

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2019
Department of Computer Science and Engineering
HUM 2207

Economics and Accounting

TIME: 3 hours

FULL MARKS: 210

N.B. Figures in the right margin indicate full marks.

SECTION A

(Answer ANY THREE questions from this section in Script A)

1. a) Define production possibilities frontier (PPF). Use a PPF to illustrate society's trade-off between a clean environment and high income. (10)
b) Explain the determinants of supply. (10)
c) There are 10,000 identical individuals in the market for commodity X , each with a demand equation is given by $Q_{dx} = 8 - 2P_x$ and 1,000 identical producers of commodity X , each with a supply equation is given by $Q_{sx} = 20P_x$. (15)
i) Obtain equilibrium price and quantity.
Now, if the government decides to collect a sales tax of \$2 per unit sold from each of the 1,000 sellers-
ii) What effect does this have on the equilibrium price and quantity?
iii) What is the total amount of tax?
2. a) Define price-elasticity of demand. Is the price-elasticity of demand for "sports shoe" greater than the price elasticity of demand for "aluminum"? Why? What general rule infer from this? (10)
b) What is the income elasticity of demand? (05)
c) The 'Asus' is a producer of computer. The corporation hires an economist to determine the demand for its product. After months of hard work, the analyst inform the company that the demand for the firm's computer is given by the following equation:
$$Q_x = 12,000 - 5,000P_x + 5I + 500P_c$$

Assume that the initial values of P_x , I , and P_c are \$5, \$10,000 and \$6 respectively. Using the above information, the company's manager wants to determine-
i) What effect a price increase would have on the total revenue (TR)?
ii) How sales of the computer would change during a period of rising incomes.
iii) Assess the probable impact if the completing producers would raise their computer.
3. a) Define personal income and disposable income. (05)
b) What are the main causes of inflation in developing countries? Explain. (15)
c) Explain the cost-benefit analysis of a project. (15)
4. a) Explain, Total cost = Fixed cost + Variable cost. (05)
b) Define short-run. Explain short-run equilibrium of a firm under perfect competition. (20)
c) What are the properties of a perfect competition market? Explain the shut-down position of a firm under perfect competition. (10)

SECTION B

(Answer ANY THREE questions including question no. 8 from this section in Script B)

5. a) Discuss the various concepts/principles of accounting. (10)
b) What is accounting cycle? Describe the steps of accounting cycle. (10)
c) Define transaction. Discuss the characteristics of transaction. (10)
d) Describe the rules of "debit" and "credit" of account. (05)
6. Runa Akter decides to open a computer programming service which she names DigiCom technology on September 1, 2018. During the first month of operations, the following transactions occurred.
September 1 Runa invested Tk. 1,50,000 cash in the business.
September 2 DigiCom purchases computer equipment for 70,000 cash.
September 3 DigiCom purchased computer paper (supplies) for Tk. 16,000 from Asad Supply Company on account.
September 4 DigiCom receives Tk. 16,000 cash from customers for programming services it has provided.

- September 5 DigiCom receives a bill for Tk. 2,500 from the Daily News for advertising on account.
- September 6 DigiCom provides Tk. 35,000 of programming services for customers. Cash of Tk. 15,000 is received from customers and the balance of Tk. 20,000 is billed on account.
- September 7 Expenses paid in cash for September are store rent Tk. 6,000, salaries of employees Tk. 9,000 and utilities Tk. 2,000.
- September 8 DigiCom pays Tk. 2,500 Daily News advertising bill in cash (transaction September 5).
- September 9 The sum of Tk. 16,000 in cash is received from customers who have previously been billed for services in transaction September 6.
- September 10 Runa Akter withdraw Tk. 13,000 cash from the business for his personal use.

From the above information,

- Prepare a tabulate summary of transactions.
- Journalize the above transactions.

(15+20)

7. IT center was started by Tanni in a small shopping center, in a first week of operation, she completed the following transactions. (35)

- 2019 Deposited Tk. 70,000 cash in account in the name of company to start the business.
- June 1 business.
- June 2 Paid current month rent Tk. 9,000 cash.
- June 3 Purchase store equipment on credit/on account Tk. 36,000.
- June 4 Purchased supplies for cash Tk. 17,000.
- June 5 Received revenue Tk. 8,000 cash for service provided.
- June 6 Service provided on account Tk. 7,000.
- June 7 Paid utility expense Tk. 2,500 in cash.
- June 10 Withdraw cash for personal use Tk. 4,000.

