Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: CS202
Course Name: COMPUTER ORGANIZATION AND ARCHITECTURE (CS, IT)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions. Each carries 3 marks.

1	Write the three-address, two-address and one-address representations of the operation below with relevant assumptions: $C \leftarrow [A] + [B]$	3
2	What is the use of linkage register in subroutine invocation?	3
3	Why is non-restoring division faster than restoring division?	3
4	Design and draw a 3X2 array multiplier.	3

PART B
Answer any two questions. Each carries 9 marks.

5		Illustrate various addressing modes with proper examples. Which is the default addressing mode selected by assemblers and compilers and why?	9
6		Give the flow chart for Booth's Algorithm. Illustrate using an example.	9

7	(a)	Assuming that stack grows towards lower address range write assembly code for the following (Without using PUSH and POP) :
		   (i) Pushing elements stored at ITEM1, ITEM2 onto stack
		   (ii) Popping an element onto address ITEM
		   (iii) Copying value of top of stack to address TOP
			4.5

7	(b)	Compare and contrast single bus and multiple bus organisation of CPU.	4.5

PART C
Answer all questions. Each carries 3 marks.

8	Compare the two main modes of DMA transfer.	3
9	Explain any two interrupt priority schemes.	3
10	What is MFC signal? How is it related to Memory Access Time?	3
11	Which design feature of SRAM cells helps in value retention without refresh?	3

PART D
Answer any two questions. Each carries 9 marks.

12		Illustrate with an example SCSI bus arbitration and selection.	9
13		With the help of a diagram examine the internal organisation of bit cells in a memory chip.	9
14	(a)	Explain the architecture of USB with help of a diagram.	4.5
14	(b)	Differentiate Direct and Associative mapped cache with examples.	4.5

PART E
Answer any four questions. Each carries 10 marks.

15	Give a simple design for generating status bits for a 8-bit ALU.	10
16	Draw a labelled block diagram of a processor unit with seven registers R1 to R7,a status register,ALU with 3-selection variables and $C_{in,}$ and shifter with 3 selection variables.	10
17	With the help of a flowchart for sign-magnitude addition/subtraction, explain the steps involved in developing a hardwired control unit.	10
18	Using a block diagram analyse the design of a microprogram control for a processor unit.	
19	What is a control word? With the help of proper illustrations and assumptions show how a designer would compose a control word for the processor unit.	10
20	With the help of a diagram establish the functioning of microprogram sequencer in a microprogram controlled processor.	10

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B   **D1012**   **Pages: 2**

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019
Course Code: CS202
Course Name: COMPUTER ORGANISATION AND ARCHITECTURE (CS, IT)
Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions,each carries 3 marks

1	Explain one, two and three address instruction with an example for each.	3
2	List the steps involved in invoking a subroutine through the use of a link register.	3
3	Draw a 3 x 2 array multiplier.	3
4	Non-restoring division is faster than restoring division. Justify the statement.	3

PART B
Answer any two questions, each carries 9 marks

5		List various addressing modes explain any four with an example for each.	9
6	a)	Draw the diagram of a multi-bus organization with 3 buses. Write the control sequence for the instruction Add R4, R5, R6 for the above mentioned multi-bus organization.	5
	b)	Give the sequence of control steps required to perform the operation Add [R3], R1 in a single-bus organization.	4
7	a)	Divide $(1000)_2$ by $(11)_2$ using restoring division method.	4
	b)	Illustrate the basic operational concepts in transferring data between main memory and processor with neat diagram.	5

PART C
Answer all question, each carries 3 marks

8	What are vectored interrupts?	3
9	Give the functions of initiator and target controllers in SCSI bus.	3
10	Compare synchronous and asynchronous DRAM.	3
11	Define temporal locality and spatial locality.	3

PART D
Answer any two questions, each carries 9 marks

12	a)	Differentiate centralized and distributed bus arbitration mechanism used in DMA.	4
	b)	Give the structure of a typical static RAM cell and explain its read and write operations.	5

13   Differentiate serial port and parallel port. Draw the diagram of a bidirectional 8-bit parallel interface and explain its working.   9

14   Elaborate the various cache mapping techniques with an example for each.   9

PART E

Answer any four questions, each carries 10 marks

15 a) Write the Register Transfer Logic format for a conditional control statement. Give an example and explain the same.   4

    b) Mention the advantages of using a scratch pad memory. Draw the diagram of a processor that employs a scratch pad memory and explain the same.   6

16 a) Design an adder/subtractor circuit with one selection variable s and two inputs A and B. When $s = 0$ the circuit performs $A + B$. When $s = 1$ the circuit performs $A - B$ by taking 2's complement of B.   5

    b) Design a 4-bit combinational logic shifter with 2 control signals H_1 and H_0 that performs the following operations (bit values given in parenthesis are the values of control variables H_1 and H_0 respectively):- No shift (00), Shift-right (01), Shift-left (10), Transfer 0's to S (11).   5

17 a) Draw and explain the block diagram for a 4-bit complete accumulator

6

    b) Discuss about condition code bits in a 4 bit status register   4

18   Design a hard-wired control unit based on the one flip-flop per state method to add/subtract 2 signed numbers represented in the sign-and-magnitude form.   10

19   Explain the organization of a microprogrammed computer with a block diagram

10

20   Draw a neat block diagram of a microprogram sequencer and explain its working.   10

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: CS202
Course Name: COMPUTER ORGANISATION AND ARCHITECTURE

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks

1	Give the relevance of MAR, PC and IR in a typical computer system with neat diagram.	3
2	Differentiate between Big-endian and Little-endian assignment for word addressing.	3
3	Illustrate the advantages of using multiple bus organization over single bus organization with the help of a sample instruction execution.	3
4	Divide 25 by 8 using restoring division algorithm.	3

PART B
Answer any two questions, each carries 9 marks

5	a)	Define Addressing mode and explain Different types of addressing modes with an example for each.	6
	b)	Show the effect of stack operations on the stack with diagram.	3
6	a)	What is meant by instruction sequencing? Discuss the different types of instruction sequencing with example.	4
	b)	Illustrate Booth multiplication with an example	5
7	a)	Discuss the data path inside the processor with single bus organization with neat diagram	4
	b)	Write down the control sequence for the execution of the instruction *Add (R1), R2* in single bus organization	5

PART C
Answer all question, each carries 3 marks

8	Discuss the different ways of accessing I/O devices of a computer system.	3
9	Explain the daisy chain method with neat diagram	3
10	Justify the need of memory hierarchy in a computer and discuss the various parameters that are considered for the formation of memory hierarchy.	3
11	Discuss about different types of RAMs.	3

PART D

Answer any two questions, each carries 9 marks

12 a) What is interrupt? Discuss the differences between subroutine and interrupt service routine.   4

    b) Describe the different bus arbitration techniques for DMA data transfer.   5

13 a) Explain semiconductor ROM memories   4

    b) Discuss the SCSI protocol for a complete disk read operation by listing out the sequence of events involved in it.   5

14 a) How do you relate set associative mapped cache with Direct mapped and associative mapped cache mechanisms?   3

    b) Design a 64K x 8 memory module using 16K x 1 static memory chips.   6

PART E

Answer any four questions, each carries 10 marks

15 a) Write short notes on Arithmetic , logic and shift microoperations with examples 6

    b) Show the block diagram that executes the following conditional control statements

        $C' \, T_2 : F \leftarrow A$ 4

        $C \, T_2 : F \leftarrow B$ where C is the conditional variable and A, B , F are registers

16   Draw the block diagram of a processor unit with 16 selection variables and discuss the functions of selection variables. Derive the control word for the micro operation $R1 \leftarrow R1 - R2$.   10

17   Discuss the major operations that can be performed by a parallel adder in the design of arithmetic circuit.   10

18   Discuss the different methods of control logic design in detail   10

19   Describe the organization of micro program sequencer with neat diagram. Also provide its address sequencing capabilities.   10

20   Explain the horizontal and vertical microinstructions in microprogrammed control.   10

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CS202

Course Name: COMPUTER ORGANISATION AND ARCHITECTURE (CS, IT)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks

1	What is meant by zero- address instruction?	(3)
2	Design 2×2 array multiplier.	(3)
3	Autoincrement mode is useful for accessing data items in successive memory locations. Justify the statement.	(3)
4	Draw the flowchart for Booth's Multiplication algorithm.	(3)

PART B
Answer any two questions, each carries 9 marks

5	a)	How the byte addresses are assigned across word?	(5)
	b)	Explain the execution of a complete instruction.	(4)
6	a)	Specify the actions needed to execute the instruction Move (R1), R2	(5)
	b)	What is the role of processor stack in subroutine call and return?	(4)
7	a)	Explain restoring method of division with the help of a flow chart.	(5)
	b)	Compare and contrast single bus and multiple bus organization of processor.	(4)

PART C
Answer all question, each carries 3 marks

8	What is the function of interrupt-service routine?	(3)
9	How the time involved in polling process is reduced in interrupted I/O?	(3)
10	Write notes on synchronous DRAM.	(3)
11	Illustrate LRU cache replacement algorithm.	(3)

PART D
Answer any two questions, each carries 9 marks

12	a)	Differentiate the data transfer in programmed I/O and interrupt driven I/O	(5)
	b)	Write about the DMA controller registers that are accessed by the processor to initiate data transfer.	(4)

13 a) Differentiate between associative mapping and set associative mapping. (5)

    b) Illustrate the operation of the Small Computer System Interface bus. (4)

14 a) Describe different types of ROM (5)

    b) A computer system uses 32-bit memory addresses and it has a main memory (4)
        consisting of 1G bytes. It has a 4K-byte cache organized in the set-associative
        manner, with 4 blocks per set and 64 bytes per block. Calculate the number of bits
        in each of the Tag, Set, and Word fields of the main memory address.

PART E

Answer any four questions, each carries 10 marks

15 a) What are conditional control statements? Represent the following conditional 4
        control statement by two register transfer statements with control functions.

        $If\,(P=1)\,then\,(R1\leftarrow R2)\,\,else\,if\,(Q=1)\,then\,(R1\leftarrow R3)$

    b) Write notes on status register 6

16 a) Explain horizontal and vertical micro instructions, with suitable examples. 5

    b) Explain how control signals are generated in one flip flop per state control logic 5
        with the help of a diagram

17   Outline the organisation of a full processor unit showing the control inputs to all 10
        components. Show with the help of an example, how an instruction is
        implemented by giving necessary control inputs to different parts of the processor.

18   Illustrate the basic arithmetic microoperations in a 4 bit ALU with the help of a 10
        parallel adder.

19   Explain with the help of an example how control signals are generated using 10
        hardwired control.

20   Describe the purpose of microprogram sequencing. How is it carried out? 10

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: CS204
Course Name: OPERATING SYSTEMS (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions. Each carries 3 marks.

1   What are the advantages of peer-to-peer systems over client-server systems?
2   What are the advantages of loadable kernel modules?
3   Which are the different process states?
4   What is the use of pipe system call?

PART B
Answer any two questions. Each carries 9 marks.

5   a)   Differentiate between the operating System structures?   (6)
    b)   How does the use of bit-maps becomes space efficient?   (3)
6   a)   Explain the process creation in Unix with the help of suitable example.   (6)
    b)   What is a PCB(Process Control Block)?   (3)
7   a)   Describe the differences among short-term, medium-term and long-term (6)
         scheduling?
    b)   With the help of a diagram, describe the actions taken by the kernel to context (3)
         switch between process?

PART C
Answer all questions. Each carries 3 marks.

8   What are the three requirements to Critical Section Problem?
9   Describe how semaphores can be used as a synchronisation mechanism?
10   What is the main problem with Shortest Job First scheduling and what is its
        solution?
11   What are the conditions that lead to a deadlock?

PART D
Answer any two questions. Each carries 9 marks.

