethical pluralism, ethical relativism.

12) Show the significance of religion

It is understood that moral values are highly influenced by religious beliefs. Many times religions set a higher moral standard than the normal moral standards. It can be realized that all religions emphasize a particular virtue.

13) Analyze various ethical theories available (Apr -17)

Virtue ethics – Virtues and vices

Utilitarianism – Most good for the most people

Duty ethics – Duties to respect people

Rights ethics – Human rights

14) Define Compromise.

In a negative sense it mean to undetermined integrity by violating ones fundamental moral principles.

In a positive sense, however it means to settle differences by mutual concessions or to reconcile conflicts through adjustments in attitude and conduct.

15) Define Ethical Pluralism

Ethical pluralism is the view that there may be alternative moral perspectives that are reasonable, but no one of which must be accepted completely by all rational and morally concerned persons.

16) Assess the principle of Utilitarianism (Nov -17)

Utilitarianism seeks to produce the most utility. It can be defined as an overall balance between good and bad consequences of an action ,taking in to account the consequences for everyone affected.

17) State Rawls Principles

Each person is entitled to the most extensive amount of liberty compatible with an equal amount for others.

Differences in social power and economic benefits are justified only when they are likely to benefit everyone, including members of the most disadvantaged groups.

18) Generalize what is meant by ethical egoism

Ethical egoism – the view that right action consist in producing one 's own good. Ethical relativism – the view that right action is merely what the law and customs of o's society require.

PART – B

- 1) Discuss in detail about the concept of Moral, Dilemmas, Moral, Autonomy? (Nov -17)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 15]
- 2) Discuss in details about Gilligans Theory and Kohlbergs Theory? (Apr -17) , (Nov -15)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 18,19]
- 3) Explain in detail about Professional and Professionalism? (Nov 15, 17)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 24,25]
- 4) Explain in detail the traits of Self Interest, Customs and Religions?

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 62]

- 5) Explain in details the various ethical theories and their uses? (May -16)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 70,71]

- 6) Discuss in detail the various types of Moral issues?

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 15]

- 7) Explain about a) Consensus, Controversy and b) Heinz's Theory?

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 22]

- 8) Analyze in detail the Traits of Self Interest (8) (Apr -17)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 63]

- 9) Analyze in detail the Customs (8)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 63]

PART – C

- 1) Explain briefly about duty ethics

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -2

- 2) How self respect is differ from self esteem, Explain and differentiate the same

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -2

UNIT - III

PART – A

- 1) **List what are the conditions required defining a valid Consent**

The consent was given voluntarily. The consent was based on the information that rational person would want, together with any other information requested, presented to them in understandable form. The consent was competent to process the information and make rational decisions.

- 2) **What are the two main elements, which are included to understand informed Consent (Nov - 15)**

Informed Consent is understood as including two main elements:

- i. Knowledge [Subjects should be given not only the information they request, but all the information needed to make a reasonable decision].
- ii. Voluntariness [Subjects must enter into the experiment without being subjected to force, fraud,

or deception].

3) Describe what are the general features of morally responsible engineers

Conscientiousness.

Comprehensive perspective.

Autonomy.

Accountability.

4) Identify what is the purpose of various types of standards

a. Accuracy in measurement, interchangeability, ease of handling.

b. Prevention of injury, death and loss of income or property.

c. Fair value of price.

d. Competence in carrying out tasks.

e. Sound design, ease of communications.

f. Freedom from interference

5) Examine a Code

Code is the set of standard and laws. This is used to guide to do things properly.

6) Name the roles of codes (Nov -17)

Inspiration and Guidance Support

Deterrence and Discipline

Education and Mutual Understanding

Contributing to the profession's Public Image

Protecting the Status Quo

Promoting Business Interests

7) Give the limitations of codes (Nov -15, May-16)

Codes are restricted to general and vague wordings. Due to this limitation they cannot be applicable to all situations directly. It is also impossible to analyze fully and predict the full range of moral problems that arises in a complex Profession .Engineering codes often have internal conflicts. So they can't give a solution or method for resolving the conflict. They cannot be treated as the final moral authority for any professional conduct. Codes represent a compromise between differing judgments and also developed among heated committee disagreements. Only a few practicing engineers are the members of Professional Societies and so they can not be compelled to abide by their codes. Many engineers who are the members of Professional Societies are not aware of the existence of the codes of their societies and they never go through it. Codes can be reproduced in a very rapid manner. Codes are said to be coercive i.e., implemented by threat or force.

8) Summarize what are the problems with the law in engineering

Minimal compliance

Many laws are without enforceable sanctions

9) Describe what is the need to view engineering projects as experiments (Apr -17)

Any project is carried out in partial ignorance. The final outcomes of engineering projects, like those of experiments, are generally uncertain. Effective engineering relies upon knowledge gained about products before and after they leave the factory – knowledge needed for improving current products and creating better ones.

10) Differentiate scientific experiments and engineering Projects

Scientific experiments are conducted to gain new knowledge, while “engineering projects are experiments that are not necessarily designed to produce very much knowledge.

11) Demonstrate what are the uncertainties occur in the model designs

Model used for the design calculations. Exact characteristics of the materials purchased. Constancies of materials used for processing and fabrication. Nature of the pressure, the finished product will encounter.

12) Illustrate the importance of learning from the past taking titanic disaster as an example

The *Titanic* lacked a sufficient number of lifeboats.

13) Explain the term Accountability

The term accountability means being responsible liable answerable or obligated. In proper terms the accountability refers to the general tendency of being willing to submit ones actions to any type of moral scrutiny and be responsive to others assessments.

14) Explain some universally accepted ethical principles

American society of mechanical engineers (ASME)

American society of civil engineers (ASCE)

Institute of electrical and electronics engineers (IEEE)

The Institution of engineers (India)

15) Explain conscientiousness (Nov -17)

Conscientiousness means commitment to live according to certain values it implies consciousness. Engineers have to be sensitive to a range of moral values and responsibilities which are relevant in a given situation.

16) What are the problems with the law in engineering (Apr -17)

Minimal compliance

Many laws are without enforceable sanctions.

17) What are the uncertainties occur in the model designs.

Model used for the design calculations.

Exact characteristics of the materials purchased.

Constancies of materials used for processing and fabrication.

Nature of the pressure, the finished product will encounter.

18) Generalize in what ways engineering experiment differs from standard Experiments

Scientific experiments are conducted to gain new knowledge while engineering projects are experiments that are not necessarily designed to produce very much knowledge.

