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10EC/TE61

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
## Digital Communication

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer FIVE full questions, selecting at least TWO questions from each part.***



### PART – A

1 a. With neat sketches explain flat top sampling. **(07 Marks)**

b. What is Aperture effect? Explain how it can be compensated. **(05 Marks)**

c. A signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples/sec.
i) Sketch spectrum of sampled signal.
ii) Specify the cutoff of ideal reconstruction filter so as to recover g(t) from $g_\delta(t)$. **(08 Marks)**

2 a. Explain the block diagram of regenerative repeater. **(05 Marks)**

b. A PCM system uses a uniform quantizer followed by a v bit encoder. Show that rms signal to quantization noise ratio is approximately given by $(1.8 + 6v)$ db. **(06 Marks)**

c. With neat sketch explain companding in PCM. Also explain μ-law and A-law companding. **(09 Marks)**

3 a. Explain the following with neat sketch:
i) Slope overload distortion.
ii) Granular noise. **(05 Marks)**

b. A delta modulator is designed to operate at five times the Nyquist rate for a signal with 3 kHz bandwidth. Determine the maximum amplitude of a 2 kHz I/P sinusoid for which delta modulator does not have slope overload. Quantizing step size is 250 mV. **(05 Marks)**

c. For the binary bit stream 10011011 draw the waveforms for the following cases:
i) Polar NRZ ii) Manchester RZ iii) Gray code NRZ **(05 Marks)**

d. With neat sketch explain power spectra of discrete PAM signals. **(05 Marks)**

4 a. What is ISI? Derive an expression for Nyquist pulse shaping criterion for distortionless base band binary transmission. **(06 Marks)**

b. What is correlative coding? Explain duobinary coding with and without precoding. **(06 Marks)**

c. The binary data 011100101 are applied to the I/P of a modified duo binary system.
i) Construct modified duo binary coder O/P without precoder.
ii) Suppose that due to error in transmission, the level produced by the third digit is reduced to zero. Construct a new receiver output. **(08 Marks)**

### PART – B

5 a. With neat block diagram, explain the DPSK transmitter and receiver. **(08 Marks)**

b. Obtain the expression for probability of symbol error of coherent binary FSK. **(07 Marks)**

c. Binary data are transmitted over a microwave link at the rate of $10^6$ bps and the PSD of the noise at the receiver input is $10^{-10}$ W/Hz. Find the average carrier power required to maintain an average prob. of error $P_e \leq 10^{-4}$ for coherent binary FSK. What is the required channel B.W? (Take erfc (3.71) = $10^{-4}$) **(05 Marks)**

6 a. Explain the Gram Schmidt orthogonalization procedure to obtain the orthonormal basis function for linearly independent set of signals. **(12 Marks)**

b. Three signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ are as shown in Fig. Q6 (b). Apply Gram Schmidt procedure to obtain an orthonormal basis for the signals. Express the signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ in terms of orthonormal basis functions. Also give signal constellation diagram. **(08 Marks)**

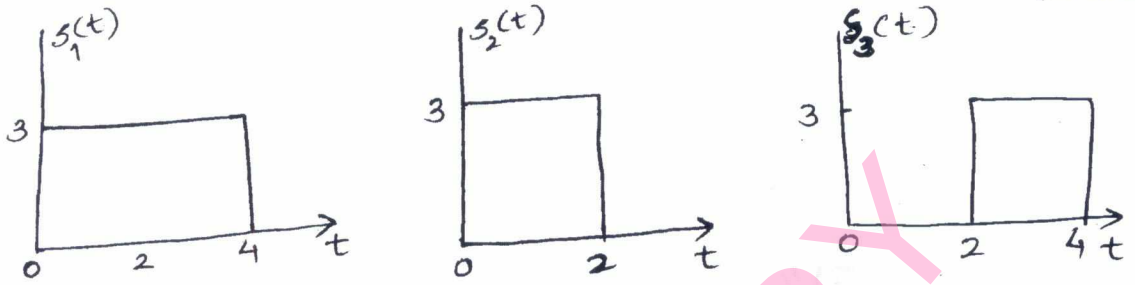


Fig. Q6 (b)