12   Enumerate any three classical problems of synchronisation?   (9)
13   Draw the Gantt Chart , find the average waiting time for the following algorithms (9)
          i) FCFS ii) Pre-emptive Priority   iii)Non-pre emptive priority

Process	Arrival Time(ms)	Burst time(ms)	Priority
P1	0	8	4
P2	2	6	1
P3	2	1	2
P4	1	9	2
P5	3	3	3

14 a)   Discuss how Resource Allocation Graph can be used for deadlock avoidance?   (5)

b) What are the measures to recover from a deadlock? (4)

PART E
Answer any four questions. Each carries 10 marks.

15 a) Given six memory partitions of 100KB,500 KB,200 KB,300 KB,600 KB (in (5) order),how would the first-fit, best-fit and worst-fit algorithms place processes of size 212KB,417 KB,112 KB,426KB(in order). Rank the algorithms in terms of how efficiently they use memory.

    b) Consider a logical address space of 64 pages of 1024 words each, mapped onto a (5) physical memory of 64 frames.
a. How many bits are required in the logical address?
b. How many bits are required in the physical address?

16 a) Discuss the concept of Virtual File Systems? (4)

    b) Suppose that a disk drive has 200 cylinders numbered from 0 to 199.The disk is (6) currently servicing at cylinder 100 and the previous request was at cylinder 120.The queue of pending requests in FIFO order is 23,89,132,42,187. Starting from the current head position, what is the total distance(in cylinders) that the disk arm moves to satisfy all the pending requests for each of the scheduling algorithms? i)FCFS ii)SSTF iii)SCAN

17 a) Which are the different access methods of a file? (4)

    b) What are the different allocation methods of a file? (6)

18 a) Discuss the principles of protection? (3)

    b) How access matrix is used as a protection mechanism? (7)

19 a) Consider the following segment table: (5)

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?
    i. 0,430
    ii. 1,10
    iii. 2,500
    iv. 3,400
    v. 4,112

    b) How is segmentation different from paging? (5)

20 a) Discuss the different aspects of contiguous memory allocation? (5)

    b) Discuss the steps in handling a page fault? (5)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CS204
Course Name: OPERATING SYSTEMS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions. Each carries 3 marks.

1	Why does an Operating System require dual mode operations?	3
2	Write short notes on clustered systems	3
3	With the help of a suitable example, explain process creation.	3
4	Differentiate between Short term, Medium term and Long term schedulers	3

PART B
Answer any two questions. Each carries 9 marks.

5	a)	Discuss any two Kernel Data structures	4
	b)	Explain briefly any five services provided by an OS.	5
6	a)	Explain the process of booting.	5
	b)	What is context switch? Why context switch is considered to be an overhead to the system?	4
7	a)	List out the List out the advantage of process cooperation	3
		How IPC using shared memory is implemented using Bounded buffer	6

PART C
Answer all questions. Each carries 3 marks.

8	What are the requirements to be satisfied by the solution to the critical section problem?	3
9	Explain Dining Philosophers problem.	3
10	Write any three criteria to be considered for comparing CPU scheduling algorithms?	3
11	What is the limitation of multilevel queue scheduling? How it is overcome in multilevel feedback queue scheduling	3

PART D
Answer any two questions. Each carries 9 marks.

12		Define semaphore with its operations. What are the two types of Semaphores?	9
13	a)	How indefinite blocking can be solved in priority scheduling	3
	b)	Find the average waiting time for pre-emptive and non pre-emptive SJF scheduling for the following set of processes	

Process	Arrival time	Burst time	
P1	0	8	
P2	2	4	
P3	4	9	
P4	5	5	6

14   Consider the following snapshot of a system

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using Bankers algorithm

a. What is the content of "*Need*" matrix?   2

b. Is the system in a safe state? Justify your answer.   4

c. If a request from P1 arrive for (0 4 2 0), can the request be granted immediately   3

PART E

Answer any four questions. Each carries 10 marks.

15 a) Explain the concept of paging.   4

b) With the help of a diagram, explain logical address to physical address translation   6
in paging. Illustrate with an example.

16 a) Describe contiguous memory allocation.   5

b) Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and   5
125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place
processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)?
Rank the algorithms in terms of how efficiently they use memory.

17 a) Explain Optimal page replacement and LRU algorithms for page replacement   3

b) Find the number of page faults for the following page reference string with 3 page
frames for Optimal page replacement and LRU algorithms.

2 3 4 2 1 3 7 5 4 3   7

18 a) Explain "Elevator" algorithm for disk scheduling with example.   4

b) Total cylinders in a disk is 5000 [0-4999]. Header is at position 143; previous
request is for 125, request queue is 86,1470, 913, 1774, 948, 1509, 1022, 1780, 130

Find the seek time for

 (i) FCFS   3

 (ii) SSTF   3

19 a) Briefly explain about file attributes   4

  b) Explain any two file allocation methods   6

20 a) Explain protection goals and principles of Operating System. 5

  b) How protection is implemented using access matrix?   5

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CS204

Course Name: OPERATING SYSTEMS (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions. Each carries 3 marks.

1	Write the differences between time sharing systems and multiprogramming systems.	3
2	What is the use of Process Control Block (PCB) in operating system?	3
3	How many times "Welcome" will be printed for the following code? void main() { fork(); fork(); fork(); printf ("Welcome\n");}	3
4	In a multiprocessor computer system bitmap is used for keeping track of the status 8 processors in the system. How many bits will be there in the bitmap? If processor0, processor3 and processor5 are currently allocated write the bitmap.	3

PART B
Answer any two questions. Each carries 9 marks.

5	a)	What do you understand by the layered structure of an Operating System? Point out its advantages and disadvantages.	5
	b)	How the long term scheduler directly affects the system performance?	4
6	a)	Write the operations taking place during the booting of a system.	4
	b)	In a message passing system how the send() / receive() operations and communication link is implemented in case of direct and indirect communication?	5
7	a)	Mention the purpose of system call. How the parameter passing takes place in system call.	5
	b)	What is process cooperation? What are the benefits of process cooperation?	4

PART C
Answer all questions. Each carries 3 marks.

8	What is meant by critical section? What is critical section problem?	3
9	Illustrate how semaphores can be used as a synchronisation mechanism?	3
10	What do you understand by starvation in operating systems? How starvation can be solved in priority scheduling?	3
11	Write the four situations under which CPU scheduling decisions take place.	3

PART D
Answer any two questions. Each carries 9 marks.

12 a) Give the solution for dining philosopher's problem using monitor.   6

    b) What are the three conditions to be satisfied to ensure solution to critical section   3
        problem?

13 a) What is the relevance of mutual exclusion to avoid race condition?   3

    b) Consider the following set of processes, with the length of the CPU burst time   6
        given in milliseconds.

Process	Burst time	Arrival time
P1	13	0
P2	9	2
P3	5	2
P4	7	3

   i) Draw Gantt chart to show execution using pre-emptive SJF and Round Robin
   (time quantum=3) scheduling.
   ii) Calculate average waiting time for each of the above scheduling algorithms.

14 Consider the following snapshot of a system with five processes P0,P1, P2, P3,   9
    P4 and four resources A,B,C and D

Process	Max	Allocation	Available
	A B C D	A B C D	A B C D
P0	0 2 1 0	0 1 1 0	1 5 2 0
P1	1 6 5 2	1 2 3 1	
P2	2 3 6 6	1 3 6 5	
P3	0 6 5 2	0 6 3 2	
P4	0 6 5 6	0 0 1 4	

Using Banker's algorithm, answer the following questions:-
i) How many instances of resources A, B, C, D are there?
ii) What is the content of Need matrix?
iii) Is the system in a safe state? If it is, find the safe sequence.

PART E

Answer any four questions. Each carries 10 marks.

15 a) Consider the following page reference string :   7
        7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0
        Indicate page faults and calculate total number of page faults for FIFO algorithm,
        assuming that number of frames as three and four. Remember initially all the
        frames are empty. Check whether Belady's anomaly happens.

    b) Does paging suffer from fragmentation? Justify your answer.   3

16   Consider a simple paging system with 8KB page size and a page table with each   10
      entry of size 4 bytes. Answer the following questions.
      (i) How many bits are used for representing the page offset value?
      (ii) What is the size of the physical memory (in bytes) that can be addressed?
      (iii) Calculate the amount of internal fragmentation for a process of size 205KB.
      (iv) Is it possible to load a process of size 98KB if there are 12 free frames.
      Justify your answer.
      (v) How many frames are required for storing a process of size 331KB?

17   a)   Explain the terms (i) Dynamic Loading (ii) Dynamic Linking   4

      b)   Consider a fixed partitioned memory management scheme with fixed partitions   6
           are 150K, 300K, 550K, 400K, 250K and 200K (in order). Five processes are
           ready for execution each with memory requirement as P1(240K), P2(120K),
           P3(380K), P4(300K) and P5(350K). Write the allocation in each of the following
           cases and calculate the internal fragmentation and external fragmentation (if any)
           in each case.
           (i) First Fit   (ii) Best Fit

18   a)   What are the advantages of indexed allocation of file space?   4

      b)   Explain the techniques used for managing free space in disk.   6

19   a)   On a disk with 1000 cylinders numbered 0 to 999. Compute the number of tracks   6
           the disk arm must move to satisfy the entire request in the disk queue. Assume the
           last request was at track 350. The queue in FIFO order contains requests for the
           following tracks 240,750,630,530,500 and 360. Starting from the current position,
           what is the total distance (in cylinders) that the disk arm moves to satisfy all the
           pending requests for the following disk scheduling algorithms?
                            (i) SSTF   (ii) LOOK

      b)   Write short notes on protection domain.   4

20   a)   Differentiate physical formatting and logical formatting of a magnetic disk.   4

      b)   Explain any three techniques used for implementation of access matrix.   6

D   **S2012**   **Pages: 2**

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CS206

Course Name: OBJECT ORIENTED DESIGN AND PROGRAMMING (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.

Marks

1   Draw the Use Case diagram of online railway ticket reservation system   (3)

2   Why are java programs said to be platform independent?   (3)

3   What is a constructor? What are its uses?   (3)

4   Why is the *main* method in java qualified as public, static, and void?   (3)

PART B
Answer any two full questions, each carries 9 marks.

5   a)   Represent the following class diagram as a java class.   (5)

Shape
- length -breadth -width
+read( ) #calculateArea( ) +calculateVolume( )

  b)   Write briefly about any fourfeatures of Java.   (4)

6   a)   Write a java program to check whether a given number is prime or not.   (4)

  b)   Show the use of different types of shift operators in java with the help of suitable examples.   (5)

7   a)   Draw a table showing the visibility of all access specifiers available in java language with respect to; same class, same package sub-class, same package non sub-class, different package sub-class, different package non sub-class.   (6)

  b)   Is it possible create an object for a class A using, A ob = new A(); if the class contains only parameterized constructor? Justify.   (3)

PART C
Answer all questions, each carries 3 marks.

8   Does importing a package makes available all classes, interfaces and sub-packages within it? Justify.   (3)

9   What are the uses of "*finally*" statement in exception handling?   (3)

10   List the sub-classes of Writer and Reader character oriented stream classes   (3)

11   Draw the lifecycle of a thread showing the different states and methods invoked.   (3)

PART D
Answer any two full questions, each carries 9 marks.

12

a)   Differentiate between Abstract class and Interface   (4)

b)   Explain the scenario under which the following three exceptions occur,   (5)
     NumberFormatException, ArithmeticException, and
     ArrayIndexOutOfBoundsException.

13   a)   Write a java program to create two threads, one for writing odd numbers and   (6)
          another for writing even numbers up to 100 into two different files.

b)   What are the uses of "*synchronized*" keyword?   (3)

14   a)   Demonstrate how polymorphism can be implemented using method overriding   (6)
          with suitable example.

b)   What is an exception? Why it needs to be handled?   (3)

PART E
Answer any four full questions, each carries 10 marks.

15   a)   Explain briefly about the Delegation Event model.   (5)

b)   List any five event sources and their corresponding generated event typeand   (5)
     listeners used.

16   a)   Describe the different character extraction methods of String class along with   (5)
          their syntax.

b)   How does an applet differ from a java application?   (5)

17   Write a java program to count the occurrence of a particular word within a   (10)
        sentence using string handling methods.