PART – B

- 1) How can engineer become a responsible experimenter? Highlight the code of ethics for Engineers? (Apr -17,May-16)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 81,82]
- 2) Explain with help of examples of that engineers would learn not only from their earlier design and operating results, but also from those of those of engineers of other engineers? (Nov -15)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 87]
- 3) Explain detail about balanced outlook on law? (Nov –15,17)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 113,117]
- 4) What is the important code of ethics? Give brief account on ‘4’ canons of codes of ethics quoted by international standard or association? (Nov-15,17,May-16,Apr -17)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 105,106]
- 5) Discuss on the roles played by the codes of ethics set by professional societies?
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 106,111]
- 6) State the various problems of law in Engineering?
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 118]
- 7) Explain detail about engineering as experimentation?
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 81,84]
- 8) Compare and contrast engineering experiments with standard experiments?
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 83,84]

PART – C

1) Explain case study about “The Challenger Disaster”

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -3

2) Explain brief about code of conduct on American Society of Mechanical Engineering

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -3

UNIT - IV**PART – A**

1) Classify the conflict of interest. Give example.

Conflict of interests is a situation in which two or more interests are not simultaneously realizable. It is the disagreement between public obligation and self-interest of simultaneously realizable. It is the disagreement between public obligation and self-interest of an official.

2) What are the factors for safety and risk. (Nov -17)

Voluntary and involuntary risk

Short term and long term risk

Expected probability

Reversible effects

Threshold levels to risk

3) Give the categories of risk.

Low consequences, low probability

Low consequence , high probability

High consequence , low probability

High consequence , high probability

4) What is meant by disaster?

A disaster does not take place until a seriously disruptive event coincides with a state of insufficient preparation. Example The titanic collision with ice berg.

5) Differentiate between Risk analysis and Risk benefit analysis. (may -16 , Apr -17)

Risk analysis is the study of risk identification, risk analysis, risk assessment, risk rating, suggestions on risk control and risk mitigation. Risk benefit analysis include study on frequency analysis, consequences analysis, risk acceptability analysis etc., if required. Probability and frequency analysis covers failure modes and frequencies from established sources and best practices for various scenarios and probability estimation.

6) List the guidelines to reach an agreement.

Attack problem and not people. Build trust. Start with a discussion and analysis of interests,

concerns, needs. It begin with interests, not positions or solutions. Listen. Brainstorm; suggesting an idea does not mean one aggress with it. Develop multiple options. Use objective criteria whenever possible. Agree on how something will be measured.

7) State the specific right.

The right of professional conscience is most general professional rights. It consists of many other specific rights. Two of the important specific rights are:

- 1) Right of conscientious refusal and
- 2) Right to recognition.

8) Define risk benefit analysis. (Nov -16)

Risk benefit analysis is a method that helps the engineers to analyze the risk in a project and to determine whether a project should be implemented or not. In risk benefit analysis the risks and benefits of a product are allotted to money amounts and the most benefit able ratio between risks and benefits is calculated.

9) what are the analytical methods?

Scenario analysis
Failure modes and effect analysis
Fault tree analysis
Event tree analysis

10) Summarize the term Safe Exit.

Assure when a product fails it will fail safely.
Assure that the product can be abandoned safely.
Assure that the user can safely escape the product.

11) What is bribe?

A bribe is a substantial amount of money or goods offered beyond a stated business contract with aim of wining an advantage in gaining or keeping the contract.

12) Point out the intellectual property right. (May -16, Apr -17)

Intellectual property (IP) is a term referring to a number of distinct types of creations of the mind for which property rights are recognized and the corresponding fields of law. Under intellectual property law, owners are granted certain exclusive rights to a variety of intangible assets, such as musical, literary, and artistic works; discoveries and inventions ;and words ,phrases ,symbols ,and designs. Common types of intellectual property include copyrights, trademarks, patents, industrial design rights and trade secrets in some jurisdictions.

13) What is called kick backs?

Prearranged payments made by contractors to companies or their representatives in exchange for contracts actually granted are called kick backs

14) What is trade secret?

A trade secret is a secret formula pattern or device that is used in a business and provides a commercial advantage.

15) Define whistle blowing (Nov -16)

Whistle blowing is alerting relevant persons to some moral or legal corruption where relevant persons are those in a position to act in response if only by registering protest. The condition to be met for whistle blowing are Need, Proximity Capability, Last record.

16) Classify and Illustrate the disadvantages of collective bargaining. (Apr ,NoV -17),

International Labor Organization has defined collective bargaining as 'negotiation about working conditions and terms of employment between an employee and one or more representative employee's with a view to reaching agreements.

17) Define employee rights .

Employee rights are rights ,moral or legal , that involve the status of being an employee. They include some professional rights that apply to the employer employee relationship.

18) Define sexual harassment.

Sexual harassment means continuous annoying and attacks on men or women on the basis of sexual considerations. It also covers the harassment by female superiors on the male employees and sexual harassment of employees by superiors of the same sex.

PART - B

1) What are the main elements of IPR. Give examples of Discrimination? (Nov-15,17)

Ref: "Professional Ethics in Engineering" by Dr S.Venkateswaran [Page No.: 4.89]

2) Define the term Risk and Safety. How we an engineer assess the safety? What are the factors that affect risk acceptability? What is the use of knowledge of risk acceptance to engineer? (Apr - 17,May16)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 129,130]

3) State the necessity of Risk Benefit Analysis? (Apr -17)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 153,154]

- 4) Discuss the features, guideline and procedures of whistle blowing
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 246,251]
- 5) Distinguish between employee rights and professional rights? (Apr -17)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.:264,237]
- 6) Discuss Event Tree analysis with some practical example of risk analysis?
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 160]
- 7) Discuss the significance of Intellectual Property rights. Also explain the legislation covering IPR in India?
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 4.93-4.94]
- 8) What are the types of conflicts of interests and the different ways to avoid conflicts of interests? (Nov -16)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 216,221]

PART – C

- 1) Explain case study about “Three – Mile Island Accident”
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -4
- 2) Explain case study about “Chernobyl Disaster”
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -4

UNIT - V

PART - A

- 1) **What are the moral issues that may arise in multinational corporation (May 14)**
Was this legal MNC business morally permissible
Who benefits more and who loses more, when MNC does outsourcing
Which standards should engineer follow when working in foreign countries.
- 2) **How do you evaluate that engineers are best suited to be managers**
The high technical knowledge with professional enrichment to manage the technological companies easy accessibility of understanding the corporate works than the non engineering individuals and possession of high strength of quantitative analysis are the positive qualities of engineers for considering them as managers.

3) Generalize the term Conflict resolution

Separate people from the problem

Focus on interest and not on positions

Generate a variety of possibilities before deciding what to do

Insist that the result be based on some objective standard.

4) What are hired guns

Hired gun is the typical type of ethical abuse in which engineers unscrupulously resort to non objective living methods by violating the standards of honesty and integrity and also by acting in a partial and biased manner.

5) What are the various abuses that engineers face as expert witness

Financial biases

Ego biases

Sympathy biases

6) List out problems of Defence industry

Problem of waste and huge cost in implementing and maintaining a weapons system

Problem of technology creep

Problems in maintaining secrecy

Every country allocates large amount of its resources to defence sector.