From the above information, prepare necessary Ledger accounts.

8. The trial balance of Mr. Amin on December 31, 2017.

(35)

| Account Titles | Debit (Tk.) | Credit (Tk.) |
|--------------------------------------|-----------------|-----------------|
| Cash | 24,780 | |
| Accounts receivable | 5,000 | |
| Allowance for doubtful accounts | | 400 |
| Inventory 1-1-17 | 31,400 | |
| Prepaid insurance | 5,520 | |
| Office equipment | 12,000 | |
| Accumulated depreciation (equipment) | | 4,500 |
| Amin's capital | | 12,000 |
| Accounts payable | | 8,000 |
| Drawing, Amin | 20,000 | |
| Sales | | 30,000 |
| Sales return | 1,000 | |
| Advertising expense | 1,000 | |
| Purchases | 1,99,200 | |
| Purchase return | | 1,400 |
| Rent expense | 3,200 | |
| Salaries expense | 23,200 | |
| Total | 3,23,420 | 3,26,300 |

Data for adjustment are as follows:

- Bad debt expense for the year ended December 31, 2017 is estimated to be Tk. 1,000.
- Prepaid insurance balance at the end of the year Tk. 368.
- Depreciation charged on equipment @ 10% p. a.
- Closing inventory at December 31, 2017 Tk. 26,400.

From the above information,

- Prepare a statement of comprehensive income for the period ended December 31, 2017.
- Prepare a statement of owner's equity.
- Prepare statement of Financial Position as on 31st December, 2017.

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2019
Department of Computer Science and Engineering
MATH 2207

TIME: 3 hours

Complex Variable, Vector Analysis and Statistics

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.
iii) Graph paper, t -table, z -table, χ^2 -table will be supplied if necessary.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Find the roots of $(2\sqrt{3} - 2i)^{1/2}$ and locate them graphically. (10)
b) Examine the limit of $\frac{\bar{z}}{z}$ at $z = 0$. (06)
c) Define harmonic function. If $f(z) = u + iv$ is an analytic function of $z = x + iy$ and $u - v = e^x(\cos y - \sin y)$, find $f(z)$ in terms of z . (12)
d) Write necessary and sufficient conditions for analyticity. (07)
2. a) State Taylor's theorem. Expand $f(z) = \sin z$ in a Taylor series about $z = \pi/4$. Determine the region of convergence of this series. (12)
b) State Laurent's theorem. Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in a Laurent series valid for (12)
(i) $1 < |z| < 3$, (ii) $|z| < 1$ and (iii) $0 < |z+1| < 2$.
c) Evaluate $\oint_c \frac{e^{2z}}{(z^2+1)^4} dz$, where c is the circle $|z| = 3$. (11)
3. a) Define with an example: (i) isolate singularity, (ii) poles and (iii) essential singularity. (11)
b) Evaluate the followings: (24)
i) $\int_0^\infty \frac{dx}{x^6 + 1}$
ii) $\int_0^{2\pi} \frac{d\theta}{3 - 2\cos\theta + \sin\theta}$
4. a) Find an equation for the tangent plane and normal line to the surface $2xz^2 - 3xy - 4x = 7$ at the point $(1, -1, 2)$. (11)
b) Find the constants a, b, c so that the directional derivative of $f = axy^2 + byz + cz^2x^3$ at $(1, 2, -1)$ has a maximum magnitude of 64 in the direction parallel to the normal of the surface $\phi = 10z^3 + 10$ at that point. (12)
c) Test whether the force field $\frac{\vec{F}}{r^2}$ is conservative or not. Hence, if possible then find the scalar potential of the force field so that the value of the scalar potential at origin is zero. (12)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Evaluate $\int_c \vec{F} \cdot d\vec{r}$ where c is the curve on the xy plane, $y = x^3$ from $(1, 1)$ to $(2, 8)$ and $\vec{F} = (5xy - 6x^2)\hat{i} + (2y - 4x)\hat{j}$. (10)
b) Verify the divergence theorem for $\vec{A} = 2x^2y\hat{i} - y^2\hat{j} + 4xz^2\hat{k}$ taken over the region in the first octant bounded by $y^2 + z^2 = 9$ and $x = 2$. (18)

- c) State Green's theorem. Using this theorem, show that the area bounded by a simple closed curve is given by $\frac{1}{2} \oint xdy - ydx$. (07)