18   Write a java AWT based program to display Fibonacci numbers in a List control   (10)
        up to a limit entered using TextField. The event handling as well as code for
        clearing the components must be provided.

19   a)   What are the advantages of using Swings?   (4)

b)   Explain any three graphics related methods along with their syntax.   (6)

20   Write the steps for connecting a java program to a database, executing a select   (10)
        query, and fetching the results with sample code.

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019
Course Code: CS206
Course Name: OBJECT ORIENTED DESIGN AND PROGRAMMING (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.   Marks

1	Explain the terms: Polymorphism and Encapsulation	(3)
2	Consider a Banking System. Identify three entities in the system which can be represented using classes and show the relationship between them using UML class diagrams	(3)
3	Explain how objects are passed as function parameters with a suitable example.	(3)
4	What are parameterized constructors? Is it possible to define a parameterized constructor for a class without defining a parameter-less constructor?	(3)

PART B
Answer any two full questions, each carries 9 marks.

5	a)	Draw Use case Diagram for online Pizza ordering system	(6)
	b)	What is the role of Java Virtual Machine?	(3)
6	a)	Explain Object Oriented System Development Life Cycle.	(4)
	b)	Write a Java program that accepts two three digit numbers as command line arguments and find all palindrome numbers between them.	(5)
7	a)	Explain method overloading with the help of an example.	(3)
	b)	Define a class Queue for representing a queue data structure. The class must define a default constructor, a parameterized constructor and functions for en-queue, de-queue and display operations. Write a Java program to implement this.	(6)

PART C
Answer all questions, each carries 3 marks.

8	What are packages? Explain how packages are created in Java.	(3)
9	What are interfaces? How interfaces are used in Java?	(3)
10	What are Checked Exceptions? Give an example.	(3)
11	What are thread priorities? How can you assign priority values for threads created in Java?	(3)

PART D

Answer any two full questions, each carries 9 marks.

12	a)	Discuss the different access specifiers used in java.	(4)
	b)	Explain how inheritance is implemented in Java. What is the use of 'super' keyword? Illustrate its usage with suitable examples.	(5)
13	a)	Discuss about any two stream classes used in Java.	(4)
	b)	Write a Java program to create two threads: One for displaying all odd numbers between 1 and 100 and second thread for displaying all even numbers between 1 and 100.	(5)
14	a)	What are abstract classes?	(3)
	b)	Create a user defined Exception 'InvalidNumberException'. Write a Java program that computes the average of N positive numbers given as Command Line Arguments. Raise the Exception 'InvalidNumberException' on reading a negative number or zero as input.	(6)

PART E

Answer any four full questions, each carries 10 marks.

15	a)	Explain Event Delegation model in Java.	(6)
	b)	Discuss any four methods used for string processing in Java	(4)
16	a)	How can we pass parameters to an Applet? Explain with an example.	(5)
	b)	Discuss how fonts are managed in AWT with suitable examples	(5)
17	a)	What are layout managers? Explain any one layout manager with an example.	(5)
	b)	What are Adapter Classes? How do we make you adapter classes while handling window events?	(5)
18	a)	What are dynamic queries? Explain how they are processed with suitable examples?	(5)
	b)	Explain the life cycle of an applet	(5)
19	a)	Discuss the different steps involved in establishing a JDBC connectivity and query processing with a suitable example.	(7)
	b)	What are the differences between a Java applet and a Java application?	(3)
20	a)	What is the use of paint() method? How do we invoke it?	(3)
	b)	Discuss any two AWT controls, the events generated by them and how they are handled with suitable code fragments.	(7)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: CS206
Course Name: OBJECT ORIENTED DESIGN AND PROGRAMMING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.

Marks

1	Distinguish between structural and behavioural UML diagrams.	(3)
2	Illustrate how information hiding is achieved in Java.	(3)
3	Define Testing. What are the major differences between Verification and Validation Testing?	(3)
4	With a simple example, explain the argument passing mechanism used in Java to pass an instance of a class as argument to a method.	(3)

PART B
Answer any two full questions, each carries 9 marks.

5   a)   What are the notations used to represent a public, private, protected and package scope members in a class diagram?   (3)

     b)   What is the syntax for representing a method and a data member in a class diagram?   (2)

     c)   Model a Java class in such a manner that it is restricted to have only one instance throughout the program in which it is used.   (4)

6   a)   Illustrate the major functionalities of the 'Class Loader' component within the JVM architecture.   (4)

     b)   Consider a scenario where a class 'Rectangle' with two data members 'Length', 'Breadth' has to be defined and initialized. Sometimes there would be a need that the instance initialization should happen by copying the value from an already initialized instance to the new instance. Model such a class with appropriate constructors and illustrate the working of the class.   (5)

7   a)   Why is that, in Java the size of 'char' datatype is of 2 bytes while that in C is of 1 byte?   (1)

     b)   Illustrate the different steps in the design phase of the Object Oriented Software Development Process.   (3)

     c)   Write a Java program with a class 'Complex' to represent complex numbers. Model the class in such a way that it uses constructor overloading aspects to initialize its   (5)

instances. Support the design with codes to demonstrate its working.

PART C
Answer all questions, each carries 3 marks.

8	State the benefits that can be achieved through the use of packages in Java.	(3)
9	What is file? How files are represented in Java?	(3)
10	Illustrate with an example, how a class in Java can be prevented from getting inherited?	(3)
11	Write two subclasses for the 'InputStream' and 'OutputStream' classes in Java and specify its uses.	(3)

PART D
Answer any two full questions, each carries 9 marks.

12 a) Can a class in Java implement more than one interfaces, if yes what is the syntax used? (1)

b) Consider a scenario where there are two classes: 'BaseClass' and 'DerivedClass', such that 'DerivedClass' is inherited from 'BaseClass'. A function 'public void myFunction()' is defined in both classes. State just the code sequences that would lead to a method overriding scenario and why this scenario is known as run time polymorphism? (2)

c) Write a Java program to create a new file named 'MyFile.txt' and write the statement "*This is the University Exam for OODP. This a program to illustrate the use of files.*" into the file with each sentence in the statement representing a new line in the file. (6)

13 a) With a suitable example summarize how 0 to 100% abstraction can be achieved through the use of Abstract class in Java? (3)

b) What is Thread Synchronization? With an example illustrate the working of any one technique used for Thread synchronization in Java. (6)

14 a) Define two user defined exception 'EvenNumberException' and 'OddNumberException'. Write a Java class which has a method which checks whether a given number if even or not. The method throws 'EvenNumberException' or 'OddNumberException' if the number is even or odd respectively. Illustrate the handling of the exception with suitable sequence of codes. (7)

b) Illustrate the use of the byte stream classes 'DataInputStream' and (2)

'DataOutputStream'.

PART E

Answer any four full questions, each carries 10 marks.

15 a) Define Applet. Draw the life cycle of Applet in Java showing the different methods   (5)
        invoked.

    b) Write a Java Applet based program which shows a label and a textbox on the html   (5)
        page. The label and the textbox should display some values which is provided to it
        from the html code representing the page.

16   Write Java AWT/Swing based program to display a GUI to accept username and   (10)
        password from user. The GUI should contain the required UI elements and should
        have appropriate event handling aspects.

17 a) Define Events in Java. Illustrate the events and the corresponding event listeners for   (4)
        the UI elements such as TextField, Button and Window.

    b) State the advantages of using Adapter Classes (WindowAdapter, MouseAdapter …   (2)
) instead of the listener interfaces (WindowListener, MouseListener …) for event
        handling in Java.

    c) Write a simple GUI Java program which displays only a Window or a Frame.   (4)
        Provide the implementation of the event handling mechanism such that the Window
        or Frame is closed when the 'Close (X)' symbol on its top is clicked.

18 a) With a diagram explain the overall architecture of the JDBC aspect in Java.   (5)

    b) Illustrate the role of JDBC driver in the database handling process. What are the   (5)
        different types of JDBC driver available?

19 a) What are the basic procedures that have to be followed to communicate with a   (5)
        database in Java using JDBC?

    b) With an example, state the basic differences between the execution of the methods   (5)
        'executeQuery' and 'executeUpdate'.

20   Write a Java program to store the marks of students corresponding to three subjects   (10)
        in database. The program should provide provision for the following.

    i.   Create a table in database corresponding to a particular class.

    ii.   Find student who topped the class.

    iii. Find the average class marks for a given subject.

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CS206

Course Name: OBJECT ORIENTED DESIGN AND PROGRAMMING (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.

		Marks
1	Why java programs are said to be robust?	3
2	Represent the entities 'Student' and 'Course' and their relationship using a Class diagram	3
3	Explain the properties of a Constructor.	3
4	Write a Java program to perform concatenation of two strings read as Command line arguments.	3

PART B
Answer any two full questions, each carries 9 marks.

			Marks
5		With the help of a neat sketch, explain the Object Oriented Software Development Life cycle model.	9
6	a)	Construct Use-case diagram for an Online Shopping Application	5
	b)	Explain any four data types in Java	4
7	a)	Create a class called Box with member variables length, breadth and height, and a default and parameterized constructor. a member function to display the volume of a box. Write a Java program to test the class.	6
	b)	Write a Java program to sort an array of integers.	3

PART C
Answer all questions, each carries 3 marks.

		Marks
8	How can we prevent a class from instantiation?	3
9	Explain Dynamic Method Dispatch in Java	3
10	What are byte streams and character streams? Give examples of Java classes for each stream.	3
11	Explain the concept of thread synchronization	3

PART D

Answer any two full questions, each carries 9 marks.

12	a)	What are packages? Illustrate package hierarchy in java with the help of an example	6
	b)	Compare and contrast abstract classes and interfaces	3
13	a)	Explain in detail how exception handling mechanism used in Java using 'throw' and 'throws'	5
	b)	Write a Java program to read characters from the console using BufferedReader class	4
14	a)	Explain the different ways of creating a thread.	6
	b)	What are synchronized blocks? Explain with an example	3

PART E

Answer any four full questions, each carries 10 marks.

15	a)	Discuss the security restrictions imposed on running Java applets	5
	b)	Write an applet program that accepts two input string as parameters, concatenate the strings and display it in status window.	5
16	a)	Explain the working of Delegation Event Model.	6
	b)	List out the various event sources and their corresponding listeners.	4
17	a)	Outline the lifecycle of an Applet.	6
	b)	Discuss the differences between Java Applets and Java Applications	4
18	a)	Differentiate between String and StringBuffer classes.	5
	b)	Discuss with proper examples, how we can create new colors and fonts in an AWT program	5
19		Write an AWT program to create a Calculator with basic arithmetic operations	10
20		Explain the steps using for connecting a Java program to a database using JDBC API with a proper example.	10

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: CS208
Course Name: PRINCIPLES OF DATABASE DESIGN (CS, IT)

Max. Marks: 100   Duration: 3 Hours
Limit answers to the required points.
PART A
*Answer all questions, each carries 3 marks.*   Marks

1 List out any *three* responsibilities of database administrators.   (3)

2 Give *good* examples (using ER notation) for unary and ternary relationships with a *very*   (3)
   brief explanation.

3 Consider a scenario where artists act in movies: an artist can act in *different* movies and   (3)
   movie can have *many*artists. Assuming suitable attributes show how the situation can
   be represented using relations with foreign keys. (A relational schema showing primary
   and foreign keys is sufficient. Minimal number of attributes is required.)

4 Two *relational algebra* expressions are said to be *equivalent* if they produce exactly the   (3)
   same output. Consider a relation R(A,B,C,D,E) with A as its key.
   (i) What can you say about the number of tuples returned by the expression $\Pi_{A,C}(R)$?
   (ii) Write *two* relational algebra expressions *equivalent* to $\sigma_{A<20}$ ($\sigma_{D>30}$ (R)).

PART B
Answer any two full questions, each carries 9 marks.