7) Classify few global issues

Multinational corporations

Environmental ethics

Computer ethics

Weapons development

8) Express the term acid rain

Acid rain is a popular term referring to the deposition of a mixture from wet (rain, snow, sleet, fog, cloud water, and dew) and dry (acidifying particles and gases) acidic components.

9) Define Globalization (May 16)

Our lives are increasingly dependent upon the goods /services produced over the world and are influenced by the business from around all the corners of the world.

Globalization is the process of international integration arising from the interchange of world views products ideas and other aspects of culture

10) What is computer ethics? (Apr -17)

Computer ethics is the study of ethical issues that are associated primarily with computing machines and the computing profession.

11) What do you understand by business ethics (Apr 15)

Business ethics is a form of applied ethics or professional ethics that examines ethical principles and moral or ethical problems that arise in a business environment

12) Give some Ethical climate

The following are the ways to create an ethical climate: Ethical values must be accepted and appreciated by the managers and employees with its full complicated features. The sincere use of ethical language has to be recognized as a justifiable part of the company. The management has to create a strong confidence among the employees that the management is more serious about ethics by establishing moral tone in words, in policies and also by personal example. The management has to establish some procedures for resolving conflicts.

13) Point out special features of an ethical corporate climate

Ethical values are widely appreciated by managers and employees

A corporate code of ethics is emphasized for using ethical language

Moral tone is set up in policies by management by providing suitable guidelines for professional codes of ethics

14) Define environmental ethics

Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non human world.

15) Define hackers

When computers are the main objects of an unethical act, it will create some ethical issues. This kind of act is called hacking.

16) what is technology transfer (Nov 15, 17)

Technology transfer is the process of moving technology to a quite new set of conditions and implementing it there.

17) Define Code of conduct (Nov -17)

The Corporate Members of The Institution of Engineers (India) are committed to promote and practice the profession of engineering for the common good of the community bearing in mind the following concerns : Concern for ethical standard; Concern for social justice, social order and human rights; Concern for protection of the environment Public safety and tranquility.

18) Point out moral leadership (Nov -15,May 16)

Moral Leadership brings together in one comprehensive volume essays from leading scholars in law, leadership, psychology, political science, and ethics to provide practical, theoretical policy guidance.

PART – B

- 1) Explain in detail the various advantages and disadvantages of MNCs. (**Apr -17**)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 291,293]
- 2) Justify Engineers as Expert witness and Advisors with suitable examples. (**May -16,Nov-15,Apr-17**)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 367-371]
- 3) Discuss in details about Environmental Ethics.
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 302-311]
- 4) Explain in details about Moral Leadership.
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 376-380]
- 5) Explain and Enumerate the significance of the concept of Computer Ethics. (**Apr -17, Nov 15,17**)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 318-329]
- 6) Discuss in details about Code of Conduct.
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 108]
- 7) Describe in details about the Global issue of Weapons development. (**May -16**)
Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 332-338]
- 8) Describe in details about Corporate Responsibility.
Ref: “Professional Ethics in Engineering” by Dr S.Venkateswaran [Page No.: 5.60]
- 9) Justify with suitable examples Engineers as Managers. (**Nov -17**)

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.:350-352]

10) Explain in details about the Management of conflicts and the Principles of conflict Resolution?

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger,[Pg. No.: 355]

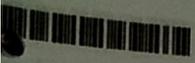
PART – C

1) Explain case study about “Bhopal Gas Tragedy”

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -5

2) Explain brief about Code of conduct on American Society of Mechanical Engineers

Ref.: T1- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Unit -5

 Reg. No. :

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Question Paper Code : 50638

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Fifth/Sixth/Seventh/Eighth Semester
Civil Engineering
GE 6075 – PROFESSIONAL ETHICS IN ENGINEERING
(Regulations 2013)
(Common to Agriculture Engineering, Automobile Engineering, Biomedical Engineering, Computer Science and Engineering, Electrical and Electronics Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering, Geoinformatics Engineering, Industrial Engineering, Instrumentation and Control Engineering, Manufacturing Engineering, Materials Science and Engineering, Mechanical Engineering, Mechatronics Engineering, Production Engineering, Chemical Engineering, Fashion Technology, Information Technology, Petroleum Engineering, Plastic Technology, Polymer Technology, Textile Chemistry, Textile Technology)

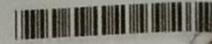
Time : Three Hours Maximum : 100 Marks

Answer ALL questions.

PART – A (10×2=20 Marks)

1. What are the General Characteristics of values ?
2. What are the two important ways of building Courage ?
3. State the three types of Inquiry.
4. What are the two important versions of utilitarianism ?
5. What is meant by Conscientiousness ?
6. What are codes of Ethics referred to ?
7. Define Safety.
8. What does the term Collective Bargaining refer to ?
9. What is meant by Technology transfer ?
10. Point out the responsibilities of Consulting Engineers.

50638



PART – B

(5×13=65 Marks)

11. a) What is Service Learning ? Why service Learning is important ? Explain the Characteristics of Service Learning.

(OR)

- b) Define Empathy. State and explain the Elements, Benefits of Empathy and compare Empathy with Sympathy.

12. a) What is meant by Moral Autonomy ? Discuss the factors influencing a persons's concern and the skills required to improve Moral Autonomy.

(OR)

- b) Describe the Professional roles played by an Engineer.

13. a) What are Codes of Ethics ? State and explain the functions of codes of ethics and the objections to codes.

(OR)

- b) Discuss the problems associated with laws in Engineering and Enumerate the proper Role of Law Engineering.

14. a) What is meant by conflict of interest ? Distinguish between General and Professional Conflicts of Interest and Discuss the various types of Conflicts of interest.

(OR)

- b) What are Intellectual Property Rights ? Explain the elements of Intellectual Property Rights in detail and benefits of IPRS.

15. a) State the types of concern for environment by the Engineers. Discuss the approaches to resolve environmental problems. What do professional codes of Ethics say about the environment ?

(OR)

- b) What is meant by Computer Ethics ? State and Explain the categories of ethical problems and the unethical acts computer as an instrument of unethical behaviour. What is meant by hacking ?

PART – C

(1×15=15 Marks)

16. a) Explain in detail about the yoga and meditation for professional excellence and stress management.

(OR)

- b) Explain in detail about the assessment of safety and Risk.

Reg. No.

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Question Paper Code : 57403**B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016****Fifth Semester****Mechanical Engineering****GE 6075 – PROFESSIONAL ETHICS IN ENGINEERING****(Regulations 2013)****Time : Three Hours****Maximum : 100 Marks****Answer ALL questions.****PART – A (10 × 2 = 20 Marks)**

1. What are the values ?
2. What is meant by self confidence ?
3. State Gilligans theory.
4. What is meant by consensus ?
5. Differentiate scientific experiments and engineering projects.
6. Give the limitations of codes.
7. Differentiate between Risk analysis and Risk benefit analysis.
8. What is intellectual property right ?
9. What is moral leadership ?
10. What is meant by Globalization ?

