Q.P. code 10320
Answer key

Duration: 21/2 hrs Total Marks: 60

N.B. (1) Figures to the right indicate full marks.
(2) All questions are compulsory.
(3) Use of non-programmable calculator is allowed.
(4) Symbols have their usual meaning unless stated otherwise.

Q.1 a) Attempt any **one**

i) Explain the relationship between bits per second and baud for a QPSK system and give the significance of the I and Q channels in a QPSK modulator. **8**

Baud refers to the rate of change of a signal on the transmission medium after encoding and modulation have occurred. Hence, baud is a unit of transmission rate, modulation rate, or symbol rate and, therefore, the terms symbols per second and baud are often used interchangeably

ii) Explain the relationship between the minimum bandwidth required for an 8-PSK system and the bit rate. **8**

The relationship between the minimum bandwidth required in a 8-PSK system is just equal to one third of the bit rate since each output information signal transmitted already contains three bits or a tribit of information from the input of the 8-PSK system Transmission is in half-duplex mode. For PSK the baud rate is the same as the bandwidth, which means the baud rate is 5000. But in 8-PSK the bit rate is 3 times the baud rate, so the bit rate is 15,000 bps.

Q.1 b) Attempt any **one**

i) Determine the Nyquist sample rate for a maximum analog input frequency of 10 kHz. **4**

ii) What is the difference between standard FSK and MSK? What is the advantage of MSK? **4**

Minimum frequency-shift keying or minimum-shift keying (**MSK**) is a particular spectrally efficient form of coherent frequency-shift keying **FSK**. In **MSK**, the **difference between** the higher and lower frequency is identical to half the bit rate. Consequently, the waveforms that represent a 0 and a 1 bit differ by exactly half a carrier period.

Q.2 a) Attempt any **one**

i) Describe the basic operation of a cordless telephone. **8**

A **cordless telephone** or **portable telephone** is a telephone in which the handset is portable and communicates with the body of the phone by radio, instead of being attached by a cord. The base station is connected to the telephone network through a telephone line as a corded telephone is, and also serves as a charger to charge the handset's batteries. The range is limited, usually to the same building or some short distance from the base station.

ii) Describe automated central office switches and exchanges and their advantages over operator-assisted local exchanges. **8**

Q.2 b) Attempt any **one**

i) List the advantages and disadvantages of WDM. **4**

It increases the information carrying capacity of a fiber.Advantages —(i) It has greater

transmission capacity(ii) Duplex transmission(iii) Simultaneous transmission of various signals(iv) Easy system expansion.(v) Lower cost(vi) Faster access to new channels.

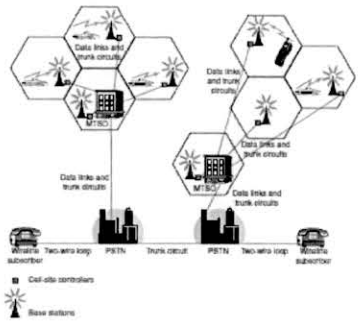
ii) What limitations are imposed with D-type conditioning? **4**

Q.3 a) Attempt any **one**

With help of neat and labelled diagram explain the concept of simplified cellular telephone system topology.

Answer

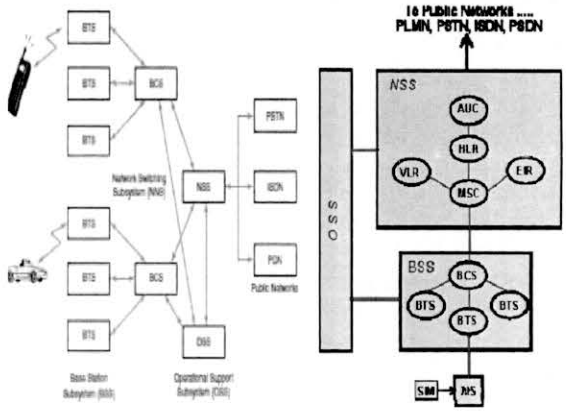
Explanation of the below diagram

i)  **8**

Describe briefly GSM services and GSM system architecture.