5 a) Briefly explain the concepts of *physical data independence* and *logical data*   (5)
       independence with a typical real-world example for each.
   b) In the following ER diagram, howcan we replace the entity set SCENE with an   (4)
       attribute of the entity set MOVIE? Draw the new ER diagram.
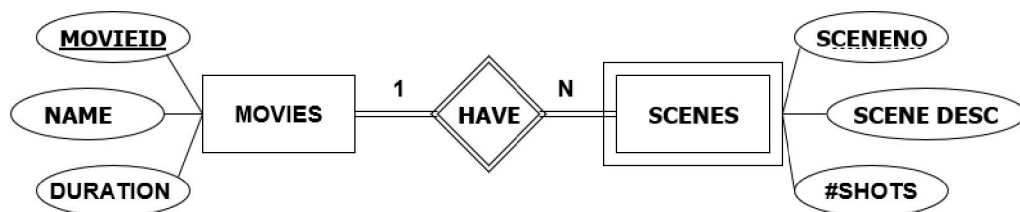
6   The relational database schema below represents certain information about albums,   (9)
       songs in the albums and singers of those songs. Foreign keys are given the *same*
       name as primary keys for easy identification.
       ALBUMS(ALBUM#, ALBUM-NAME, PRODUCED-BY, YEAR)
   SONGS(SONG#, SONG-START, DURATION, ALBUM#)
       SUNGBY(ARITISTNAME, SONG#)
       In the context of the schema, write relational algebra expressions for the following
       queries:
       (a) Names of albums produced by 'HMV' in the year 2018. (b) Names of albums
       in which an artist with name, 'AVANTHIKA' sung. (c) Names of albumsin which

all the artists have sung songs.

7   a)   Use the standard synthesis procedure to generate the set of relations corresponding to the ER diagram below. Identify primary and foreign keys of the relations   (4)
.
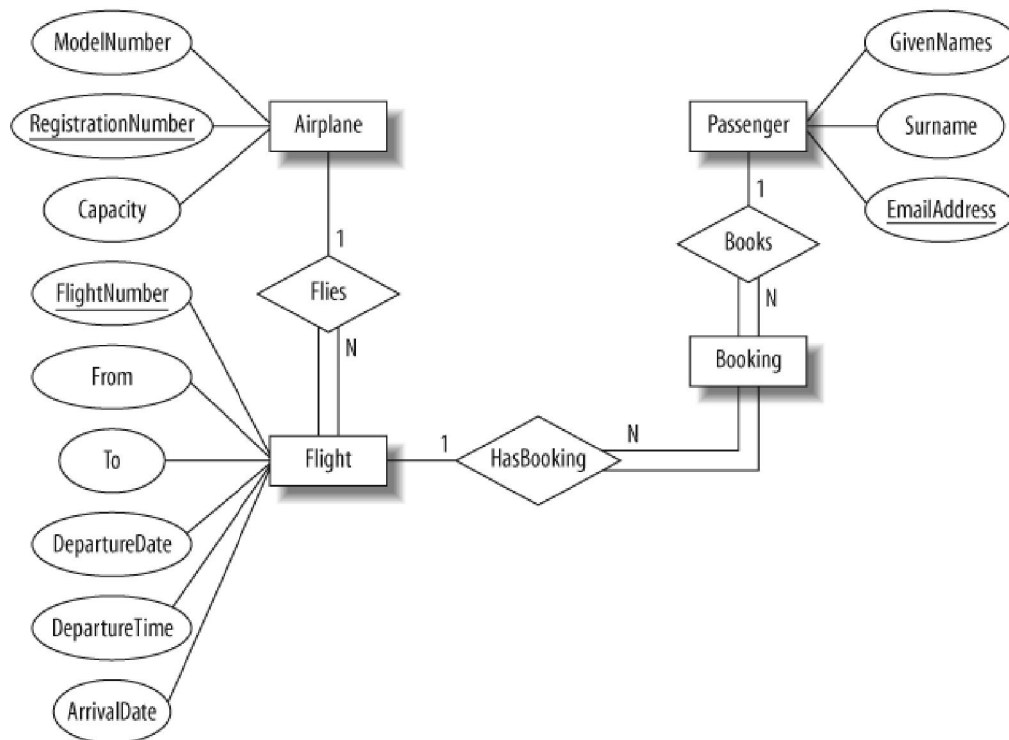
b)   In the relational schema for a library given below, foreign keys have the same name as primary keys. Draw an ER diagram for the schema, clearly marking keys and cardinality constraints.   (5)
BOOKS(<u>ACC-NO</u>, TITLE, EDITION, YEAR)
MEMBERS(<u>MEMBERID</u>, MEMBERNAME, MEMBERTYPE)
ISSUEDTO(<u>ACC-NO</u>,<u>MEMBERID</u>, DATEOFISSUE)

PART C
Answer all questions, each carries 3 marks.

8   Illustrate DELETE and UPDATE clauses using typical examples.   (3)

9   Given two tables STUDENT(<u>ROLLNO</u>,NAME,CLASS) and ENROLLMENT(<u>ROLLNO,COURSENAME</u>) where ROLLNO in ENROLLMENT refers to STUDENT, what does the following SQL statement return?   (3)
SELECT COURSENAME FROM ENROLLMENT WHERE ROLLNO = ALL (SELECT ROLLNO FROM STUDENT)

10   Define super key and minimal super key and illustrate using good examples.   (3)

11   Given a relation R(A,B,C,D,E,F) with functional dependencies A→B, B→D, D→EF, F→A, compute {D}+ and {EF}+.   (3)

PART D

Answer any two full questions, each carries 9 marks.

12   Consider the following relations: (9)

FACULTY(<u>FNO</u>, NAME, GENDER, AGE, SALARY, DNUM)
DEPARTMENT(<u>DNO</u>, DNAME, DPHONE)
COURSE(<u>CNO</u>, CNAME, CREDITS, ODNO)
TEACHING(<u>FNO, CNO</u>, SEMESTER)

DNUM is a foreign key that identifies the department to which a faculty belongs. ODNO is a foreign key identifying the department that offers a course.Write SQL expressions for the following queries:
(a) Names and department names of faculty members. (b) Names of faculty members not offering any course. (c) Names of departments offering more than three courses, in alphabetic order.

13   Given a relation R(A,B,C,D,E,F,G, H) with keys BD and C and functional   (9)
dependencies D→G, E→F and H→C, decompose the R into the highest normal form possible.

14   a)   For the relations listed below, write SQL statements to create the database schema.   (5)
      Assume suitable data types.
      ALBUMS(<u>ALBUM#</u>, ALBUM-NAME, PRODUCED-BY, YEAR)
      SONGS(<u>SONG#</u>, SONG-START, DURATION, ALBUM#)
      SUNGBY(<u>ARITISTNAME, SONG#</u>)

    b)   Why the following is table,TRAININFO, not in INF? How can we make it 1NF?   (4)

Route No	Rout Name	Distance	Trains	
			Train No	Name
5	MAS-TVC	179	12475	AP Express
			13457	Tvm Mail
9	TVC-DELHI	2781	16345	ND Express
			12461	Kerala Express
			16277	NZM Mail

PART E

Answer any four full questions, each carries 10 marks.

15   a)   Define the following: (i) physical record (ii) logical record (iii) blocking factor.   (3)
    b)   There are 12000 records in a data file. Each record in the file is of 75 bytes.   (7)
      Compute the number of block accesses if (i) Single level secondary index is available on a field of size 15 bytes. (ii) Multilevel index is available on the same field.
      Assume that the block size is 394 bytes, that un-spanned organization is used and that block and record pointers are 5 and 7 bytes, respectively.

16   a)   How is *clustering index* different from *primary index*?   (3)
    b)   Illustrate structure of B-Tree and B+-Tree and explain how they are different.   (5)

c) Give a *non-canonical query tree* for the expression $\pi_{A,B}(\sigma_{D<20}(R*S))$ on the relations R(A,B,C,D) and S (D,E). (2)

17 a) Consider the following tables representing enrolment of students to courses: STUDENT (<u>ROLLNO</u>, NAME, AGE, ADDRESS, EMAIL), COURSE(<u>CNO</u>, CNAME, AREA) and ENROLEMENT(<u>ROLLNO, CNO</u>,GRADE), where ROLLNO and CNO in ENROLMENT are foreign keys referring to the primary keys with the same names. (10)
Show an initial query tree for the following query and optimize it using the rules of heuristics. Assume that CNAME is a candidate key of COURSE.
SELECT CNAME, NAME, EMAIL, GRADEFROM STUDENT, COURSE, ENROLMENTWHERE COURSE.CNO=ENROLMENT.CNO AND STUDENT.ROLLNO = ENROLLMENT.ROLLNO AND COURSE.CNAME = 'dbs'

18 a) Check if the following schedules are conflict-serializable using precedence graph. If so, give the equivalent serial schedule(s). *r3(X), r2(X), w3(X), r1(X), w1(X).* (Note: ri(X)/wi(X) means transaction Ti issues read/write on item X.) (4)

b) Discuss *dirty-read* and *lost-update* problems with the help of examples. (6)

19 a) How is *strict two-phaselocking* different from *standard two-phase locking* protocol? (2)

b) With the help of suitable logs, show how recovery is done in *deferred database modification scheme.* (5)

c) What is the significance of *check-pointing*? (3)

20 a) Give a simple RDF document and show the corresponding graph structure. (3)

b) Write an explanatory note on Big Data. (4)

c) Highlight any *three* salient features of GIS. (3)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019
Course Code: CS208
Course Name: PRINCIPLES OF DATABASE DESIGN (CS, IT)

Max. Marks: 100   Duration: 3 Hours

Limit answers to the required points.
PART A
Answer all questions, each carries 3 marks.   Marks

1 Illustrate with an example, the difference between the conceptual data models and the   (3)
physical data models.

2 How is weak entity type different from a strong entity type? Give an example.   (3)

3 What is entity integrity constraint? Why is it important?   (3)

4 Using the following ER diagram, create a relation database. Give your assumptions.   (3)
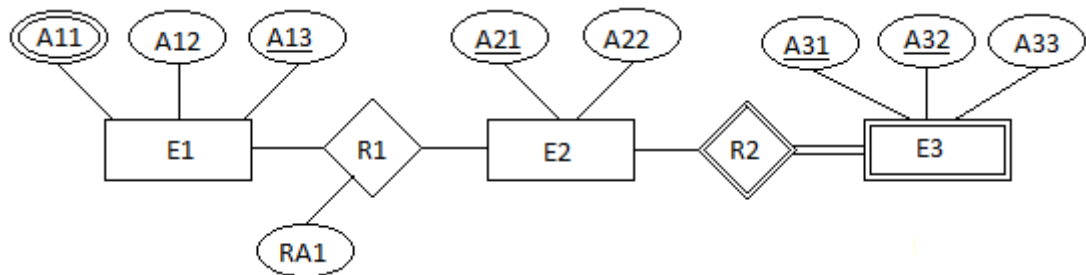
PART B
Answer any two full questions, each carries 9 marks.

5 a) With the help of an example, compare DML and DDL.   (4)

    b) What are logical data independence and physical data independence? What is the   (5)
difference between them? Which of these harder to realize? Why?

6 Design an ER diagram to represent the following scenario: (9)

A company has many employees working on a project. An employee can be part of
one or more projects. Each employee works on a project for certain amount of time.
Assume suitable attributes for entities and relations. Mark the primary key(s) and the
cardinality ratio of the relations.

7 Consider the following relations for a database that keeps track of business trips of
salespersons in a sales office:

SALESPERSON(Ssn, Name, StartYear, DeptNo)

TRIP(Ssn, FromCity, ToCity, DepartureDate, ReturnDate, <u>TripId</u>)

EXPENSE(<u>TripId, AccountNo</u>, Amount)

a) A trip can be charged to one or more accounts. Specify the foreign keys for this schema, stating any assumptions you make.   (3)

b) Write relation algebra expression to get the details of salespersons who have travelled between Mumbai and Delhi and the travel expense is greater that Rs. 50000.   (3)

c) Write relation algebra expression to get the details of salesperson who had incurred the greatest travel expenses among all travels made.   (3)

PART C
Answer all questions, each carries 3 marks.