7 a. Show that the output SNR of a matched filter is proportional to ratio of signal energy to PSD of input noise. **(06 Marks)**

b. Explain the function of correlation receiver. **(06 Marks)**

c. Determine the impulse response of matched filter. **(08 Marks)**

8 a. Explain properties of PN sequence (max length sequence). **(06 Marks)**

b. Explain the working of direct sequence spread spectrum transmitter and receiver with BPSK. **(08 Marks)**

c. The direct sequence spread spectrum communication system has following parameters:
Data sequence bit duration $T_b = 4.095$ ms, PN chip duration $T_C = 1$ μs.
$\frac{E_b}{N_0} = 10$ for average probability of error less than $10^{-5}$.
Calculate processing gain and jamming margin. Also find jamming margin in db. **(06 Marks)**

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10EC/TE62

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
## Microprocessors

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***



### PART – A

1 a. Draw the internal architecture of 8086 processor and explain in brief the execution unit and bus interface unit. **(10 Marks)**

b. Explain the PSW register of 8086. **(06 Marks)**

c. List the advantages of memory segmentation of 8086. **(04 Marks)**

2 a. Determine the physical address resulting from the following instructions:

i) MOV DL, [BP+SI]
ii) MOV DI, [BX + 100h]
iii) SUB BOX, AX
iv) MOV [BP + DI + 5], AH
v) MOV AL, [5036h]

BP = 7000h, SI = 0350h, SS = 8000h, BOX = 4000h, BX = 4FFFh, DS = 2000h DI = 6A00h. **(10 Marks)**

b. Opcode for MOV instruction is 100010. Determine the machine language code for the following:

i) MOV AL, BL ii) MOV AL, [1234h] **(04 Marks)**

c. What are assembler directives? Explain the significance of the following:

i) DW ii) EQU iii) ALIGN 16 iv) OFFSET. **(06 Marks)**

3 a. Write a short note on string instructions. **(10 Marks)**

b. Using table translation instruction WAP to find equivalent seven segment code for the given BCD digit. **(06 Marks)**

c. Differentiate between Macros and Procedures. **(04 Marks)**

4 a. What is an interrupt? Discuss the interrupt classification in 8086 with example. **(07 Marks)**

b. Explain the response to an interrupt in 8086. **(07 Marks)**

c. Write subroutines to

i) Set trap flag ii) Reset trap flag. **(06 Marks)**

### PART – B

5 a. Explain with a neat diagram the interfacing of a 4×4 keyboard to 8086. Draw the flow chart also. (Program not reqd.) **(12 Marks)**

b. Interface a DAC AD7523 with 8086 WAP to generate a saw tooth waveform of period 1 ms with $V_{max}$ = 5V. Clock frequency of 8086 = 8 MHz. **(08 Marks)**

6 a. With a neat diagram explain the architecture of 8087 coprocessor. **(10 Marks)**

b. Represent the real number $(13.75)_d$ in a short real or in single precision representation. **(04 Marks)**

c. Write a program in 8087 ALP to find the area of a circle. **(06 Marks)**

7 a. Draw the block diagram of PCI interface bus and explain. **(10 Marks)**
b. Write a short note on USB. **(10 Marks)**

8 a. Explain with neat diagram the programming model of Intel 80386 registers. **(10 Marks)**
b. Explain the memory system of 80386 with diagram. **(04 Marks)**
c. Explain Branch prediction logic and cache structure of Pentium processor. **(06 Marks)**

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10EC63

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
## Microelectronics Circuits

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting THREE from PART-A and TWO from PART-B.***