6. a) Derive the relation between 2nd central moment and raw moment from general formula. (05)
 b) Find first four moments measured from origin. Hence, find mean, standard deviation and coefficients of skewness. Where, experimental data are: 3, 5, 9, 5. (15)
 c) A fair dice is flipped. Define the random variable x as 3 times of the value of upper face minus 2. Now, write down the probability distribution of the random variable for this flipped dice. Hence, find mean, variance and coefficient of variation. Also, find the probability $P(x < 0)$. What is/are the actual value of $x < 0$ according to flipped dice? (15)
7. a) Test whether the following function is probability density function or not for some value of λ . (12)

$$P(x) = \begin{cases} \lambda x & \text{if } 1 \leq x \leq 4 \\ 0 & \text{otherwise} \end{cases}$$

Hence, if possible then find $E(2x^2 - 4)$ and $P(-2 < x < 2)$.

- b) Define binomial distribution with appropriate assumptions. Also, fit the following data in binomial distribution. Hence, test goodness of fit with 5% level of significance. (18)

| | | | | | |
|-----------------------|---|----|----|---|---|
| Output | 0 | 1 | 2 | 3 | 4 |
| Number of observation | 8 | 10 | 25 | 4 | 3 |

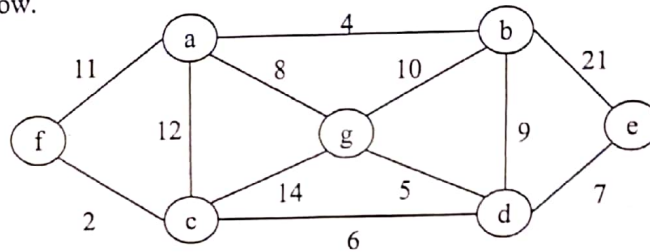
- c) Define uniform distribution and write down its three properties. (05)
8. a) What are the necessary assumptions you need regarding binomial distribution? In a small town, there are 500 single floored houses. Each house contains 10 pillars and 4 beams (perfect or defect). The probability of perfect beam is 0.8. For a single house, find the probability that there is (i) no perfect beam (ii) at least two defective beams. (10)
 In that town, how many houses you expected that there is no any defective beam?
- b) Suppose there are 5500 candidates in any examination of a qualification test. Let the average score is 70 (in percentage) and variance is 36. Assume that scores are normally distributed. Find the expected number of candidates who are (10)
 i) not qualified (i.e., score is less than 60),
 ii) qualified but not eligible for choosing any specific field (i.e., $60 < \text{score} < 75$),
 iii) eligible for choosing any department (i.e., $\text{score} > 80$).
- c) Define Poisson process. (05)
- d) The number of customers arriving at a grocery store can be modelled by the Poisson process. The average customer per hour is 20. (10)
 i) Find the probability that there are 5 customers between 9:00 to 9:40 and 20 customers between 11:00 to 11:30.
 ii) Find the probability that at least one customer between 9:00 to 9:40.

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

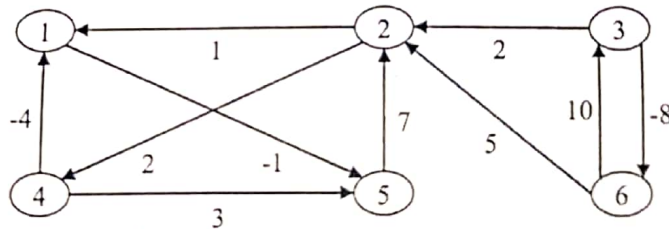
(Answer **ANY THREE** questions from this section in Script A)

1. a) What are the differences between performance analysis and performance measurement of an algorithm. (07)
- b) Consider a 0/1 Knapsack problem. Explain the application of dynamic programming and greedy algorithm to find an optimal solution. Give the two separate repetition of problem space and compare the time complexity of the algorithm under the said paradigm. (11)
- c) "Is the minimum spanning tree generated using both Krushkal's and Prim's unique" Explain your answer if you say 'yes' or give a counter example if you say 'no'. (09)
- d) Write the control abstraction for greedy method. (08)
2. a) Define BFS and DFS. What are the time complexity of BFS and DFS of a graph? (06)
- b) What is Spanning Tree? Use Prim's algorithm to determine the Minimum Cost Spanning Tree of the graph below. (10)



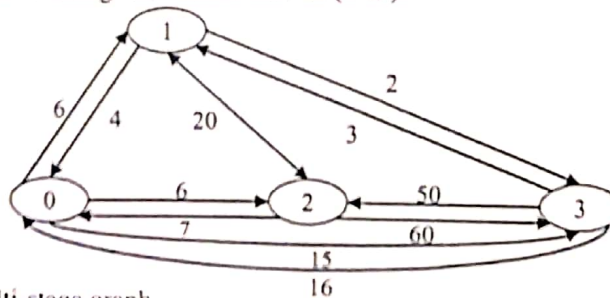
What is the total cost of the tree?