8   With the help of an example, illustrate the use of SQL TRIGGER.   (3)

9   List the basic data types available for defining attributes in SQL?   (3)

10   Consider a relation $R=\{A,B,C,D,E,F\}$ and a set of functional dependencies $F=\{A{\rightarrow}BC, C{\rightarrow}BD, BF{\rightarrow}E, F{\rightarrow}D\}$. Find the closure of A. Is A a candidate key? Justify.   (3)

11   What are fully functional dependencies and partial functional dependencies? Give an example to distinguish between these?   (3)

PART D
Answer any two full questions, each carries 9 marks.

12   a) Consider the following table MARKS. Why is the table not in 1NF? Reconstruct the table so that it is in 1NF.   (5)

Roll No.	Name	Marks	Subject	
			Code	Name
1001	Tom	42	M001	Maths
		34	C002	Chemistry
		37	P003	Physics
1057	Sam	21	M001	Maths
		25	C002	Chemistry
		34	P003	Physics
1001	Tom	45	M001	Maths
		48	C002	Chemistry
		44	P003	Physics

b) When does a relational scheme is said to be in 3NF? How is BCNF different from 3NF?   (4)

13   a) List aggregate functions of SQL.   (3)

b) Given a relation **R(A,B,C).** Find the minimal cover of the set of functional   (3)
dependencies given;

F= {A→BC, B→C, A→B, AB→C}

c) What is the lossless (or nonadditive) join property of decomposition? Why is it   (3)
important?

14 Consider the relation **R = {A, B, C, D, E, F, G, H}** and the setof functional   (9)
dependencies **F = {A→DE, B→F, AB→C, C→GH, G→H}.** What is the key for R?
Decompose R into 2NF andthen 3NF relations.

PART E

Answer any four full questions, each carries 10 marks.

15 a) Suppose that we have an ordered file with 400,000 records stored on a disk with   (6)
block size 4,096 bytes. File records are of fixed size and are unspanned,with record
length 200 bytes. How many blocks are needed for the file? Approximately, how
many block accesses are required for a binary search in this file? On an average, how
many block accesses are required for a linear search, if the file is nonordered?

b) Based on question 15.a, give an example to illustrate that indexing can improve the   (4)
search time.

16 a) Explain the structure of an internal node and a leaf node in a B+-tree.   (5)

b) Illustrate with an example how searching for a record with search key field value is   (5)
done using a B+-Tree.

17 Why Concurrency Control Is Needed? What are the different types of problems we   (10)
may encounter when two transactions run concurrently? Illustrate each problem with
suitable examples.

18 a) What are the desirable properties of transactions? Explain.   (4)

b) "If every transaction in a schedule follows the two-phase lockingprotocol, the   (3)
schedule is guaranteed to be serializable", justify the statement.

c) What are the different types of lock that are commonly used in concurrency control?   (3)

19 a) Consider the following tables representing courses taken by instructors in an   (10)
institute:

INSTRUCTOR(<u>ID</u>, NAME, DEPT, SALARY)

TEACHES(<u>ID, COURSE-ID</u>, SEMESTER, YEAR)

COURSE(<u>COURSE-ID</u>, TITLE, DEPT, CREDITS)

where, ID and COURSE-ID are foreign keys referring to the primary keys with the

same names. Show an initial query tree for the following query and optimize it using the rules ofheuristics. Assume that TITLE is a candidate key of COURSE.

SELECT NAME, TITLE, SEMESTERYEAR

FROM INSTRUCTOR, COURSE, TEACHES

WHERE COURSE.COURSE-ID=TEACHES.COURSE-ID AND

TEACHES.ID = INSTRUCTOR.ID AND INSTRUCTOR.DEPT ='MATHS'

AND TEACHES.DEPT = INSTRUCTOR.DEPT

20 a) Write a short note on Big Data.   (4)

      b) What is a semantic web technology? How is it relevance?   (3)

      c) How does RDF support semantic web technology?   (3)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
**Course Code: CS208**
Course Name: PRINCIPLES OF DATABASE DESIGN

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.
Marks

1	List three significant differences between a file-processing system and a DBMS.	(3)
2	When is the concept of weak entity used in data modelling? Define the following terms: (i) Identifying relationship type (ii) Owner entity type	(3)
3	Consider the relational database shown below: employee (<u>person-name</u>, street, city) works (<u>person-name, company-name</u>, salary) company (<u>company-name</u>, city) manages (<u>person-name</u>, manager-name) Define the integrity constraints in the given relation. State the assumptions used.	(3)
4	Design a relational database corresponding to the following E-R diagram.	(3)
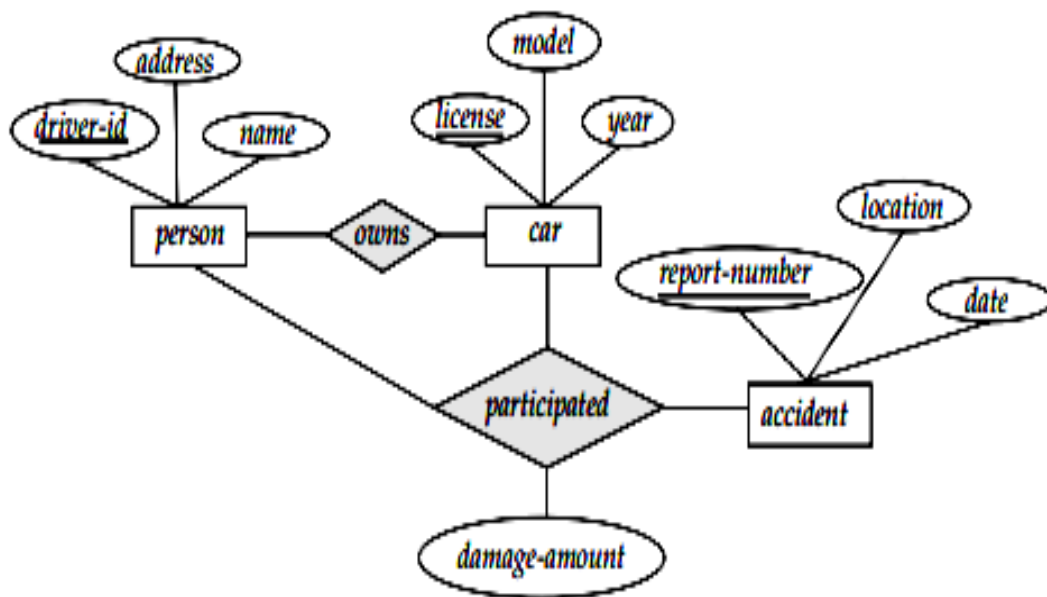
PART B
Answer any two full questions, each carries 9 marks.

5	a)	Explain the characteristics of the database approach.	(3)
	b)	Explain three schema architecture with figure.	(6)
6	a)	Who all are the actors on the scene in DBMS and explain their roles?	(3)
	b)	Explain the left outer join, right outer join and full outer join operations with examples.	(6)

7		Consider the following schema:	(9)

Suppliers(<u>sid</u>, sname, address)
Parts(<u>pid</u>, pname, colour)
Catalog (<u>sid, pid</u>, cost)
The key fields are underlined. Foreign key in Catalog are sid and pid referring to Supplier and Parts, respectively. Write the relational algebra expression for the following queries:
(i) Find the sids of suppliers who supply some red or green part.
(ii) Find the sids of suppliers who supply every part.
(iii)Find the names of suppliers who supply some red part.

PART C
Answer all questions, each carries 3 marks.

8		Illustrate the concept of trigger in SQL with an example.	(3)
9		Give any three examples to illustrate the schema modification statements in SQL.	(3)
10		Explain any three uses of attribute closure algorithm.	(3)
11		Consider the following setF of functional dependencies for relation schema	(3)

R = (A, B, C, D, E).
F= {A → BC ,CD → E, B → D, E → A}
Compute the canonical cover of F.

PART D
Answer any two full questions, each carries 9 marks.

12	a)	What is an assertion?	(2)
	b)	Write an assertion for the bank database to ensure that the assets value for the Perryridge branch is equal to the sum of all the amounts lent by the Perryridge branch. The schema for branch and loan are shown below: branch(<u>branch_name</u>, branch_city, assets) loan(<u>loan_number</u>, branch_name, amount)	(7)
13	a)	Explain the difference between BCNF and 3NF with an example.	(4)
	b)	Given below are two sets of FDs for a relation R(A,B,C,D,E).Are they equivalent? F1 = {A➔B, AB➔C, D➔AC, D➔E} F2 = {A➔BC, D➔AE}	(5)
14	a)	Give suitable example for nested sub queries. Write the advantages of nested query?	(4)
	b)	Suppose that we decompose the schema R = (A, B, C, D, E) into R1(A, B, C) R2(A, D, E) Test whether the given decomposition is a lossless-join decomposition, if the following set F of functional dependencies holds in R: F= {A ➔BC, D ➔E, B ➔ D, E ➔ A}	(5)

PART E
Answer any four full questions, each carries 10 marks.

15	a)	What is the main difference between a primary index and a clustering index? Give examples.	(3)
	b)	How does multilevel indexing improve the efficiency of searching an index file? Explain your answer.	(4)
	c)	Is it possible in general to have two primary indices on the same relation for different search keys? Explain your answer.	(3)
16	a)	Draw the structure of a B+-tree with q-1 search values. Differentiate between internal nodes and leave nodes of B+-tree.	(5)
	b)	Construct a B+-tree for the following set of key values: (2, 3, 5, 7, 11, 17, 19, 23, 29, 31)	(5)

     Assume that the tree is initially empty and values are added in ascending order. Construct B+-trees for the case where the number of pointers that will fit in one node is four.

17 a) What is Big Data? (3)
   b) What is the significance of Big Data in current data management scenarios? (3)
   c) How is Big Data different from traditional data sources? (4)

18 a) What are the different types of locks used in concurrency control? (2)
   b) How conversions of locks are achieved in concurrency control? (3)
   c) Explain how we can guarantee serializability by two phase locking protocol. (5)

19 a) Consider the following relations: (10)
     Instructor(<u>IID</u>, Iname,Iage,Idept,Isalary)
     Teaches(<u>IID,CID</u>, semester)
     Course(<u>CID</u>,Ctitle,credit)
     The foreign keys in Teaches are same as the primary key names. Perform heuristics-based query optimization on the following SQL query.
     SELECT IID
     FROM Instructor, Teaches, Course
     WHERE Instructor.IID = Teacher.IID AND Course.CID = Teaches.CID AND
          Teaches.semester = "Even" AND Course.title = "DBMS";

20 a) Explain the components of GIS systems. (4)
   b) What are the characteristics of data in GIS. (6)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CS208
Course Name: PRINCIPLES OF DATABASE DESIGN (CS, IT)

Max. Marks: 100   Duration: 3 Hours

Limit answers to the required points.
PART A
Answer all questions, each carries 3 marks.   Marks

1	Illustrate three schema architecture with a suitable diagram.	(3)
2	With a help of an example, elaborate weak entity set and strong entity set.	(3)
3	Differentiate DDL and DML with suitable example.	(3)
4	With suitable example, define integrity constraint?	(3)

PART B
Answer any two full questions, each carries 9 marks.

5   Design an ER diagram for the given scenario;   (9)

Suppose that you are designing a schema to record information about reality shows on TV. Your database needs to record the following information:

_ For each reality show, its name, genre, basic_info and participants name. Any reality show has at least two or more participants.

- For each producer, the company name, company country. A show is produced by exactly one producer. And one producer produces exactly one show.

- For each television, its name, start year, head office. A television may broadcasts multiple shows. Each show is broadcasted by exactly one television.

-For each user, his/her username, password, and age. A user may rate multiple shows, and a show may be rated by multiple users. Each rating has a score of 0 to 10.