18-06

1

57403

PART – B (5 × 16 = 80 Marks)

11. (a) Explain character and spirituality and their importance in ethics.

OR

(b) Explain the importance of self confidence in ethics.

12. (a) Explain in details about the senses of Engineering Ethics.

OR

(b) Discuss in details the various ethical theories and their uses.

13. (a) How can engineer become a responsible experimenter ? Highlight the code of ethics for Engineers.

OR

(b) Discuss on the roles played by the codes of ethics set by professional societies.

14. (a) What are the factors that affect risk acceptability ? What is the use of knowledge of risk acceptance to engineer ?

OR

(b) Discuss the significance of intellectual property rights. Also explain the legislation covering IPR in India.

15. (a) Describe in details about the Global issues of Weapons development.

OR

(b) Justify Engineers as Expert witness and Advisors with suitable examples.

IV Year/VIII Semester

Department of Electronics and communication Engineering

Sub. Code /Sub. Name: MG6071 ENTREPRENEURSHIP DEVELOPMENT

MG6071 ENTREPRENEURSHIP DEVELOPMENT L T P C 3 0 0 3

UNIT I	ENTREPRENEURSHIP	9
Entrepreneur – Types of Entrepreneurs –Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.		
UNIT II	MOTIVATION	9
Major Motives Influencing an Entrepreneur–Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test– Stress Management, Entrepreneurship Development Programs– Need, Objectives.		
UNIT III	BUSINESS	9
Small Enterprises–Definition, Classification–Characteristics, Ownership Structures–Project Formulation– Steps involved in setting up a Business– identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment –Preparation of Preliminary Project Reports–Project Appraisal–Sources of Information–Classification of Needs and Agencies.		
UNIT IV	FINANCING AND ACCOUNTING	9
Need–Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation–Income Tax, Excise Duty–Sales Tax.		
UNIT V	SUPPORT TO ENTREPRENEURS	9
Sickness in small Business–Concept, Magnitude, Causes and Consequences, Corrective Measures– Business Incubators–Government Policy for Small Scale Enterprises–Growth Strategies in small industry– Expansion, Diversification, Joint Venture, Merger and Sub Contracting.		

TEXTBOOKS :**TOTAL : 45 PERIODS**

1. S.S.Khanka, “Entrepreneurial Development” S.Chand & Co. Ltd., RamNagar, New Delhi, 2013.
2. Donald F Kuratko, “Entrepreneurship–Theory, Process and Practice”, 9th edition, Cengage Learning 2014.

REFERENCES :

1. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, “Entrepreneurship Theory at Cross Roads: paradigms and Praxis”, 2nd edition DreamTech, 2005.
3. Rajeev Roy, “Entrepreneurship” 2nd edition, Oxford University Press, 2011.
4. EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development”, Institute of India, Ahmadabad, 1986.

UNIT I- ENTREPRENEURSHIP

PART A

1. List out Characteristics of Successful Entrepreneurs. (MAY/JUNE 14)

- Be passionate about achieving their goals
- Have a spirit of adventure (in fact, the word "adventure" is derived from the Latin word meaning "to venture")
- have a strong need to achieve and seek personal accomplishment
- be self-confident and self-reliant
- be goal-oriented
- be innovative, creative, and versatile
- be persistent
- be hardworking and energetic
- have a positive attitude
- be willing to take initiative
- have a strong sense of commitment

2. How does an entrepreneur called as innovator? (May/June 2013)

An entrepreneur is meant for innovation. In the present world the taste of the customer keeps on changing so the entrepreneurs initiate research and innovative activities to produce goods to satisfy the customers changing demands for the products.

3. Why Entrepreneurs Are Important for the Economy?

Entrepreneurs are frequently thought of as national assets to be cultivated, motivated; more time to devote to work means economic growth.

4. Briefly explain the term Intrapreneur.

An Intrapreneur is an employee who is given the authority and support to create a new product without having to be concerned about whether or not the product will actually become a source of revenue for the company. Unlike an entrepreneur, who faces personal risk when a product fails to produce revenue, an Intrapreneur will continue to receive a salary even if the product fails to make it to production.

5. Define 'Innovation'

Innovation is the process of entrepreneurship. It involves the translation of a useful idea into an application which has commercial value. It involves analytical planning, organizing resources, implementation and commercial application.

6. Mention the factors affecting Entrepreneurial Growth? (NOV/DEC2104)S

- Economic,
- Social,
- Political
- Psychological

7. Illustrate the role of entrepreneurs in economic development. (Nov/Dec 2017)

Entrepreneurs create jobs, disperse wealth and encourage regional development. Entrepreneurs are the basis of economic development.

8. Define the term Entrepreneur. NOV/DEC 2014

An entrepreneur is an advanced economist, is an individual who introduces something new in the economy. One who undertakes an enterprise, especially(or) contractor acting as intermediary between capital and labour.

9. Distinguish between entrepreneurs and investors. (APR/MAY 2015)

A new entrepreneurs coming from a large industrial organization is called investors.

An entrepreneur is an independent businessman. But an investor is semi-independent businessman.

10. How entrepreneurship act as a "gap filling function"? (APR/MAY 2015)

The main aspects of the entrepreneur is to fill the gap(or) make up the deficiencies which always exist in the knowledge about the production function.

11. List out the types of entrepreneurs. Which one do you think most suitable for India?

- Innovating entrepreneur
- Imitative entrepreneur
- Fabian entrepreneur
- Drone entrepreneur
- Innovating entrepreneurs are more suitable for India

12. What is the meaning of social entrepreneur? NOV/DEC 2017

social entrepreneurs are individuals with innovative solutions to society's most pressing and daunting social problems. They are ambitious and persistent, tackling major social issues and offering new ideas for wide-scale range.

13. Define Intrapreneur. (NOV/DEC 2016)

A new entrepreneur coming from a large industrial organization with a new innovative idea is

called Intrapreneur.

14. Entrepreneurship is a process of giving birth to an enterprise. Justify. APRIL/MAY 2017

Entrepreneurships are regarded as an abstraction whereas entrepreneurs are regarded as a tangible person. The tendency of a person to organize one's own business and run it profitably is regarded as entrepreneurship.

15. Write any five barriers of Entrepreneurship

- Lack of a viable concept
- Lack of Market Knowledge
- Lack of technical skill
- Lack of initial capital
- Lack of business know how

16. Suggest how rural entrepreneurship can be developed in India.

One peculiarity of rural entrepreneurs is that most of them join their entrepreneurial career not by choice but by chance. In order to solve the problem of marketing for rural industries, common production-cum marketing centers need to be set up and developed with modern infrastructural facilities, particularly, in the areas having good production and growth potential.