- c) Use example to distinguish between feasible solution and optimal solution for the case of Knapsack problem (07)
- d) Run the Floyd-Warshall algorithm on the weighted directed graph shown in the following figure. (12)



Show the Matrix (All pair) D^k that results for each iteration of the outer loop.

3. a) Define Implicit and Explicit constraints. Write Implicit and Explicit constraints for n-queens and Sum of Subset problems. (06)
- b) Consider the following Travelling Salesman Problem (TSP): (14)

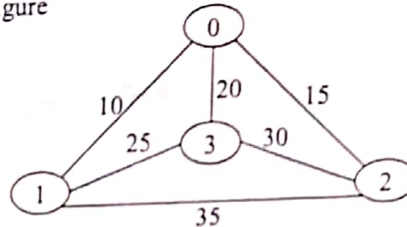


- i) Convert Multi-stage graph.
- ii) Find the minimum cost path in the Multi-stage graph (from (i)). Do this using the forward reasoning approach.

- c) Apply backtracking technique to solve the following instance of Subset Sum problem: (10)
 $S = \{1, 3, 4, 5, 8\}$ and $d = 16$. (05)
d) What are the differences between Branch-and-Bound and back tracking paradigm? (09)
4. a) Draw the State-space tree for 4-queen problem. How is the solution reduced from 4^4 to optimal solution? (13)
b) Consider the following table:

| i | 1 | 2 | 3 | 4 | 5 |
|-------|------|------|------|-----|------|
| P_i | 0.24 | 0.22 | 0.23 | 0.3 | 0.01 |

- Construct OBST for keys with the given probabilities. (13)
c) Consider the following figure



Find the optimal solution for TSP using Branch-and-Bound technique.

SECTION B

(Answer ANY THREE questions from this section in Script B)

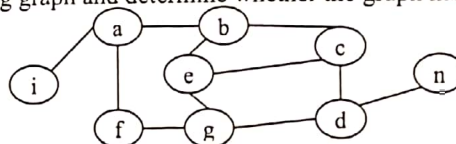
5. a) What do you mean by algorithm? Write down the basic characteristics of an algorithm. (10)
b) Define running time of an algorithm. Discuss some running time functions of an algorithm. (10)
c) Consider the code segments given in the following figure and calculate time frequency of each of the segments. (15)

```
i) for(i=0; i<n; i++)
{
    for(j=0; j<n; j=j*2)
    {stmtnt;}
}
```

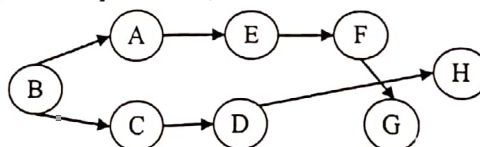
```
ii) p = 0;
for(i=1; i<n; i*2)
{ p++; }
for(j=1; j<p; j=j*2)
{stmtnt; }
```

```
iii) i = 1; k = 1;
while(k < n){
    stmtnt;
    k = k+i;
    i++; }
```

6. a) What do you mean by recurrence? What are the methods to solve the recurrence? Solve the following recurrences: (10)
i) $T(n) = 2T(\sqrt{n}) + \log(n)$
ii) $T(n) = T(n-a) + T(a) + n$
b) Give the best Big-Oh characterization for each of the following running time estimates (where n is the size of the input problem) (15)
i) $(n+1)^3$ ii) $\sum_{i=1}^n i$ iii) $n!$ iv) $6n^3 / (\log n + 1)$ v) $6 \cdot 2^n + n^2$
c) Define algebraic simplification. Explain the principal of algebraic simplification using dense polynomial representation. (10)
7. a) Let $C(x) = A(x) \times B(x)$, where $A(x) = 3x^2 + 4x + 1$ and $B(x) = x^2 + 2x + 5$. Now, find the resultant polynomial $C(x)$ using algebraic transformation and evaluation. (10)
b) "Any algorithm that computes the largest and smallest elements of a set of n ordered elements requires $(\lceil 3n/2 \rceil - 2)$ comparison." – Prove the statement. (05)
c) What is tight lower bound? Show that the lower bound of an insertion sort is tight. (10)
d) Consider the following graph and determine whether the graph has a cycle using DFS. (10)