6   Covert the following ER Model to Relational Model   (9)
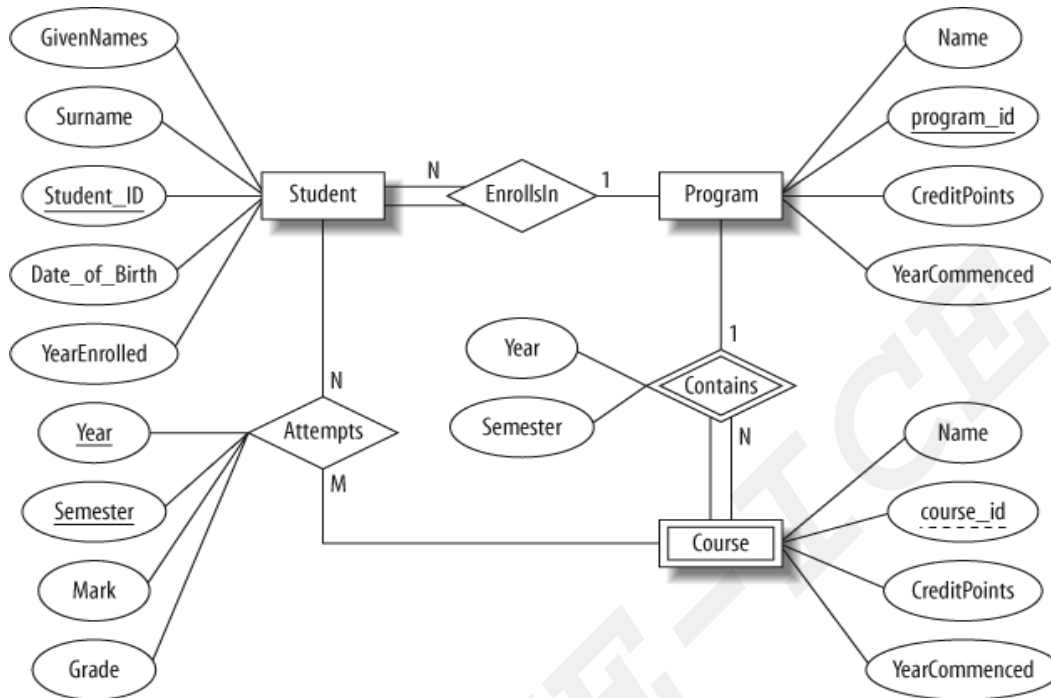
7   a)   Differentiate Natural join, Equi-join and Left outer join   (3)

7   b)   Consider the schema given below.   (6)

employee (person-name, street, city)

works (person-name, company-name, salary)

company (company-name, city)

manages (person-name, manager-name)

Write relational algebra queries for the following questions

a. Find the names and cities of residence of all employees who work for First Bank Corporation.

b. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum.

c. Find the names of all employees in this database who live in the same city as the company for which they work.

PART C
Answer all questions, each carries 3 marks.

8   With suitable example, list aggregate functions in sql   (3)

9   What is the importance of views in sql? Explain with suitable example.   (3)

10   Illustrate different anomalies in designing a database.   (3)

11   How can we conclude two FDs are equivalent?   (3)

PART D
Answer any two full questions, each carries 9 marks.

12 a) Consider the schema given below.   (9)

person (driver-id, name, address)

car (reg-no, model, year, driver-id)

accident (report-number, date, location)

participated (driver-id, reg-no, report-number, damage-amount)

Write SQL queries for the following

a. Find the name of driver, who is drives the car with reg-no='AABB2000'. Find the total number of people who were involved in car accidents in 01-01-1989.

c. Find the number of accidents in which the cars belonging to "John Smith" were involved.

d. Update the damage amount for the car with reg-no "AABB2000"in the accident with report number "AR2197" to $3000.

13 a) Compute the closure of the following set F of functional dependencies for relation schema R = (A, B, C, D, E).   (3)

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

List the candidate keys for R.

b) Define 3NF and BCNF. Let R (A, B, C, D, E) be a relational schema in which the following functional dependencies are known to hold: $AB \rightarrow C$, $C \rightarrow E$ and $E \rightarrow D$. Identify the highest normal form   (6)

14 a) Illustrate triggers with a suitable example.   (4)

b) R = (A, B, C, D, E). We decompose it into R1 = (A, B, C), R2 = (C, D, E). The set of functional dependencies is: $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$. Check whether this decomposition is a lossless join decomposition or not.   (5)

PART E
Answer any four full questions, each carries 10 marks.

15 a) Compare primary indexing, secondary indexing and clustered indexing with suitable diagram.   (6)

b) Define the structure of B+ tree   (4)

16	a)	Database system implementers have paid much more attention to the ACID properties than have file-system implementers. Why might this be the case?	(6)
	b)	Explain deferred database modification with an example.	(4)
17	a)	Consider a file with 450000 records . Each record size is 125 bytes and block is 1000 bytes. The primary key of the file is 10 bytes and record pointer size is 6 bytes. 1). Calculate number of index block required in case of primary indexing 2) Calculate number of index blocks required in case of multilevel indexing.	(10)
18	a)	Differentiate serial and concurrent schedules. Elaborate Conflict serializability with suitable example.	(6)
	b)	Illustrate two phase locking	(4)
19	a)	Why recovery is needed in transaction processing	(5)
	b)	Illustrate heuristic query optimization with suitable example.	(5)
20	a)	Write short notes on	(10)

1) Big Data
2) Biological Database
3) GIS

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

Course Code: HS200
Course Name: BUSINESS ECONOMICS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any three questions, each carries 10 marks.   Marks

1   a)   What is a production possibility curve? Suppose a country's production is at a   (6)
         point inside the PPC. What does it imply? Draw a diagram and explain?

    b)   State the law of diminishing marginal utility. Explain any three of its   (4)
         limitations.

2   a)   Define Economics in terms of scarcity of resources? Why does the problem of   (6)
         choice arise in an economy?

    b)   Identify the type of goods from the sign of elasticity.   (4)
         i) positive price elasticity   ii) negative income elasticity   iii) positive cross
         elasticity   iv) negative cross elasticity

3   a)   Suppose population increases. How does it affect equilibrium price and   (6)
         quantity? Draw a diagram and explain.

    b)   Suppose price of 'Y' increased from Rs.10 to 12 and the demand for its related   (4)
         good 'X' increased from 50 units to 60 units. Estimate cross elasticity of
         demand. What type of goods are 'X' and 'Y'?

4   a)   State the law of variable proportion. Explain the law with the help of a schedule. (6)

    b)   (4)
         A production function is given as $Q = AL^{\alpha}K^{\beta \cdot}$ What does α and β represent?
         What is constant returns to scale? Cobb-Douglas production function represent
         constant returns to scale. Why?

PART B
Answer any three questions, each carries 10 marks.

5   a)   Suppose AVC<P<AC. Will this firm produce or shutdown in the short run?   (6)
         Draw a diagram and explain.

    b)   What is social cost?   (4)

6 a) Suppose the TFC of a firm is Rs.50000/- and its current sales is for Rs.75000/-.   (6)
If the TVC of the firm is Rs.60000/- and price equals Rs.25/- per unit calculate
the following.

        i) Contribution   ii) P.V Ratio iii) Break-even sales iv) Break-even output

  b) What are the features of perfect competition?   (4)

7 a) Define GDP. How will you derive the following from GDPmp?   (6)

        i) NDPmp   ii) GNPmp   iii) GNPfc

  b) Prepare a chart and explain the circular flow in a two sector model with saving   (4)
and investment.

8 a) What are the effects of inflation on production and distribution?   (6)

  b) What is repo and reverse repo rate?   (4)

PART C

Answer any four questions, each carries 10 marks.

9 Suppose the capital outlay on a project is Rs.10000/- and the cost of capital is   (10)
10%. The cash flows from year 1 to 5 are Rs.2000, 3000, 4000, 3000 and 2000.
Estimate NPV and payback.

10 a) What is IRR? What is the decision rule when IRR is the criteria for investment   (6)
decision making? Point out any two merits and demerits of IRR

  b) What is cost-benefit analysis?   (4)

11 a) A payoff matrix is given below. Which alternative a manager will select   (6)
according to i) Maximin principle ii) Maximax principle iii) Laplace principle
under conditions of uncertainty. Give reason for your selection.

<div align="center">Possible future Demand</div>

Alternatives	Low	Medium	High
Small facility	20	20	20
Medium facility	18	24	24
Large facility	6	8	28

  b) What is a decision tree?   (4)

12 a) Explain the components of a balance sheet.   (6)

  b) What are the limitations of a balance sheet?   (4)

13 a) Distinguish between foreign direct investment and foreign port-folio   (6)
        investment.

    b) What are the merits and demerits of direct taxes?   (4)

14 a) The data given below shows the number of cars sold in a showroom. Predict the   (6)
        sales for the year 2020 by using the method of least squares.

Year	2012	2013	2014	2015	2016
No. of cars sold	50	70	60	80	100

    b) Explain any two qualitative methods of demand forecasting.   (4)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD/FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: HS200
Course Name: BUSINESS ECONOMICS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any three questions, each carries10 marks.   Marks

1 a) With the help of a figure demonstrate the relationship between total and marginal   (5)
      utility.
   b) Marginal analysis is the basis for several theories in Business Economics. Do you   (5)
      support this view?
2 a) Mention the relevance of the concept of scarcity in business economics.   (5)
   b) Mark the point on a graph of the PPC, showing underutilization of resources.   (5)
      Using the PPC, explain the concept of trade off.
3 a) If the production function of a firm is $Q = 10 L^{1/2}K^{1/2}$, find out the maximum
      output that can be produced, if 144 units of labour is combined with 169 units of   (5)
      capital. Also calculate the average and marginal product of labour from the
      function
   b) In July, Parle sold 40,000 bottles of their mango juicewhen the price of   (5)
      Tropicana was Rs.35 per bottle. In August, they sold 45,000 bottles when the
      price of Tropicana was Rs.40. Calculate the cross elasticity of demand of mango
      juice for Parle.
4 a) State and explain the law of variable proportions   (4)
   b) The following schedule shows the number of laptops purchased by offices and
      homes at different market prices.

Price(Rs)	purchased by offices(units)	Purchased by homes(units)
50000	3400	2500
55000	3300	2100
60000	3200	1600
65000	3100	1200

(6)

As the price of laptops increases from 55000 to 60000, what is the price elasticity
of demand for (i) offices and (ii) homes?

PART B
Answer any three questions, each carries 10 marks.

5 a) Define average and marginal revenue. With the help of a figure demonstrate the   (6)
      relationship between average and marginal revenue.
   b) Distinguish between Perfect Competition and Monopoly.   (4)
6 a) Draw a diagram showing AFC, AVC and TC curves.   (4)
   b) A small-scale company, engaged in the production of manufacturing   (6)
      biodegradable carry bags has total sales of Rs. 20000. Its fixed cost is Rs. 6000,
      while its variable cost is at Rs.12000. Calculate (i) the P/V ratio (ii) breakeven
      point (iii) Margin of safety at this level of sales (iv) If it sells each bag for Rs.5,
      how many bags should the company sell to break even? (v)Find out the sales
      required to earn a profit of Rs. 4000.
7 a) Examine the various phases of a trade cycle. Draw a neat diagram to substantiate   (5)

your view.

b) Define GNP, NNP, NI, PI and DPI. (5)

8 a) Examine the various functions of the Reserve Bank of India. (5)

b) A mobile manufacturing company makes Rs.100000 every day by selling them. (5)
During this time, the machinery of the company depreciates by 10000. The
company pays GST of Rs.6000, gives the owner Rs. 40000 and retains Rs. 44000
for its expansion activities. The owner pays Rs. 45000 as income tax from his
income. Compute the firm's contribution to the following measures of national
income. (i) GDP (ii) NDP (iii) NI (iv) Personal income (v) Disposable Personal
income.

PART C
Answer any four questions, each carries10 marks.

9 a) What is Capital budgeting? (4)

b) The following table gives the annual sales and cost for two machines, which a (6)
company is planning to purchase. Machine A costs 2,60,000 while machine B
costs Rs. 90,000.

	Machine A	Machine B
Sales	1,70,000	1,70,000
Raw Materials	60,000	60,000
Labour	15,000	60,000
Electricity	30,000	20,000

Use the payback method to determine which machine the company should buy?