17. Distinguish between social entrepreneurship and business Entrepreneurship.

The need for and significance of social entrepreneurs is imbued with multiplicity of justifications. Just as business entrepreneurs change the face of business, social entrepreneurs act as the change agents for society. While business Entrepreneur might create entirely new industries, a social entrepreneur comes up with new solutions to social problems and then implements them on a large-scale for the benefit of the humanity.

18. Write the advantages and disadvantages of Entrepreneurship.

Advantages:

An entrepreneur is regarded as the person who organizes, operates and assumes risk of running a business enterprise. Innovation is a specific instrument through which an entrepreneur search for changes, respond to changes and exploit in a profitable manner out of changes.

- Decision making

- Motivation
- Creation
- Vision
- Leadership
- Imitation
- Organisation

Dis Advantages:

- Lack of a viable concept
- Lack of Market Knowledge
- Lack of technical skill
- Lack of initial capital

PART B

1. Discuss the types of entrepreneur. **APRIL/MAY 2017,NOV/DEC17**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:22]

2. What are the differences between entrepreneur and Intrapreneur? **NOV/DEC 2015**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:26]

3. Explain about the role of entrepreneurship in economic growth. **APRIL/MAY 2017**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:38]

4.Explain about the factors affecting of entrepreneurship growth. **(APR/MAY 2015)**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:164]

5.Explain the characteristics of a successful entrepreneur. **NOV/DEC 2017**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:8]

6. Briefly discuss the entrepreneurial process with neat diagram. **NOV/DEC 2015**

Ref: Entrepreneurial Development by Dr.S.S.Khanka [Page no:15]

7. Discuss the contributions of the entrepreneur to economic development. **NOV/DEC 2015**

Ref: Entrepreneurial Development by Dr.S.S.Khanka [Page no:43]

8. Justify the need for and significance of entrepreneurs in an economy like India.

Ref: Entrepreneurial Development by Dr.S.S.Khanka [Page no:36]

UNIT II- MOTIVATION

PART A

1. What are the uses of a Project Report for:- (a) an entrepreneur (b) government (c) financial institutions?

An entrepreneur – it works as a blue print that helps in explaining his idea to financiers, market customer/SWOT analysis.

Government- helps in executing statutory and legal requirements, land tax, sales tax, commercial tax, and transport license and pollution control certificate have all to be obtained on the basis of project report.

Financial institutions – Before extending financial assistance, the bankers would like to know the feasibility and profitability of the enterprise. They would also like to know whether the entrepreneurs will be able to generate the necessary funds periodically to repay the loan together with interest.

2. Mention the internal motives influences an entrepreneur. NOV/DEC 2014

- Desire to do something new.
- Become independent.
- Achieve what one wants to have in life.
- Be recognized for one's contribution.
- One's educational background.
- One's occupational background and experience in the relevant field.

3. Define Thematic Apperception Test.

Thematic Apperception Test (TAT) is a projective psychological test. Proponents of the technique assert that subjects responses, in the narratives they make up about ambiguous pictures of people, reveal their underlying motives, concerns, and the way they see the social world

4. Point out the different Phases of EDPs. NOV/DEC 2014

- Pre- training Phase
- Training Phase
- Post-training Phases

5. What are the main objectives of EDPs? APR/MAY 2015

- Develop and strength their entrepreneurial quality.
- Analysis environmental set up relating to small industry and small business.
- Select product
- Formulate project for the product
- Know pros and cons in becoming an entrepreneurs
- Develop a broad vision about the business.

6. List any six problems faced by first generation entrepreneurs.

- Capital
- Lack of goodwill
- Lack of Experience
- Lack of risk taking ability
- No market standing
- Lack of orientation to problem solving
- Poor productivity
- Competition

7. Explain the term 'Personal Financing'.

The entrepreneur always has to make the initial investment as capital. For this purpose the arranges finance from his personal resources such as his personal cash, borrows from members of the family, converts his assets into cash or uses them in business (e.g. car, telephone, computer etc). Such personal sources of finance are part of personal financing.

8. Define Eustress

Eustress refers to the healthy, positive, constructive outcome of stressful events and the stress response. Eustress is the stress experience that activates and motivates people to achieve their goals and succeed in their life's challenges.

9. Comment on SWOT analysis.

SWOT analysis (alternatively SWOT matrix) is an acronym for strengths, weaknesses, opportunities, and threats and is a structured planning method that evaluates those four elements of a project or business venture. A SWOT analysis can be carried out for a company, product, place, industry, or person.

10. What are the various factors motivating people to become entrepreneurs? APR/MAY 2015

Internal factors:

- Desire to do something new
- Educational qualification
- Technical background
- No. of years of experience
- Occupational background

External factors:

- Government support and assistance
- Availability of labour and raw material
- Encouragement from already established business house
- Promising demand for the product

11. What is self-efficacy? What is its relevance for entrepreneurial career? NOV/DEC 2016

Self-efficacy means a person's or entrepreneur's belief that he or she has the ability, motivation and required resources to complete the task successfully. It refers to the sense of adequacy in a person. self-efficacy mediates the relationship between satisfaction of being an entrepreneur and the intention of staying in the profession.

12. Define a term EDP's. (Nov/Dec 2008)

The need for achievement is one of the important entrepreneurial traits/competencies. Behavioral experiments have proved that need achievement can be developed through entrepreneurship training, popularly known as EDP's.

13. List out the self-rating which used to develop the entrepreneurs.

Self rating teaches people to observe their own behavior, compare their outputs to their goals

and administer their own reinforcement to sustain goal commitment and performance.

14. Compare Solvency vs. Liquidity Ratios.

Solvency refers to an enterprise's capacity to meet its long-term financial commitments.

Liquidity refers to an enterprise's ability to pay short-term obligations; the term also refers to its capability to sell assets quickly to raise cash.

15. Summarize the symptoms of stress. (NOV/DEC 2016)

The various symptoms of stress are

- Nervousness and tension
- Emotional instability
- Sleeping problem absentesian
- Inability to relax

16. Comment on psychological problems faced by an entrepreneur.

The high level of stress may be accompanied by psychological reactions such as anger, anxiety, depression, nervousness, irritability, tension and boredom depending upon the nature of stress and the capacity of individual to bear stress.

17. Illustrate the objectives of EDP's. (Nov/Dec 2008)

The objectives of EDP's are

- Develop and strengthen their entrepreneurial quality
- Select product/project
- Acquire the basic management skill.

18. Give an Meaning about stress and distress.

Stress: Slyer defined stress as “ an adoptive response to the external situation that results in physical, psychological and/or behavioral deviation for organizational participants.