### PART – A

1 a. Explain channel length modulation effect and derive an expression for finite output resistance of a MOSFET in saturation region. **(08 Marks)**

b. Analyze the circuit shown in Fig. 1(b) to determine the voltages at all nodes and the currents through all branches let the nMOSFET $V_t = 1V$ and $k'_n \frac{W}{L} = 1mA/V^2$. Assume $\lambda = 0$. **(08 Marks)**

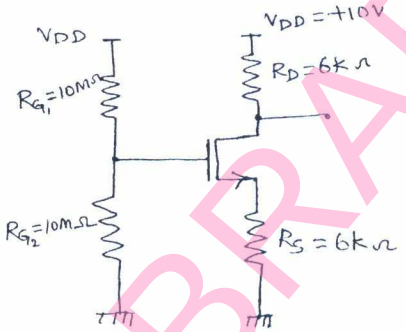


Fig.Q1(b)

c. Explain briefly biasing using constant current source. **(04 Marks)**

2 a. Derive analytical expressions for transfer characteristics of CS amplifier. **(08 Marks)**

b. Fig. Q2(b) shows a discrete CS MOSFET amplifier utilizing the drain to gate feedback biasing arrangement. Determine the small signal voltage. Gain its input resistance and the largest allowable input signal. Let $V_t = 1.5V$, $k'_n \frac{W}{L} = 0.25mA/V^2$ and $V_A = 50V$.

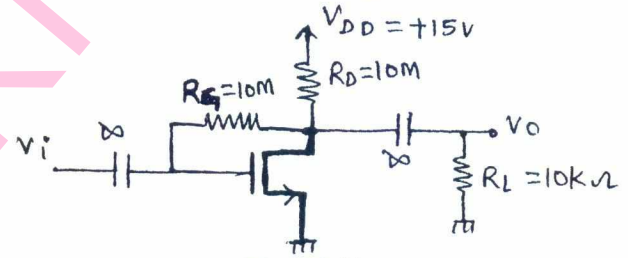


Fig.Q2(b) **(07 Marks)**

c. Briefly explain common drain amplifier. **(05 Marks)**

3 a. With neat circuit diagram, explain basic BJT current mirror and derive an expression for CT ratio of BJT current mirror for finite β. **(08 Marks)**

b. Derive an expression for 3dB frequency $f_H$ for an amplifier having 2 poles and 2 zeros. **(08 Marks)**

c. Explain millers theorem. **(04 Marks)**

4 a. Briefly explain common source amplifier with active load. **(10 Marks)**

b. With neat circuit diagram, explain the MOS cascode amplifier. **(10 Marks)**

## PART – B

5 a. Explain the operation of MOS differential pair with a common mode input voltage. **(07 Marks)**

b. Briefly explain the basic operation of BJT differential pair with neat circuit diagram. **(07 Marks)**

c. Explain two stage CMOS OPAMP. **(06 Marks)**

6 a. Write a note on gain desensitivity and bandwidth extension. **(06 Marks)**

b. Draw the ideal structure and equivalent circuit of the series shunt feedback amplifier and explain. **(10 Marks)**

c. Write a note on amplifier with a single pole response. **(04 Marks)**

7 A Derive an expression for the closed load gain ($v_0/v_i$) of the circuit shown in Fig. Q7(a). Assume the OPAMP is ideal. **(06 Marks)**

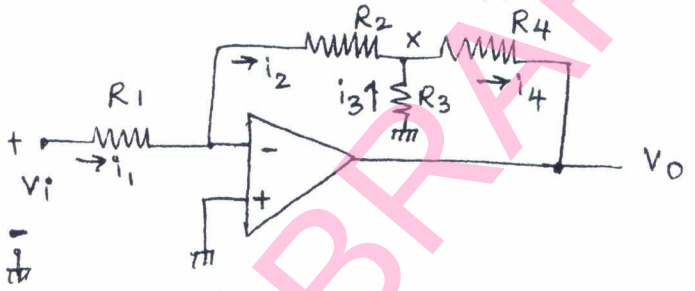


Fig.Q7(a)