8. a) Why do we need non-deterministic algorithm? Convert a deterministic search into a non-deterministic search. (10)
b) Justify the statement – "the Halting Problem is a NP-hard problem that is not NP." (06)
c) Discuss the basic paradigm to find space complexity of a recursive algorithm. (10)
d) Apply Topological sort in Lexicographical order of the graph mentioned in the following figure. If the graph has multiple answer, then mention all of them. (09)



KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2019
Department of Computer Science and Engineering
CSE 2207
Numerical Methods

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) What is Numerical Errors? Give examples and classify it if possible. (06)
 b) Using Bisection method find a root of the following equation: $x^2 - 4x - 10 = 0$; Iterate this procedure 7 times. (15)
 c) Determine Significant digit and apply (i) chopping (ii) symmetric round off errors [use four digit mantissa] of the following numbers: 0.0007596, 54×10^2 , 25.2594321 (09)
 d) Find a rule to determine largest possible root of a polynomial. (05)
2. a) Prove that "Division by Zero" may occur in Newton-Raphson method. (07)
 b) What are the underlying methodologies of False Position method? Derive it along with figures. (09)
 c) Find a root of the following equation using Secant method. $x^2 - 4x - 10 = 0$; Initial guess $x_1 = 2, x_2 = 4$. (12)
 d) Derive Newton-Raphson method using Taylor's series expansion. (07)
3. a) What are the limitations of linear interpolation? How are these limitations solved by Lagrange interpolation? (09)
 b) Considering the following set of data points, obtain the table of divided differences and use it to find Newton interpolation polynomial. (14)

| | | | | | |
|------|---|---|----|----|-----|
| x | 1 | 2 | 3 | 4 | 5 |
| f(x) | 0 | 7 | 26 | 63 | 124 |

- c) How does Secant method overcome the limitations of Newton-Raphson method? Explain with examples. (12)
4. a) Use Least Square regression to fit a power function model of the form $y = ax^b$ to the following data: (14)

| | | | | | |
|---|-----|---|-----|---|------|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 0.5 | 2 | 4.5 | 8 | 12.5 |

- b) From the concept of interpolation with equidistant point, show that $\Delta^j f_i = j! h^j f[x_i, x_{i+1}, \dots, x_{i+j}]$ (12)
- c) Estimate the value of $\sin \theta$ at $\theta = 25^\circ$ using the Newton-Gregory forward difference formula with the help of the following data: (09)

| | | | | | |
|---------------|--------|--------|-----|--------|--------|
| θ | 10 | 20 | 30 | 40 | 55 |
| $\sin \theta$ | 0.1736 | 0.3420 | 0.5 | 0.6428 | 0.8192 |

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) What do you mean by partial differential equation? Give an example. (10)
 b) What is Bender-Schmidt recurrence equation? Derive the formula. (12)
 c) Solve the equation $2f_{xx}(x, t) = f_t(x, t)$, $0 < t < 1.5$, $0 < x < 4$ given the initial condition $f(x, 0) = 50(4 - x)$, $0 \leq x \leq 4$ and the boundary conditions $f(0, t) = 0$, $0 \leq t \leq 1.5$ and $f(4, t) = 0$, $0 \leq t \leq 1.5$ (13)
6. a) How can you estimate the error of the Trapezoidal rule? Explain in brief. (10)
 b) Derive the formula for the Simpson's 1/3 rule. (12)
 c) Derive the general quadrature formula for equidistant ordinates and from there draw the equation for Simpson's 3/8 rule. (13)
7. a) Write the difference between Round-off errors and Truncation errors. (10)
 b) Derive the formula for modified Euler's method. (13)
 c) Use R-K method to estimate $y(0.4)$ when $y'(x) = x^2 + y^2$ with $y(0) = 0$ assume $h = 0.2$ (12)
8. a) Define unit matrix and how can you find the inverse of a matrix using unit matrix. (10)
 b) Suppose a matrix A will be factorized into L and U as $A = LU$. Find the equation for L and U . (13)
 c) Solve the following equations using Gauss Seidel iterative method. $2x - 6y - 8z = 24$; $5x - 4y - 3z = 2$; $3x + y + 2z = 16$. (12)

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY
B.Sc. Engineering 2nd Year 2nd Term Examination, 2019
Department of Computer Science and Engineering
CSE 2203

Microprocessors and Microcontrollers

TIME: 3 hours

FULL MARKS: 210

- N.B. i) Answer **ANY THREE** questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION A