10 a) Define payback period and average rate of return. (4)

b) Examine the various sources of capital for a business firm. (6)

11 a) What is cost benefit analysis? Mention the difficulties encountered while (4)
carrying out this analysis.

b) A project has been started by a company with an initial investment of Rs.10, (6)
00,000. The company gets a cash inflow of Rs. 2,00,000 in year 1, Rs. 2,00,000
in year 2, Rs.3,00,000 in year 3, Rs.2,00,000 in year 4, and Rs. 3,50,000 in year
5. The cost of capital for the firm is 10 percent. Use the NPV method to
determine whether the company should go ahead with the project.

12 a) What is the balance sheet? Distinguish between assets and liabilities. (5)

b) What is the money market? What are the various instruments in the money (5)
market?

13 a) Mention the canons of taxation. (4)

b) . The following table gives the demand of a company for five years. Use the (6)
trend method to project the demand for the years of 2018, 2019 and 2020.

Year	Demand
2013	200
2014	220
2015	210
2016	230
2017	210

14 a) What are the major techniques used in forecasting? (6)

b) What is FII? Mention its disadvantages. (4)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: HS200
Course Name: BUSINESS ECONOMICS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any three questions, each carries10 marks.

                                                               Marks

1   a)   How does Business Economics help a business man?   (5)

     b)   What are the three central problems of an economy?   (3)

     c)   How is Economics defined in terms of scarcity of resources?   (2)

2   a)   Draw a total utility curve and marginal utility curve and derive three relations between MU and TU.   (5)

     b)   Explain the law of demand with the help of a demand schedule.   (3)

     c)   Give any two exceptions of law of demand.   (2)

3   a)   How is equilibrium price of a commodity determined? Suppose cost of production of a commodity increases. How does it affect supply as well as equilibrium price? Substantiate your answer with a diagram.   (6)

     b)   Suppose 50 unitsof commodity X was demanded when it's price was Rs.10 per unit. Later it's demand decreased to 40 units without any change in its price. It has been found that the price of a similar product Ydecreased from Rs.10 to 8. Estimate cross elasticity of demand between the products X and Y.   (4)

4   a)   State the law of variable proportions. Explain the law with the help of a diagram.   (6)

     b)   i) A production function is given as $Q = 3\ L^{1/4}\ K^{3/4}$. This is a linearly homogeneous production function. Why? ii) If L=16 and K=6, what will be the output?   (4)

PART B
Answer any three questions, each carries10 marks.

5   a)   Distinguish between TFC and TVC. Draw TFC and TVC and TCcurves   (5)

     b)   Suppose the average cost of a product is Rs.20 and average variable cost is Rs.15. If price of the product is Rs.18, will the firm continue its production in the short run or shutdown? Give reason.   (3)

     c)   Suppose P.V ratio is 0.2 and fixed cost is Rs.10000. What is the break-even sales? If the price per unit is Rs.50 what is the break-even level of output?   (2)

6   a)   Make a comparison between perfect competition and monopolistic competition.   (6)

     b)   What is collusive oligopoly?   (4)

7   a)   Estimate GDPmp and GNPfc from the following data(given in crores) according   (6)
to the expenditure method.   Private final consumption expenditure(C) = 6000, Investment(I)=4000, Government consumption expenditure(G)=1400, Net-exports(X-M)=600, Net indirect tax =500, Net factor income from abroad = 1000

     b)   In a three sector model what are the money flows between the government sector   (4)
and firms, and the government sector and household sector.

8   a)   What is inflation? What are the monetary policy measures to control inflation   (10)

PART C

Answer any four questions, each carries10 marks.

9   a)   Suppose the initial cash outlay on a project is Rs.1,00,000 and life of the project   (6)
is 5 years. The salvage value is Rs.6000 and the annual income after tax and depreciation are Rs.6000, 10000,14000, 18000 and 22000 from year 1 to 5 respectively. Estimate ARR.

     b)   What is a decision tree?   (4)

10   a)   The initial investment on a project is Rs.50000 and the cost of borrowing is 10%.   (6)
If the cash flows after tax are Rs.30000, 20000 and 10000 from year 1 to 3, estimate NPV of the project.

     b)   Give any two merits and demerits of NPV method   (4)

11   a)   What is savage principle? A pay off matrix is given below. Which alternative   10
will be selected according to the savage principle or minimax regret?(estimate regrets)
Possible future demand

Alternatives	Low	Medium	High
Small facility	15	15	15
Medium facility	14	17	17
Large facility	8	9	19

12   a)   Explain accounting equation?   (6)

     b)   Give any two uses and limitations of a balance sheet.   (4)

13   a)   Explain any three qualitative methods of demand forecasting.   (6)

     b)   Give any four advantages and disadvantages of foreign capital   (4)

14   a)   What are the major differences between a money market and capital market?   (6)

     b)   Distinguish between direct tax and indirect tax.   (4)

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: HS210
Course Name: LIFE SKILLS

Max. Marks: 50   Duration: 2 Hours

PART A
Answer all questions, each carries 6 marks.   Marks

1   Your college recently organised a seminar on 'Say No to Tobacco'. The speakers   (6)
    included well known educationists and doctors. Write a report on the same for
    your college magazine in not more than 100 words.

2   a)   You were asked to give a speech on global warming for the Environment Day   (3)
         celebration in your college. Prepare the data needed by the method of mind
         mapping.

    b)   Give 3 differences between critical thinking and creative thinking.   (3)

3   What are the different steps taken in group problem solving?   (6)

4   a)   Explain the meaning and need of work ethics.   (3)

    b)   What is environmental ethics and comment on environmental ethics and   (3)
         engineers?

5   Give a short note on leadership styles.   (6)

PART B
Read carefully the following case and answer the questions given below, it carries 20 marks.

6   **(Case study)**

The Exxon Valdez oil spill occurred in Prince William Sound, Alaska, March 24,
1989, when Exxon Valdez, an oil tanker owned by Exxon Shipping Company,
bound for Long Beach, California, struck Prince William Sound's Bligh Reef, 1.5
miles west of Tatitlek, Alaska at 12:04 am local time and spilled 10.8 million US
gallons (or a mass of 35,000 metric tonnes) of crude oil over the next few days. It
is considered to be one of the most devastating human-caused environmental
disasters. Prince William Sound's remote location, accessible only by helicopter,
plane, or boat, made government and industry response efforts difficult and
severely taxed existing response plans. The region is a habitat for salmon, sea
otters, seals and seabirds. The oil, originally extracted at the Prudhoe Bay oil
field, eventually covered 1,300 miles (2,100 km) of coastline, and 11,000 square

miles (28,000 km2) of ocean.

According to official reports, the ship was carrying 53,094,510 gallons (1,264,155 barrels) of oil, of which about 10.8 million US gallons were spilled into the Prince William Sound. During the first few days of the spill, heavy sheens of oil covered large areas of the surface of Prince William Sound.

Multiple factors have been identified as contributing to the incident: Beginning three days after the vessel grounded, a storm pushed large quantities of fresh oil on to the rocky shores of many of the beaches in the Knight Island chain. Exxon Shipping Company failed to supervise the master and provide a rested and sufficient crew for Exxon Valdez. The third mate failed to properly maneuver the vessel, possibly due to fatigue or excessive workload.

Exxon Shipping Company failed to properly maintain the Raytheon Collision Avoidance System (RAYCAS) radar, which, if functional, would have indicated to the third mate an impending collision with the Bligh Reef. Captain Joseph Hazelwood, who was widely reported to have been drinking heavily that night, was not at the controls when the ship struck the reef.

Other factors, included: Ships were not informed that the previous practice of the Coast Guard tracking ships out to Bligh Reef had ceased. The oil industry promised, but never installed, state-of-the-art iceberg monitoring equipment. Exxon Valdez was sailing outside the normal sea lane to avoid small icebergs thought to be in the area. (Source: Wikipedia).

a) Identify the key players in the case   (4)

b) What are the professional responsibilities neglected by each of the key players in   (4)
the case?

c) What are the ethical issues attached to the case?   (4)

d) How do you think that the disaster management team of the Exxon reacted to the   (4)
accident?

e) What are the lessons learned from the Exxon Valdez oil spill?   (4)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER B. TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: HS210

Course Name: LIFE SKILLS

Max Marks: 50   Duration: 2Hours

PART A

Answer all questions, each carries 6 marks.

1. (a) Differentiate between Transactional leader and Transformational leader. (3)
   (b) Explain different levels of leadership.   (3)
2. Discuss about the six thinking hats. Explain the significance of colours associated with each.   (6)
3. (a) Discuss how to manage conflicts in teams.   (3)
   (b) Differentiate between group discussion and debate.   (3)
4. (a) List the main functions of left and right brain.   (3)
   (b) Write a covering letter to the manager of an MNC enquiring about the vacancy of web developer in their firm.   (3)
5. Explain the moral reasoning development over different stages according to Kohlbergs theory.   (6)

PART B
6. *Read carefully the following case and answer the questions given below, it carries 20 marks.*

(Case study)

Greenhouse protocol establishes comprehensive global standardized frameworks to measure and manage greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation actions. Building on a 20-year partnership between World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), GHG Protocol works with governments, industry associations, NGOs, businesses and other organizations. GHG Protocol arose when WRI

and WBCSD recognized the need for an international standard for corporate GHG accounting and reporting in the late 1990s. Together with large corporate partners such as BP and General Motors, in 1998 WRI published a report called, "Safe Climate, Sound Business." It identified an action agenda to address climate change that included the need for standardized measurement of GHG emissions. Similar initiatives were being discussed at WBCSD. In late 1997, WRI senior managers met with WBCSD officials and an agreement was reached to launch an NGO-business partnership to address standardized methods for GHG accounting. WRI and WBCSD convened a core steering group comprised of members from environmental groups (such as WWF, Pew Center on Global Climate Change, The Energy Research Institute) and industry (such as Norsk Hydro, Tokyo Electric, Shell) to guide the multi-stakeholder standard development process.

The first edition of the Corporate Standard, published in 2001, has been updated with additional guidance that clarifies how companies can measure emissions from electricity and other energy purchases, and account for emissions from throughout their value chains. GHG Protocol also developed a suite of calculation tools to assist companies in calculating their greenhouse gas emissions and measure the benefits of climate change mitigation projects. The Paris Agreement, adopted within the United Nations Framework Convention on Climate Change (UNFCC) in December 2015, commits participating all countries to limit global temperature rise, adapt to changes already occurring, and regularly increase efforts over time. GHG Protocol is developing standards, tools and online training that helps countries and cities track progress towards their climate goals

    A. No country can afford to tackle the climate challenge alone. Substantiate this statement. (5)

    B. As an engineer suggest better ways to reduce greenhouse gas emission. (5)

    C. As of the present situation, do you think that there are effective movements for resisting global warming from the authorities? Justify your answer. (5)

    D. Identify who all can play key role in controlling nations greenhouse gas emission. (5)

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: HS210

Course Name: LIFE SKILLS

Max. Marks: 50   Duration: 2 Hours

PART A
Answer all questions, each carries 6 marks.   Marks

1	a)	Discuss the types of reports and its features.	(4)
	b)	Differentiate between group discussion (GD) and debate.	(2)
2	a)	Compare critical and creative thinking. Give examples	(4)
	b)	List the different types of intelligences.	(2)
3	a)	Discuss the steps involved in group problem solving.	(3)
	b)	Define Team Performance Management (TPM) and draw the TPM cycle.	(3)
4	a)	State Gilligan's theory of moral development	(4)
	b)	What are the moral issues related to engineering?	(2)
5	a)	Explain leadership grid with neat sketches.	(4)
	b)	List the important personality traits of effective leaders.	(2)

PART B
Read carefully the following case and answer the questions given below, it carries 20 marks.

