May 2018.

S.E. Sem IV (Choice Base)(IT)
Applied Mathematics IV

Q. P. Code: 37498

Hours: 3 hrs **Marks: 80**

Note: 1. Question no. **1** is compulsory.
2. Attempt any **three** questions out of remaining **five** questions.

Q.1.[a] A random discrete variable x has the probability density function given [5]

x	-2	-1	0	1	2	3
P(x)	0.2	k	0.1	2k	0.1	2k

Find (i) k (ii) E(X) (iii) V(X).

[b] Find smallest positive integer modulo 5, to which $3^2.3^3.3^4.3^{10}$ is congruent. [5]

[c] Given two lines of regression lines $6y = 5x + 90,\ 15x = 8y + 130$. [5]
Find (i) $\bar{x}$, $\bar{y}$ (ii) correlation coefficient r.

[d] Show that $G = \{1, -1, i, -i\}$ is a group under usual multiplication of complex number. [5]

Q.2.[a] Show that $111^{333} + 333^{111}$ is divisible by 7. [6]

[b] The following table gives the number of accidents in a city during a week. Find whether the accidents are uniformly distributed over a week. [6]

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
No. of accidents	13	15	9	11	12	10	14	84

[c] **(i)** Write the following permutation as the product of disjoint cycles [8]
f = (1 3 2 5) (1 4 5) (2 5 1).
(ii) Simplify as sum of product (A+B) (A+B′) (A′+B) (A′+B′).

Q.3.[a] Find gcd (2378, 1769) using Euclidean Algorithm. Also find x and y such that [6]
$2378x + 1769y = \gcd(2379,1769)$.

[b] Give an example of a graph which has [6]
(i) Eulerian circuit but not a Hamiltonian circuit
(ii) Hamiltonian circuit but not an Eulerian circuit
(iii) Both Hamiltonian circuit and Eulerian circuit

[c] Show that $(D_{10}, \leq)$ is a lattice. Draw its Hasse diagram. [8]

Q.4.[a] Calculate the coefficient of correlation between x and y from the following data [6]

x	23	27	28	29	30	31	33	35	36	39
y	18	22	23	24	25	26	28	29	30	32

[b] Let G be a group of all permutations of degree 3 on 3 symbols 1, 2 & 3. Let H ={I, (1 2)} be a subgroup of G. find all the distinct left cosets of H in G and hence index of H. [6]

[c] **(i)** The average marks scored by 32 boys is 72 with standard deviation of 8 while that for 36 girls is 70 with standard deviation of 6. Test at 5% LOS whether the boys perform better than the girls. [8]
(ii) A random sample of 15 items gives the mean 6.2 and variance 10.24. Can it be regarded as drawn from a normal population with mean 5.4 at 5% LOS?

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Q.5.[a] Derive mgf of Binomial distribution and hence find its mean and variance. [6]

[b] It was found that the burning life of electric bulbs of a particular brand was normally distributed with the mean 1200 hrs and the S.D. of 90 hours, Estimate the number of bulbs in a lot of 2500 bulbs having the burning life: (i) more than 1300 hours (ii) between 1050 and 1400 hours. [6]

[c] **(i)** Find inverse of $8^{-1} \pmod{77}$ using Euler's theorem. [8]

(ii) Find the Jacobi's symbol of $\left(\frac{32}{15}\right)$.

Q.6.[a] Solve $x \equiv 1(\text{mod } 3),\ x \equiv 2(\text{mod } 5),\ x = 3 \pmod{7}$. [6]

[b] Given L = {1, 2, 4, 5, 10, 20}with divisibility relation. Verify that $(L, \leq)$ is a distributive but not complimented Lattice. [6]

[c] **(i)** Draw a complete graph of 5 vertices. [8]

(ii) Give an example of tree. (sketch the tree).

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SE/sem-IV (Choice Based)/INFT/computer Networks

Q. P. Code: 38761

[Time: Three Hours]

[Marks: 80]

Please check whether you have got the right question paper

N.B.:

1. Question number **ONE** is compulsory
2. Attempt any **THREE** questions from question 2 to 6
3. Figures to the right indicate full marks.

Q. 1. Answer any **FOUR** from the following 20

a) What are the routing devices in computer network? Explain each of them in brief.

b) Compare lossy with lossless data compression technique.

c) List five nonproprietary Internet applications and the application-layer protocols that they use.

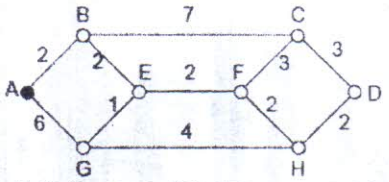
d) Examine the advantages of LAN, WAN and MAN.

e) Examine problems in Application Layer.

Q. 2 a) Explain TCP network model for network communication. Hence, choose a layer which is responsible for routing of packets. 10

Q. 2 b) Explain Client-Server communication architecture. 10

Q. 3 a) Create a shortest path between node A and D 10



Q. 3 b) What is IP? Explain IPv6 Header. 10

Q. 4 a) Justify that the Stop-and-Wait protocol is not good for network communications. 10

Q. 4 b) Justify Hamming Code is error detection and correction code. 10

Q. 5 a) What is MACA? Explain by giving suitable example. 10

Q. 5 b) What is carrier sense? Explain any one carrier sense protocol. 10

Q. 6. Answer any **FOUR** from the following 20

a) Examine different types of ALOHA.

b) What is broader gateway protocol (BGP) Explain BGP in brief.

c) Why do HTTP, FTP, SMTP, and POP3 run on top of TCP rather than on UDP?

d) Compare various data flow control techniques.

e) What is classful addressing? Explain difference classes of IP address.