(Answer **ANY THREE** questions from this section in Script A)

1. a) Explain the most important characteristics of a microprocessor. (05)
b) Describe how the Bus Interface Unit and Execution Unit interacts with each other to execute a specific instruction in 8086 with an appropriate figure. (10)
c) Show the process of calculating physical addresses of 8086 microprocessor with necessary figure(s). (08)
d) Illustrate the concept of parameter passing to or from a procedure using stack. (12)
2. a) Construct the binary code for each of the following instructions: (12)
i) AND BL, 0AH.
ii) MOV AX, [CX].
iii) IN AL, 0F0H.
b) Specify interrupt pointer table. Explain dedicated, reserved and available interrupt pointers using 8086 interrupt pointer table. (10)
c) What are the advantages of using a CPU register for temporary data storage over using a memory location? (05)
d) Compare the following instructions with proper examples. (08)
i) ROL and ROR
ii) IN and OUT
iii) RET and IRET
3. a) What is the role of Instruction Set Architecture (ISA) in computers? (05)
b) 'While using cascading, unused IR inputs of 8259A should be tied to ground' - Decide whether or not the above statement is correct and justify your answer with proper diagram. (10)
c) Explain five stage pipelining using RISC processor to achieve instruction level parallelism. (10)
d) (10)

| Instructions | Cycles |
|-------------------|--------|
| MOV BX, N1 | 4 |
| THERE: MOV CX, N2 | 4 |
| HERE: LOOP HERE | 17/5 |
| DEC BX | 2 |
| JNZ THERE | 16/4 |

If the system has a clock of 12MHz and N2 = FFFFH, find the value of N1 for a total delay of 1 second.

4. a) Suppose, you are trying to test various interrupt service procedures. Which of the following is more appropriate for this purpose? (10)
i) Software interrupt.
ii) Hardware interrupt.
iii) Interrupts generated by some error conditions.
Explain your answer with proper examples.
- b) Illustrate Reentrant procedure with necessary figure. Write down the conditions that are crucial for a procedure to be Reentrant. (10)
- c) Specify overflow interrupt. Describe two major ways to detect and respond to an overflow error in a program. (10)
- d) Demonstrate the different advantages of bit-slice microprocessors. (05)

SECTION B

(Answer **ANY THREE** questions from this section in Script B)

5. a) Write down the criteria for choosing a microcontroller. (08)
b) Explain the alternate function of Port 3 of 8051 microcontroller. (07)
c) Why do we need a math coprocessor? Convert -39.65 into single precision floating number form. (10)
d) Briefly explain the internal block diagram of a counter of 8254 programmable interval timer with proper illustration(s). (10)
6. a) Why do memories starting at even address take 1 cycle and odd address take 2 cycles in 8086 memory banks? Explain with proper diagram(s). (08)
b) Suppose, interrupts INT0, TF0 and INT1 of 8051 microcontroller activated at the same time. Assume that after reset, the interrupt priority is set by the instruction "MOV IP, #00001100B". Discuss the sequence in which the interrupts are serviced after setting this value to IP register of 8051 microcontroller. (09)
c) What is meant by Direct Memory Access (DMA)? Briefly describe the process to read a disk file and then write it to a memory location using DMA with appropriate figure(s). Also, explain the function of the following registers of 8237: CR, MASR and BR. (12)
d) Explain the function of TMOD register of 8051 microcontroller with appropriate figure(s). (06)
7. a) Explain the following timer mode operation of 8051 microcontroller using necessary figure(s): (12)
 i) Timer Mode 0
 ii) Timer Mode 1
 iii) Timer Mode 2
 iv) Timer Mode 3
b) How can $16,384 \text{ segments} \times 65,536 \text{ bytes/segment}$ or about 1Gbytes of logical or virtual address space be achieved? Explain with necessary figures. (10)
c) Illustrate the paging memory management mode of 80386 with proper diagram. (13)
8. a) Suppose, 80286 microprocessor is currently working in real address mode. Now, it needs to switch into the protected address mode. Write the switching procedure from real address mode to protected address mode in 80286 microprocessor. (08)
b) Differentiate between counter latch command and read back command of 8254 programmable interval timer. Explain the following operational modes of 8254 programmable interval timer: (12)
 i) Interrupt on terminal count.
 ii) Software triggered strobe.
c) Briefly explain "Register Banks" of 8051 microcontroller with a proper diagram. (05)
d) Explain Overlays and Bank Switching memory management methods with proper illustrations. (10)