b. Explain instrumentation amplifier with neat circuit diagram. **(08 Marks)**

c. With neat circuit diagram, explain antilog amplifier. **(06 Marks)**

8 a. A CMOS inverter fabricated in a 0.25 μm process has $C_{ox} = 6$ f F/μm$^2$, $\mu_n C_{ox} = 115$ μA/v$^2$, $\mu_p C_{ox} = 30$ μA, $v_{tn} = -v_{tp} = 0.4$v and $V_{DD} = 2.5$v. The W/L ratio of $Q_n$ is 0.375 μm/0.25μm, and that for $Q_p$ is 1.125μm/0.25 μm. The gate – source and gate drain overlap capacitances are specified to be 0.3 f F/μm of gate width. Further the effective value of drain body capacitances are $C_{dbn}$ = 1fF and $C_{dbp}$ = 1 fF. The wiring capacitance $C_W = 0.2$f F. Find $t_{PHL}$, $t_{PLH}$ and $t_p$. **(10 Marks)**

b. Implement $F = \overline{AB + \overline{AB}}$ using AOI. **(05 Marks)**

c. Explain two single input domino CMOS gate. **(05 Marks)**

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10EC64

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
## Antennas and Propagation

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer FIVE full questions, selecting at least TWO questions from each part.***



### PART – A

1 a. Define directivity. Obtain the relationship between directivity and beam area to show that smaller the beam area, larger is the directivity. **(07 Marks)**

b. Define antenna aperture. Derive the relationship between aperture and beam area. **(06 Marks)**

c. Show that maximum effective aperture of a short electric dipole is equal to $0.119\ \lambda^2$. **(07 Marks)**

2 a. Find the power radiated and the directivity for the following:

i) $U = U_m \sin^2\theta \sin^3\phi \quad 0 \le \theta \le \pi \quad 0 \le \phi \le \pi$

ii) $U = U_m \cos^n\theta \quad 0 \le \theta \le \pi/2 \quad 0 \le \phi \le 2\pi$ **(08 Marks)**

b. Obtain the relative field pattern for two isotropic point sources of same amplitude but opposite phase, spaced $\frac{\lambda}{2}$ apart. **(08 Marks)**

c. State and explain power theorem. **(04 Marks)**

3 a. Derive the equation for radiation resistance of a short electric dipole. **(08 Marks)**

b. Explain the following : i) Folded dipole, ii) Rhombic antenna. **(08 Marks)**

c. A half wave dipole radiating in free space is driven by a current of 0.5 amperes at the terminals. Calculate E and H field at a distance 1 km from the antenna at angles of 45° and 90°. **(04 Marks)**

4 a. Obtain the radiation resistance of a small loop antenna. **(07 Marks)**

b. Write short notes on: i) Slot antenna, (ii) Patch antenna. **(08 Marks)**

c. Find the radiation efficiency of a 1 meter diameter loop of 10 mm diameter copper wire at (i) 1MHz, (ii) 10 MHz. **(05 Marks)**

### PART – B

5 a. Determine the length L, H plane aperture and flare angles $\theta_E$ and $\theta_H$ of a pyramidal horn for which E-plane aperture $a_E = 10\ \lambda$. The horn is fed by rectangular waveguide with $TE_{10}$ mode. Let $\delta = 0.2\ \lambda$ in the E-plane and $0.375\ \lambda$ in the H-plane. Also find beam width and directivity. **(08 Marks)**

b. Write short notes on: i) Lens antenna; ii) Log periodic antenna **(08 Marks)**

c. Design a Yagi-Uda six element antenna for operation at 500 MHz with a folded dipole field. What are the lengths of (i) reflector element, (ii) driven element, (iii) four director element? What is the spacing between reflector and driven element? **(04 Marks)**