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SE/INFT/Sem-IV [CHOICE BASED] / Operating Systems / May-2018

Q.P.Code: 40533

(3 hours) **[80 marks]**

NOTE: Question No 1 is compulsory
Attempt any three questions from remaining.
Assume suitable data if necessary.

Q.1. a) What are the major activities of an Operating system with regard to file management and memory management? 10M

b) Compare and contrast stateless and stateful service with the help of an example. 10M

Q.2. a) Explain with the help of an example, which of the following scheduling algorithms could result in starvation? 10M

a. First-come, first-served
b. Shortest job first
c. Round robin
d. Priority

b) What resources are used when a thread is created? How do they differ from those used when a process is created? 10M

Q.3. a) Show that, if the wait () and signal () semaphore operations are not executed atomically, then mutual exclusion may be violated. 10M

b) Consider the following snapshot of a system: 10M

	Allocation	*Max*	*Available*
	ABCD	*ABCD*	*ABCD*
Po	0012	0012	1520
pl	1000	1750	
p2	1354	2356	
p3	0632	0652	
p4	0014	0656	

Answer the following questions using the banker's algorithm:
a. What is the content of the matrix *Need?*
b. Is the system in a safe state?
c. If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?

Q.4. a) With the help of a neat labeled diagram, explain the hardware support with TLB for paging. 10M

b) Consider the following page reference string: 10M

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, and seven frames?
Remember that all frames are initially empty, so your first unique pages will cost one fault each.

- LRU replacement
- FIFO replacement
- Optimal replacement

Q.5. a) Justify the statement: Demand paging can significantly affect the performance of computer system. 10M

b) Compare and contrast given allocation methods: Contiguous allocation, Linked allocation, Indexed allocation. 10M

Q.6. Write Short Notes on: (Any four) 20M

a) Just-in-time compiler.
b) Memory segmentation
c) Deadlock avoidance in distributed system.
d) Operating System Schedulers
e) File system organization
f) Two-phase locking protocol

S.E. (IT) Sem IV (Choice Base) May 2018

COA.

Q.P.Code: 37701

(3 Hours) [Total Marks: 80

N.B.: (1) Question No. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five.**
(3) Figures to **right** indicate **full** marks.
(4) Assume suitable **data** where **necessary.**

1. Solve any four out of five sub questions. [04 x 05=20]
   a) Differentiate between minimum and maximum mode of operation of 8086 microprocessor.
   b) Explain any five arithmetic instructions of 8086 microprocessor with suitable examples.
   c) Draw and explain basic instruction execution cycle.
   d) Describe Nano programming.
   e) Explain the hierarchical organization of computer memory.

2. a) Explain with suitable diagram architecture of 8086 microprocessor. 10
   b) Explain hardwired approach to the design of a control unit. 10

3. a) Represent the number $(-0.125)_{10}$ in single and double precision IEEE 754 binary floating point representation formats. 10
   b) Write 8086 Assembly Language Program to convert two digit packed BCD number to unpacked BCD number. 10

4. a) Identify the addressing modes of following instructions and explain their meaning. 10
      I. MOV AX, 1000
      II. MOV AX, [1000]
      III. MOV AX, BX
      IV. MOV [BX], AX
      V. MOV AX, [SI+200]
   b) Draw the flowchart of Booths algorithm and multiply (-7)*(3)using Booths algorithm. 10

5. a) Explain working of DMA and its different configurations. 10
   b) Explain different cache memory mapping techniques. 10

6 Write notes on (**any two**) 20
   a) Interleaved and Associative memory.
   b) Interrupt driven I/O
   c) Pipeline Hazards

B.E. (IT) Sem IV (Choice Base) May 2018

Automata Theory

Q. P. Code: 40016

Duration: 3 Hours Marks :80

Note :

1. Question No.1 is compulsory.
2. Attempt any three question form remaining question.
3. Draw suitable diagram whenever necessary.
4. Assume suitable data if, necessary.

Q.1:

a) Design FA for decimal number divisible by 4 (05)

b) Write a regular expression for $a^n b^m c^k$ where n+m is odd and k is even (05)

c) Design NFA for binary number divisible by 4 or 6 (05)

d) Design Moore machine for binary adder. (05)

Q.2:

a) Convert the following Regular Expression to NFA with Null moves , then convert it to DFA (10)
$(0+1)^* 011 (0+1)^*$

b) Give the Regular expression and corresponding DFA for all the words that begin and end with double letter (10)

Q.3:

a) Design the Turing machine for $a^n b^n c^n$ **where** $n \geq 1$. (10)

b) Write a Right linear grammar and left linear grammar for RE $(0+1)^*0$ and show derivation tree for 1010110. (10)

Q.4:

a) Construct CFG for the following

i. Alternate sequences of 0 and 1. (03)

ii. Do not contain 3 consecutive b's (04)

iii. $a^n b^m c^k$ where k=n+m (03)

b) Design CFG for $a^n b^n$ **where** $n \geq 1$ and convert it to Chomsky's Normal form (10)

Q.5:

a) What is Ambiguous Grammar, find if the following grammar is ambiguous or not? (10)

S--> S+S

S-->S*S

S-->a

S-->b

b) Design PDA for odd length palindrome, **let** $\Sigma = \{0,1\}$, $L = \{ W X W^R$ **where** $W \in \Sigma^* \}$ (10)

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Q.6:

a) Design Turing machine which adds 2 unary numbers and convert the Turing machine design to a Program (12)

b) Explain the Applications of Automata (FM,PDA,TM) in detail with example (08)

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