PART-B

1. Entrepreneurship development program needs, phases and objectives –Explain.
Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:229]
2. Summarize the Self rating motivation.
Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:225]
3. Explain about stress Management.
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:2.21]
4. Entrepreneurship development program is the process of grooming entrepreneurs – Enumerate.

NOV/DEC 2015

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:232]

5. Summarize the contribution of State financial corporation to the development of Small Scale Enterprises in the country. **APR/MAY 2014**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:296]

6. How can achievement motivation be developed?. **NOV/DEC 2017**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:188]

7. Briefly explain the Entrepreneurial motivation factors. **APR/MAY 2015,16**

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:193]

8. Define entrepreneurial motivation. Discuss the major theories of entrepreneurial Motivation.

Ref:Entrepreneurial Development by Dr.S.S.Khanka [Page no:175,177]

UNIT III – BUSINESS

PART-A

- 1. Mention any four decisions which have to be taken into considerations under the head 'Material'.**

Four Decisions are:

- (a) Size and location
- (b) Manufacturing process
- (c) Identifying and purchasing machinery
- (d) Obtaining electricity power

- 2.State any four advantages of Inventory Control.**

Four Advantages of inventory control are:

- (a) To know whether materials are readily available for production/use.
- (b) To examine quantity discounts for large orders.
- (c) To ensure prompt delivery of materials to customers.
- (d) To stabilize the fluctuation of demands.

- 3.Write any two merits of partnership firm. (Nov/Dec 2008)**

The merits of partnership firm is

- Objectives of the unit are clearly stated
- Line of authority specified

4. List the two key behavioral characteristics of an entrepreneur.

The two key behavioral characteristics of an entrepreneurs are:-

- Perceive an opportunity
- Creativity to innovate and build something of market value.

5. What are the most common ways to organize a business?

- Sole Proprietorship
- Partnership
- Limited partnership
- Limited Liability Company (LLC)
- Corporation (for-profit)
- Nonprofit Corporation (not-for-profit)
- Cooperative.

6. Illustrate the steps to identify business opportunities. (Apr/May 2008)

The basic steps in identifying business opportunity are:

- Preliminary evaluation
- Selection of product or service
- Conduct or market survey
- Contactual programmes to collect sufficient information about proposed venture
- Succeeding in the market.

7. Define Microenterprise. NOV/DEC 2016

A microenterprise will usually operate with fewer than 10 people and is started with a small amount of capital. Most microenterprises specialize in providing goods or services for their local areas. Microfinance seeks to help microenterprises by loaning small amounts of capital

8. Describe “Techno-economic assessment”

Techno-economic assessment TEA in principle is a cost-benefit comparison using different methods. These assessments are used for tasks such as:

- Evaluate the economic feasibility of a specific project
- Investigate cash flows (e.g. financing problems) over the lifetime
- Evaluate the likelihood of different technology scales and applications.
- Compare the economic quality of different technology applications providing the same service.

9. Point out the steps involved in the process of a market survey. (Apr/May 2008)

The steps involved in the process of a market survey are:

- Defining the purpose (or) objectives

- Gathering data from secondary source
- Gathering information from primary source
- Analyzing and interpreting the report

10.Name and explain the concept which states that a particular volume of production of a firm neither makes a profit nor a loss.

BEP is the volume of production at which a firm neither makes a profit nor a loss.

At the BEP revenue equals the total costs.

11.Write any two demerits of partnership firm. (Nov/Dec 2008)

The demerits of partnership firm is

- Lack of harmony in the event of mutual distrust
- Lack of public confidence.

12.Name the products which are sold to other firms for their production purposes. Industrial products.

Example- (Any one): Machines, equipments, raw materials, packaging and labeling products etc.

13.What is meant warehouse?

A warehouse is a commercial building for storage of goods. Warehouses are used by manufacturers, importers, exporters, wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial areas of cities, towns and villages.

14.Define Business Environment. NOV/DEC 2017

Business environment is the sum total of all external and internal factors that influence a business. You should keep in mind that external factors and internal factors can influence each other and work together to affect a business. For example, a health and safety regulation is an external factor that influences the internal environment of business operations. Additionally, some external factors are beyond your control. These factors are often called external constraints.

15.List the elements of Project Formulation. (Nov/Dec 2008)

The elements of project formulation are

- Feasibility analysis
- Techno-economic analysis
- Project design and network analysis
- Input analysis
- Financial Analysis
- Social cost-benefit analysis

16. Write a note on feasibility study. (Nov/Dec 2009)

Feasibility study is used to investigate the project in six different aspects: economic, technical, managerial, organizational, commercial and financial. The relative importance of these different aspects varies considerably according to the type of project involved.

17. Comment on Project Appraisal. NOV/DEC 2015

Project Appraisal is a consistent process of reviewing a given project and evaluating its content to approve or reject this project, through analyzing the problem or need to be addressed by the project, generating solution options for solving the problem, selecting the most feasible option, conducting a feasibility analysis of that option, creating the solution statement, and identifying all people and organizations concerned with or affected by the project and its expected outcomes.

18. Mention the types of marketing research. APR/MAY 2015

- Consumer research
- Market/Demand research
- Competition research
- Distribution research
- Price research
- Advertising/Promotion research

PART-B

1. What are the different ownership forms available to entrepreneur? Discuss each form in brief.

NOV/DEC 2015

Ref: "Entrepreneurial Development" by Dr.S.S.Khanka.[Page.no:356]

2. Identify the steps involved in prefeasibility study. **NOV/DEC 2017**

Ref: "Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:3.56]

3. Explain the different methods of generating product ideas. **APR/MAY 2017**

Ref: "Entrepreneurial Development" by Dr.S.S.Khanka.[Page.no:289]

4. Elaborate on the cooperative organization form of ownership available to the entrepreneur.

NOV/DEC 2015

Ref: "Entrepreneurial Development" by Dr.S.S.Khanka.[Page.no:368]

5. Briefly describe advantages and disadvantages of different of business organization.

Ref: "Entrepreneurial Development" by Dr.S.S.Khanka.[Page.no:303]

6. List the features and merits of Joint stock company.
Ref: “Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:3.18]
7. Summarize the characteristics of partnership firms. **NOV/DEC 2017**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:358]
8. Mention the difficulties involved in capital budgeting.
Ref: “Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:3.63]
9. Explain the various steps in identification of business opportunity.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:288]
10. Assess the outcome of economic feasibility study. **NOV/DEC 2014,15**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:322]
11. Explain the different methods of generating product ideas.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page. no: 289]
12. Examine the criteria used for selecting the product for business idea.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:294]
13. Describe the elements of project formulation.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:356]
14. Discuss about financial feasibility study. **APR/MAY 2015**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:322]
15. What are the difficulties involved in capital budgeting? **NOV/DEC 2017**
Ref: “Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:3.63]
16. How would you describe the content of Managerial Study?
Ref: “Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:3.59]

UNIT IV FINANCING AND ACCOUNTING**PART A****1. Define a Planning paradigm.**

Planning paradigm- it is a general pattern which suggests how to progress from an abstract idea to achieving sustained stability, growth and value added services.