6 a. Derive an expression for resultant field intensity in the case of a space wave propagation. **(10 Marks)**

b. Evaluate the roughness factors for the earth at 10 MHz, if $\sigma = 5$, for '$\theta$' equal to (i) 30°, (ii) 45°, (iii) 60°. **(05 Marks)**

c. A transmitting antenna of 100 m height radiates 40 kW at 100 MHz uniformly in azimuth plane. Calculate maximum LOS range and strength of the received signal at 16 m high, receiving antenna at a distance of 10 km. At what distance would the signal strength reduce to 1 mV/m? **(05 Marks)**

7 a. Explain the structure of ionosphere. Derive an expression for refractive index of ionospheric layer. **(10 Marks)**

b. Define the following with respect to ionospheric propagation:
   i) Critical frequency
   ii) Virtual height **(06 Marks)**

c. Obtain the relationship between maximum usable frequency (MUF) and skip distance. **(04 Marks)**

8 Write short notes on:
a. Principle of pattern multiplication
b. Scanning array
c. Embedded antennas
d. Ground wave propagation **(20 Marks)**

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10EC65

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
# Operating System

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***



## PART – A

1 a. List the different tasks in an operating system. Describe the different computational structures used in an operating system. **(06 Marks)**

b. With a suitable timing diagrams, explain the priority assignment rule in a multiprogramming systems. **(06 Marks)**

c. Define the following :
i) System call
ii) Throughput
iii) Turn–around time
iv) Response time
With a suitable curve, explain the key features and concerns of different operating system classes. **(08 Marks)**

2 a. With a neat diagram, explain the layered design of operating systems. **(08 Marks)**

b. Explain the structure of microkernel based operating system. **(06 Marks)**

c. Write an explanatory note on virtual machine operating system. **(06 Marks)**

3 a. With a state transition diagram, explain the different states of a process and its transitions. **(06 Marks)**

b. With a neat diagram, explain the threads used in Solaris. **(06 Marks)**

c. Discuss the problem of race condition with a suitable example. Explain the method to overcome this problem. **(08 Marks)**

4 a. Discuss the methods used to achieve the memory protection with a suitable diagram. **(08 Marks)**

b. Describe the memory allocation methods for the program controlled data. **(08 Marks)**

c. Differentiate between contiguous and non-contiguous memory allocation methods. **(04 Marks)**

## PART – B

5 a. What is demand paging? Explain the mechanism of address translation buffers with a neat diagram. **(08 Marks)**

b. Explain the FIFO page replacement policy and LRU page replacement policy. Find the number of page faults for the following page reference string using these two policies.
Reference string : 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5
Assume page frames = 3. **(12 Marks)**

6 a. With a neat diagram, explain the facilities provided by the file system and IOCS layers. **(08 Marks)**

b. Describe the organization of sequential access and direct access files. **(06 Marks)**

c. Write an explanatory note on FCB. **(06 Marks)**

7 a. Explain the long term, short term and medium term schedulers. Explain how these schedulers work in case of time sharing system. **(10 Marks)**

b. Explain the operation of preemptive scheduling policies and its performance for the data given below :

| Process | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ |
|---|---|---|---|---|---|
| Arrival time | 0 | 2 | 3 | 5 | 9 |
| Service time | 3 | 3 | 2 | 5 | 3 |

**(10 Marks)**

8 a. Explain the Kernel actions to implement message passing using symmetric naming and blocking sends. **(06 Marks)**

b. Write an explanatory note on mailboxes. **(06 Marks)**

c. Explain how inter-process communication can be done in UNIX. **(08 Marks)**

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10EC662

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
# Satellite Communication

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

## PART – A

1 a. List out any four advantages and four applications provided by satellites. **(08 Marks)**

b. List out the frequency band disignations in common use for satellite services. **(06 Marks)**

c. The apogee and perigee of an elliptical satellite orbits are 3000 km and 200 kms. Determine the eccentineity, semi-major axis and semi-minor axis. **(06 Marks)**