Answer

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band

ii) 
 8

Q.3 b) Attempt any **one**

i) Explain the term frequency reuse. Determine the number of channels per cluster and the total channel capacity for a cellular telephone area comprised of 10 clusters with seven cells in each cluster and 10 channels in each cell. **4**

Answer

definition

the total number of full-duplex channels is
F = (10)(7)
= 70 channels per cluster
Substituting into Equation 3, the total channel capacity is
C = (10)(7)(10)
= 700 channels total

Explain the concept of event driven programming and polling used in serial communication system.

Answer

ii) Polling is the process where the computer or controlling device waits for an external device to check for its readiness or state, often with low-level hardware. For example, when a printer is connected via a parallel port, the computer waits until the printer has received the next character. These processes can be as minute as only reading one bit. This is sometimes used synonymously with busy-wait polling. In this situation, when an I/O operation is required, the computer does nothing other than check the status of the I/O device until it is ready, at which point the device is accessed. In other words, the computer waits until the device is ready. Polling also refers to the situation where a device is repeatedly checked for readiness, and if it is not, the computer returns to a different task. Although not as wasteful of CPU cycles as busy waiting, this is generally not as efficient as the alternative to polling, interrupt-driven I/O. **4**

Q.4 a) Attempt any **one**

Write a python program to find the sum of natural numbers up to n where n is provided by user. Explain each step in detail and provide with a sample output for the above program.

Answer

i) **8**

```
# change this value for a different result
num = input ("enter the no ")
# uncomment to take input from the user
#num = int(input("Enter a number: "))

if num < 0:
   print("Enter a positive number")
else:
   sum = 0
   # use while loop to iterate un till zero
   while(num > 0):
       sum += num
       num -= 1
   print("The sum is",sum)
```

ii) Write a python program to find Fibonacci sequence for a given interval given by the user. Explain the each working of the program and give an example for the same. **8**

Answer

Q.4 b) Attempt any **one**

i) Explain the use of 'if' statement in python programming language

Answer **4**

Decision making in anticipation of condition occurring while execution of program.
Any example to support above

ii) Explain the concept of global variable and local variable used in python program.

Answer **4**

Global variable = accessible by multiple scope.
Local variable = is a variable defined within a function or argument
Example to support

Q.5 Attempt any **four**

i) What is the purpose of a clock recovery circuit? When is it used? **3**

Clock recovery is very closely related to the problem of carrier recovery, which is the process of re-creating a phase-locked version of the carrier when a suppressed carrier modulation scheme is used. A carrier recovery system is a circuit used to estimate and compensate for frequency and phase differences between a received signal's carrier wave and the receiver's local oscillator for the purpose of coherent demodulation.

ii) Explain quantizing. What is quantization range? Quantization error? **3**

Quantization, is the process of mapping a large set of input values to a (countable) smaller set. Rounding and truncation are typical examples of quantization processes. Quantization is involved to some degree in nearly all digital signal processing, as the process of representing a signal in digital form ordinarily involves rounding. Quantization also forms the core of essentially all lossy compression algorithms. The difference between an input value and itsquantized value (such as round-off error) is referred to as quantization error. A device or algorithmic function that performs quantization is called aquantizer.

iii) What is meant by the term loop resistance? **3**

Loop Resistance is the total resistance through two conductors looped at one end of the link. This is usually a function of the conductor diameter and varies only with distance.

iv) Define call progress tones and signals. **3**

v) Explain what is meant by channel density

vi) Explain the term TDMA and CDMA. **3**

Answer
Time division multiple accesses
Code division multiple accesses

vii) What do you mean by operator precedence? Explain with help of examples. **3**

Answer
Operator precedence determines the grouping of terms in an expression and decides how an expression is evaluated. Certain operators have higher precedence than others; for example, the multiplication operator has a higher precedence than the addition operator. For example, x = 7 + 3 * 2; here, x is assigned 13, not 20 because operator * has a higher precedence than +, so it first gets multiplied with 3*2 and then adds into 7

viii) Explain the use of following operator '&','|'.'%'. **3**