2. Why inventory control essential for an entrepreneur? Give any two reasons.

Inventory control is essential because:

- To know whether materials are readily available for production/ use.
- To examine quantity discounts for large orders.
- To ensure prompt delivery of materials to consumers
- To stabilize the fluctuations of demands
- To take care of holding cost and carrying cost of inventory.

3. Define Term loan. NOV/DEC 2014

A **term loan** is a monetary **loan** that is repaid in regular payments over a set period of time. **Term loans** usually last between one and ten years, but may last as long as 30 years in some cases. A **term loan** usually involves an unfixed interest rate that will add additional balance to be repaid.

4. Write a short notes on an income tax.

An income tax is a tax imposed on individuals or entities (taxpayers) that vary with the income or profits (taxable income) of the taxpayer. Details vary widely by jurisdiction. Many jurisdictions refer to income tax on business entities as company's tax or corporate tax. Partnerships generally are not taxed; rather, the partners are taxed on their share of partnership items. Tax may be imposed by both a country and subdivisions. Most jurisdictions exempt locally organized charitable organizations from tax.

5. What is costing? NOV/DEC 2017

System of computing cost of production or of running a business, by allocating expenditure to various stages of production.

6. List out the Long term financing sources . NOV/DEC 2015

- Share Capital or Equity Shares.
- Preference Capital or Preference Shares.
- Retained Earnings or Internal Accruals.
- Debenture / Bonds.
- Term Loans from Financial Institutes, Government, and Commercial Banks.

- Venture Funding.
- Asset Securitization.

7. Define excise duties.

An excise or excise tax (sometimes called a special excise duty) is an inland tax on the sale, or production for sale, of specific goods or a tax on a good produced for sale, or sold, within a country or licenses for specific activities.

8. Summarize an fixed working capital.

Fixed working capital is the minimum amount of working capital required to ensure effective utilization of fixed assets and support the normal operation of the business.

9. Mention the functions of SFC.

The major functions of SFC are:

- Promotion of self-employment
- To finance expansion, modernization and up gradation of technology in the existing units.
- Providing soft-term loan to cover the equity gap to help small-scale industrial units.

10. Why is a Project report required? Explain briefly.

A project is required to clarify for the entrepreneur as what he is doing, why he is doing it and how he will do a particular work.

It will enlighten him during the progress of the venture and facilitate him to moderate and harmonize with various components of the scheme.

11. Mention any three types of resources that have to be considered by an entrepreneur while setting up a small-scale enterprise.

Resources are :

- Human resources (men)
- Material resource (material)
- Financial resources (money)

12. Suggest the three basic qualities that a” good entrepreneur should have.

The basic qualities of a good entrepreneur are:-

- creativity
- Innovation
- Propensity to risk taking
- Taking initiative
- Concern for attaining standards of excellence in whatever they undertake.
- Orientation to problem solving

13. List out the various financial institutions. NOV/DEC 2015

- Commercial banks
- IDBI
- IFCI
- ICICI
- LIC
- UTI
- SFCs
- SIDBI
- EXIM BANK

14. State the types of costing. APR/MAY 2015

The types of costing are

- Historical costing
- Standard Costing
- Uniform Costing
- Marginal Costing
- Opportunity Costing

15. Define working capital management. NOV/DEC 2016

Working capital management is an integral part of overall corporate management. Working capital refers to the excess of current assets over current liabilities. Working capital management is concerned with the administration of all current assets and current liabilities.

16. Write any two advantages CPM.

The advantages of CPM

- It helps in ascertaining the time schedule.
- It makes better and detailed planning possible.

17. Comment on general sales tax. NOV/DEC 2016

A general sales tax is imposed by the government on the sale of all commodities except those which may be specially exempted by the government. Under the general sales tax, a common rate of tax is applied on all taxable commodities.

18. What is PERT?

PERT is a short form of project evaluation and review technique. The PERT techniques deals with projects whose activities are non-deterministic in nature. In PERT we try to find best estimate of time using some appropriate statistical method. The expected duration of each activity leads to determination of expected duration of the project and one can also determine the confidence limits for the expected project duration.

PART-B

1. Explain about any three medium term sources of finance available for the entrepreneur.
NOV/DEC 2017
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:338]
2. Identify the Government policy for small scale enterprise and explain in detail. **NOV/DEC 2017**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:427]
3. Discuss the factors determining requirements of working capital. **APR/MAY 2015**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:476]
4. Examine the significance and assessment of working capital
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:474]
5. Debenture is a source of raising long term funds. Explain.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:350]
6. Explain about working capital. Discuss the sources and the management of working Capital.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:477]
7. What is sales tax? Explain the types of sales taxation in India.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:419]
8. Define Excise duties and what are the kinds of excise duties?
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:424]
9. Discuss the sources for raising short term loans required by a small scale enterprise.
APR/MAY 2014
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:350]
- 10.Distinguish between shares and debentures.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:341]
- 11.Briefly explain the various financial institution that extend financing assistance to entrepreneur. (APR/MAY 2017)
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:382]
12. Explain the various types of working capital.
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:471]
13. What is meant by PERT? What are the advantages and limitations of PERT?
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:4.62]
14. Explain about CPM and write its advantages and limitations.
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:4.65]
- 15.Explain various types and classification of costing.**NOV/DEC 2016**
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:4.43]

UNIT V -SUPPORT TO ENTREPRENEURS**PART A****1. How do channel selection influences launching of small business?**

Small businesses need to find a way to serve their customers, wherever they are located. That's why selecting a distribution channel is an important aspect of building channel for your business.

2. Define Term Loan. NOV/DEC 2015

A term loan is a monetary loan that is repaid in regular payments over a set period of time. Term loans usually last between one and ten years, but may last as long as 30 years in some cases. A term loan usually involves an unfixed interest rate that will add additional balance to be repaid.

3. Point out the different types of Mergers. APR/MAY 2015

- Horizontal merger
- Vertical merger
- Conglomerate merger

4. Define merger. (Apr/May 2010)

Merger is defined as “a transaction involving two (or) more companies in the exchange of securities and only the company services.

5. What is Sub-Contracting? (May/Jun 2013)

Sub-contracting is a type of work contract that seeks out source certain types of work to other companies. Sub-contracting is done when the general contractor does not have the time (or) skills to perform certain tasks.

6. List the causes of slow growth of Industrial Entrepreneurship in India.

The causes of slow graph of industrial entrepreneurship in India is.

- Improper policy
- Change of government
- Environment factor etc.