2 a. State Kepler's three laws of planetary motion, with suitable diagram and its relevant equations. **(08 Marks)**

b. With necessary diagram, define : i) Apogee ii) Prograde orbit iii) Inclination iv) Retrograde orbit. **(08 Marks)**

c. What is meant by sidereal time? Explain. **(04 Marks)**

3 a. Explain what is meant by rain rate and how this is related to specific attenuation. **(05 Marks)**

b. Derive the expression for $[C/N_0]$ for the uplink. **(10 Marks)**

c. An LNA is connected to a receiver to which has a noise figure of 12 dB, the cable loss is 5 dB, the LNA gain is 50 dB and its noise temperature is 150k. The antenna noise temperature is 35 K. Calculate the overall noise temperature referred to the input. **(05 Marks)**

4 a. What is meant by the term attitude control? Explain two forms of attitude control. **(12 Marks)**

b. With neat block diagram, describe the TT and C facilities of a satellite communication system. **(08 Marks)**

## PART – B

5 a. With the suitable block diagram, explain the function of DBS – TV receiving system intended for home application. **(10 Marks)**

b. Explain and compare master antenna TV and community antenna TV. **(10 Marks)**

6 a. Describe briefly the modes of interference that can occur in a satellite communication system. Distinguish carefully between satellite and terrestrial modes of interference. **(10 Marks)**

b. Explain what the abbreviation "SPADE" system stands for. Explain in detail the operation of spade system. **(10 Marks)**

7 a. What is meant by TDMA? Explain the need for a reference burst in a TDMA system. **(10 Marks)**

b. What are different multiple access methods used in satellite communication? Briefly explain. **(06 Marks)**

c. Explain bit rate for digital television. **(04 Marks)**

8 Write short notes on :

a. Radar sat

b. Antenna look angle

c. GPS and its uses

d. VSat (VSAT). **(20 Marks)**

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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10EC665

# Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
## Programming in C++

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***



### PART – A

1 a. What are comments? Explain different types of comments in C++ with an example. **(04 Marks)**

b. Distinguish between static memory allocation and dynamic memory allocation. **(06 Marks)**

c. List the salient features of object oriented programming. **(06 Marks)**

d. Explain the following : #elif, # if def. **(04 Marks)**

2 a. What are variables? Describe with an example. **(06 Marks)**

b. Explain reference types and distinguish between reference types and pointer types. **(08 Marks)**

c. Write a C++ program to read integer numbers from keyboard until user enters zero and sum the even numbers only and display the result. **(06 Marks)**

3 a. Write the O/P of followings :

i)
```
# define square(x) x * x
  void main( )
  {
  int i = 64/square (4) :
  cout<<i;
  }
```

ii)
```
void main( )
  {
  int num, a = 15;
  num = - - - - a - - ;
  cout<<num<<a;
  }
```

iii)
```
void main( )
  }
  int i;
  for (i = 0 ; 1 < 5; i++)
  {
  int i = 10;
  printf("%d", i);
  i++;
  }}
```

**(06 Marks)**

b. Write a program to find the minimum of three numbers using conditional operator. **(05 Marks)**

c. Describe : break, continue and goto statements. **(09 Marks)**

4 a. Describe call by value and call by reference with an example. **(08 Marks)**

b. Describe inline function with an example. **(06 Marks)**

c. Write a program to calculate sum of first n integers using recursion. **(06 Marks)**

## PART – B

5 a. Describe exception handling in C++ with an example. **(10 Marks)**

b. Describe :

i) Rethrow

ii) Catch all handler. **(10 Marks)**

6 a. Write a C++ program using class and explain public, private, object, class members. **(10 Marks)**

b. Explain friend function and friend class, with example. **(10 Marks)**

7 a. Discuss the principle of operator overloading with an example. **(10 Marks)**

b. Write a program to overload both prefix and postfix increment operator. **(10 Marks)**

8 a. Describe base class access control with an example. **(08 Marks)**

b. With a program illustrate inheritance of multiple base classes. **(12 Marks)**

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