7. Summarize the factors covered in the final contract.

The factors covered in the final contract are

- Detail contract agreement
- Agreement deed
- Consideration
- Time period

- Purpose of contract
- Person involved etc.

8. What do you understand by vertical diversification? Give a suitable example. (May/Jun 2009)

Virtual integration is a new form of value chain management. Under such a system, the links of the value chain are brought together by informal arrangements among suppliers and customers.

9. Illustrate an venture capital. Mention any two sources from which it can be received. (May/Jun 2009)

Venture capital funds made available for startup firms and small businesses with exceptional growth potential management and technical expertise are often also provided it also called risk capital.

Sources from which it can be received are:

- Venture capitalist
- Financial institutions like bank,IFCI,SBI,ICICI etc.

10. Define small Business. (Apr/May 2011)

Designation for firms of a certain size which fall below certain criteria (that varies from country to country) in terms of annual turnover, number of employees, total value of assets, etc.

11. State the growth strategies in small scale industry. (Apr/May 2012)

Here are five growth strategies that small businesses should consider. Not every strategy will be right for your situation, but some of these might offer an opportunity for your business.

- Market segmentation
- Leveraging partnerships
- Use checklists
- Acquisitions
- Become a leader in the industry.

12. List the types of mergers. (Apr/May 2011)

There are three types of mergers:

- Horizontal merger
- Vertical merger
- Conglomerate merger

13. When companies do prefer joint ventures? (Apr/May 2012)

Joint ventures may involve companies in one (or) more countries. International joint ventures in particular are becoming more popular, especially in capital-intensive industries such as oil and gas exploration, mineral extraction and metals processing. The basic reason is simple to save money.

Joint ventures become more attractive as a way to share risks and costs and create scale economies.

Another factor that contributed to the expansion in joint ventures in the past few decades was the cost involved for capital-intensive industries to continue their operations. Joint ventures became a favored method of doing business for such industries.

14. Define the term Magnitude. (Apr/May 2014)

An order of magnitude is an exponential change of plus or minus 1 in the value of a quantity or unit. The term is generally used in conjunction with power of 10.

15. What do you understand by Expansion? (Apr/May 2014)

Expansion is one of the forms of internal growth of business. It means enlargement (or) increase in the same line of activity. Expansion is a natural growth of business enterprise taking place in course of time. In case of expansion, the enterprise grows of its own without falling in hands with any other enterprise.

16. Mention the Government policies for small scale enterprises.(Apr/May 2015)

The government policies for small scale enterprises are:

- Industrial policy resolution (IPR) 1948
- Industrial policy resolution (IPR) 1956
- Industrial policy resolution (IPR) 1977
- Industrial policy resolution (IPR) 1990
- Industrial policy resolution (IPR) 1991

17. Comment on Diversification. APR/MAY 2017

Diversification is a method of portfolio management whereby an investor reduces the volatility (and thus risk) of his or her portfolio by holding a variety of different investments that have low correlations with each other.

18. Write a short note on Diversification, Joint Venture, Merger. NOV/DEC 2017

Diversification: Diversification is a method of portfolio management whereby an investor reduces the volatility (and thus risk) of his or her portfolio by holding a variety of different investments that have low correlations with each other.

Joint Venture: Joint ventures may involve companies in one (or) more countries. International joint ventures in particular are becoming more popular, especially in capital-intensive industries such as oil and gas exploration, mineral extraction and metals processing. The basic reason is simple to save money. Joint ventures become more attractive as a way to share risks and costs and create scale economies.

Merger: Merger is defined as “a transaction involving two (or) more companies in the exchange of securities and only the company services.

PART-B

1. Discuss in detail about the growth strategies in Small industry. **NOV/DEC 2017**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:635]
2. Explain in detail about Business incubator.
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:5.4]
3. What are the salient features of new small enterprise policy? How is the government 's protective policy beneficial for the development of small scale industries? **APR/MAY 2015**
Ref:Entrepreneurship Development by Dr.S.Senthil [Page no:5.20]
4. Define Joint Ventures . State the reasons behind creation of joint venture. Discuss the partner selection criteria. **NOV/DEC 2015**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:646]
5. What do you understand by sickness in small firms? What are its causes? Suggest measures to overcome such sickness. **NOV/DEC 2014,15,17**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:663]
6. Critically evaluate Government policy for small scale enterprises. Do you perceive the policy to be adequate? If no, as an entrepreneur what modifications do you suggest? **APR/MAY 2017**
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:427]
7. What are the four major types of growth strategies adopted by industrial units?
Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:643]
8. Explain the government policy initiatives for promotion of small scale business in our country
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Ref: “Entrepreneurial Development” by Dr.S.S.Khanka.[Page.no:428]

PART B — (5 × 16 = 80 marks)

11. (a) List and explain the various types of Entrepreneurs and their characteristics.

Or

- (b) Critically discuss the role of entrepreneurs in contributing to the economic growth of India.
12. (a) What are the major motivations for start-ups movement in India? Explain with case studies.

Or

- (b) Discuss the role of creativity and innovation in generating ideas for a new Business projects citing examples.
13. (a) Sketch and discuss the business ownership structure in private commercial enterprises in India citing examples.

Or

- (b) Discuss the role of market survey, research and feasibility tests in Setting up new business projects.
14. (a) Enumerate the role of financial institutions in growth of IT sector in India.

Or

- (b) What are the various sources of finance opportunities and tax benefits for first generation entrepreneurs in India — Discuss.
15. (a) Discuss the Major policies of the Government of India in facilitating small scale enterprises in India.

Or

- (b) Critically comment on the ethics, values and social responsibility. Write the major challenges faced by the entrepreneurs in highly competitive environment.

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PART - B

(5×16=80 Marks)

11. a) Discuss the characteristics, knowledge and skills that an entrepreneur should possess with examples in the contemporary business landscape.

(OR)

- b) What are the types of entrepreneur ? Explain each with suitable examples.

12. a) Explain the various motivational initiatives of the central and state government to promote entrepreneurship in automobiles sector.

(OR)

- b) Discuss the role played by the Entrepreneurship development institute in promoting entrepreneurship in India.

13. a) Discuss the importance of feasibility assessment and preparation of project reports with a suitable case study.

(OR)

- b) According to A. Schumpeter "The entrepreneurship is essentially a 'creative activity' or it is 'An innovative function'. Discuss the various idea generation techniques that would support the above statement.

14. a) Business model defines what a business does and how it makes money doing that. There is a long list of traditional business models and recent shift to new business models. Write in detail any 2 models that interests you with relevant examples.

(OR)

- b) Elaborate the various sources of funding available for entrepreneurs in automobile sector in India.

15. a) Discuss about how expansion plans, diversification and joint ventures help the growth of the business in auto sector.

(OR)

- b) Enumerate the Government of India policy for small scale enterprises with examples.