(Case study)

Engineer A was a competent consulting engineer, specializing in manufacturing plant layout, but she was always very busy. A client asked Engineer A to review a proposed plant layout and prepare an evaluation report. Engineer A reluctantly agreed. Because of the pressure of other work, Engineer A assigned the task to an employee, Technologist B, who was experienced in construction, but had little background in plant layout. Technologist B did his best to evaluate the layout, but several key points were beyond his knowledge. Although he tried to get advice from Engineer A, he was unable to do so, because Engineer A was always too busy with her other projects. Technologist B finally prepared a draft report for Engineer A to correct and complete. Technologist B sent the report to Engineer A with a note saying that the report was an incomplete draft and that A should "give it detailed study." By this time, Engineer A was even busier than

before, and she had to complete several major tasks before going overseas for a month's vacation. Engineer A simply had her secretary reformat the draft report and print it on high-quality paper. Engineer A signed, sealed, and mailed the report, without even reading it. When the client received and read the report, he phoned Engineer A and said he was disgusted with the poor report and would not pay for it. Although Engineer A apologized profusely, the client insisted on sending the report to the Association and making a formal complaint. Engineer A admitted her negligence and received a reprimand from the Discipline Committee.

6 a) Identify the key players in this case.   (2)

  b) What are the professional responsibilities neglected by the key players in this case?   (4)

  c) What clauses of the Code of Ethics have been violated by Engineer A's actions? What disciplinary actions could she expect?   (5)

  d) If you were Engineer A, what would you do at this point?   (5)

  e) As engineers, what are the lessons learnt from this case?   (4)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: MA202
Course Name: PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS

Max. Marks: 100   Duration: 3 Hours
Normal distribution table is allowed in the examination hall.

PART A (MODULES I AND II)
Answer two full questions.

1 a) Suppose that the probabilities are 0.4, 0.3, 0.2, and 0.1 that there will be 0, 1, 2, or 3 (7)
        power failures in a certain city during the month of July. Find the mean and
        variance of this probability distribution.

   b) During one stage in the manufacture of integrated circuit chips, a coating must be (8)
        applied. If 70%of chips receive a thick enough coating. Use Binomial distributionto
        find the probabilities that, among 15 chips
        (i) at least 12 will have thick enough coating;
        (ii) at most 6 will have thick enough coating;
        (iii) exactly 10 will have thick enough coating.

2 a) If the distribution function of a random variable is given by   (7)

$$F(x) = \begin{cases} 1 - \dfrac{1}{x^2} & for \ x > 1 \\ 0 & for \ x \leq 1 \end{cases}$$

        find the probabilities that this random variable will take on a value
        (i)   less than 3;   (ii) between 4 and 5.

   b) In a given city, 6% of all drivers get at least one parking ticket per year. Use the (8)
        Poisson approximation to the binomial distribution to determine the probabilities
        that among 80 drivers(randomly chosen in the city):
        (i)   4 will get at least one parking ticket in any given year;
        (ii)   at least 3 will get at least one parking ticket in any given year;
        (iii)   anywhere from 3 to 6, inclusive, will get at least one parking ticket in
        any given year.

3 a) Derive mean and variance of uniform distribution.   (7)

   b) The time required to assemble a piece of machinery is a random variable having (8)
        approximately a normal distribution with mean 12.9 minutes and standard deviation
        2.0 minutes. What are the probabilities that the assembly of a piece of machinery of
        this kind will take
        (i)   at least 11.5 minutes;
        (ii)   anywhere from 11.0 to 14.8 minutes?

PART B (MODULES III AND IV)
Answer two full questions.

4 a) Using Fourier cosine integral , show that $\int_0^\infty \dfrac{\cos xw}{1+w^2} dw = \dfrac{\pi}{2} e^{-x}$ if $x > 0$. (7)

   b) Find the Fourier sine transform of $f(x) = \begin{cases} \sin x & if \ 0 < x < \pi \\ 0 & if \ x > \pi \end{cases}$. (8)

5 a) Find the Fourier transform of $f(x) = \begin{cases} e^{kx} & if \ x < 0 \\ 0 & if \ x > 0 \end{cases}$, $k > 0$.   (7)

    b) Find the inverse Laplace transform of $\dfrac{5}{(s^2 + 1)(s^2 + 25)}$ using Convolution Theorem.   (8)

6 a) Find the Laplace transforms of (i) $t \ e^{kt}$ (ii) $\cos(wt + \theta)$ (7)

    b) Solve the initial value problem $y'' - y' - 6y = 0$, $y(0) = 6$, $y'(0) = 13$ by using Laplace transforms.   (8)

PART C (MODULES V AND VI)
Answer two full questions.

7 a) Find the positive solution of $2\sin x = x$ by using Newton-Raphson method, the solution is near to 2.   (7)

    b) Calculate the Lagrange polynomial $p(x)$ for the 4-D values of the function $f(x)$, $f(1.00) = 1.0000, f(1.02) = 0.9888, f(1.04) = 0.9784$,and   from   it   find   the approximate value of $f(x)$ at $x = 1.005$.   (7)

    c) Compute $f(1.5)$ from $f(1) = -1, f(2) = -1, f(3) = 1, f(4) = 5$ by using Newton's forward interpolation formula.   (6)

8 a) Solve $6x_1 + 2x_2 + 8x_3 = 26$, $3x_1 + 5x_2 + 2x_3 = 8$, $8x_2 + 2x_3 = -7$ by Gauss Elimination method.   (7)

    b) Find the value of $(13)^{1/3}$ using Newton Raphson method.   (7)

    c) Evaluate $\int_0^1 e^{-x^2} dx$ by Trapezoidal rule taking 10 subintervals.   (6)

9 a) Use Euler's method with $h = 0.1$,compute the value of $y(0.5)$ for the equation $y' = (y + x)^2$, $y(0) = 0$.   (7)

    b) Use Runge-Kutta method with $h = 0.1$, compute the value of $y(0.1)$ for the equation $y' = xy^2$, $y(0) = 1$.   (7)

    c) Evaluate $\int_0^1 \dfrac{dx}{\cos^2 x}$ by Simpson's rule taking 10 subintervals and compare it with the exact solution.   (6)

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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: MA202
Course Name: PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS

Max. Marks: 100   Duration: 3 Hours

Normal distribution table is allowed in the examination hall.
PART A (**MODULES I AND II**)
Answer two full questions.

1 a) A random variable X takes the values -3,-2,-1,0,1,2,3 such that P(X=0)=P(X>0)   (7)
       =P(X<0) and P(X=-3) = P(X=-2) = P(X=-1) = P(X=1) = P(X=2) = P(X=3).Obtain
       the probability distribution and the distribution function of X

   b) If the sum of the mean and variance of a binomial distribution for 5 trials is 1.8   (8)
       Find the probability distribution function.

2 a) It is known that 2% of the accounts in a company are delinquent. If 5 accounts are   (7)
       selected at random, compute the following probabilities (i) atmost 2 accounts will
       be delinquent (ii) atmost 4 accounts will be delinquent

   b) Find the value of k and hence find the mean and variance of the distribution   (8)
       $f(x) = kx^2e^{-x}$ $0<x<\infty$

3 a) If X is uniformly distributed over (-α,α) , α<0. Find α so that (i) P(x>1) = 1/3   (7)
       (ii) P(|x| <1) = P(|x| >1)

   b) 5% of the observation in a normal distribution are below 5 and 25% of the   (8)
       observations are between 5 and 25. Find mean and SD

PART B (MODULES III AND IV)
Answer two full questions.

4 a) Find the fourier transform of f(x)=$\begin{cases} 1 - |x| & if \quad |x| \le 1 \\ 0 & if \quad |x| > 1 \end{cases}$ and also find fourier   (7)
       inverse transform

   b) Using fourier sine integral for f(x) = e^{-ax} show that $\int_0^\infty \frac{\lambda sin\lambda x}{\lambda^2+a^2}d\lambda = \pi \, e^{-ax}$ (8)

5 a) Find the fourier sine transform of e^{-x}, x≥0 .Hence evaluate $\int_0^\infty \frac{xsinx}{1+x^2}dx$ (7)

b)   Find the Laplace transform of (i) $te^{-t}\sin t$ (ii) $\dfrac{\sin^2 t}{t}$ (8)

6   a)   Solve $\dfrac{d^2 y}{dt^2} - 4\dfrac{dy}{dt} + 5y = 4\,e^{3t}$ given that $y = 2, \dfrac{dy}{dt} = 7$ when $t = 0$ (7)

    b)   Using convolution theorem find $L^{-1}\,\dfrac{s}{(s^2+a^2)^2}$ (8)

PART C (MODULES V AND VI)
Answer two full questions.

7   a)   Using Newton Raphson method find correct to four decimal places, the root   (8) between 0 and 1 of the equation $x^3 - 6x + 4 = 0$

    b)   The population of a town is as follows   (12)

Year	1941	1951	1961	1971	1981	1991
Population (in lakhs)	20	24	29	36	46	51

Estimate the population increase during the period 1946 to 1976

8   a)   Apply Lagrange's formula to obtain the value of y when x=35 given that   (6)

x	30	34	38	42
y	-30	-13	3	18

    b)   Solve the equation using Gauss elimination method   (7)
       $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$

    c)   Solve the system of equations $4x + 2y + z = 14$, $x + 5y - z = 10$, $x + y + 8z = 20$ (7) using Gauss-Seidal iteration method

9   a)   A solid of revolution is formed by rotating about the x axis, the area between the x   (7) axis, the line x=0 and x=1 and a curve through the points with the following coordinates

X	0.0	0.25	0.50	0.75	1.00
Y	1.0000	.9896	.9589	.9089	.8415

Estimate the volume of the solid formed using Trapezoidal rule

    b)   Using Euler's method find y(0.2) and y(0.4) given $\dfrac{dy}{dx} = x + y$, $y(0) = 1$ and $h = 0.2$ (6)

    c)   Use the fourth order Runge-Kutta method to find y(0.2) from $\dfrac{dy}{dx} = y - x$,$y(0) = 2$ (7) taking h=0.1

A   **D192003**   **Pages:3**

Reg No.:_____   Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: MA202
Course Name: PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS

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Max. Marks: 100   Duration: 3 Hours

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Normal distribution table is allowed in the examination hall.
PART A (MODULES I AND II)
Answer two full questions.

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1 a) The following table gives the probability that a certain computer will malfunction
       0, 1, 2, 3, 4, 5, or 6 times on any one day

Number of Malfunctions x	0	1	2	3	4	5	6
Probability f(x)	0.17	0.29	0.27	0.16	0.07	0.03	0.01

(7)

       Find (i) The Mean, Variance and Standard Deviation of this probability distribution

       (ii) P(0<x<5)   (iii) P(x>4)

   b) It is known that 5% of the books bound at a certain bindery have defective
       bindings. Find the probability that atmost 2 of 100 book bound by this bindery will
       have defective binding using

       (i)   The formula for binomial distribution

       (ii)   Poisson approximation to the binomial distribution

(8)

2 a) Derive the mean, variance and distribution function of the uniform distribution in
       the interval (a,b).

(7)

   b) The amount of time that a surveillance camera will run without having to be reset is
       a random variable having the exponential distribution with mean 50 days.
       Find the probability that such a camera will

       (i)   have to be reset in less than 20 days

       (ii)   not have to be reset in at least 60 days

       (iii)   have to be reset between 20 and 60 days.

(8)

3 a)   The time required to microwave a bag of popcorn using the automatic setting can
       be treated as a random variable having a normal distribution with standard
       deviation 10 seconds. If the probability is 0.8212 that the bag will take less than
       282.5 seconds to pop, find the probability that it will take longer than 258.3
       seconds to pop.

(7)

b) Prove that binomial distribution with parameters n and p can be approximated to   (8)
Poisson distribution when *n* is large and *p* is small with $np = \lambda$, a constant.

PART B (**MODULES III AND IV**)
Answer two full questions.

4 a) Use Fourier integral to show that $\int_0^\infty \dfrac{cosx\omega + \omega sinx\omega}{1+\omega^2} d\omega = \begin{cases} 0 & if\ x < 0 \\ \pi/2 & if\ x = 0 \\ \pi e^{-x} & if\ x > 0 \end{cases}$ (7)

   b) Find the Fourier Sine and Cosine Transform of $f(x) = \begin{cases} x^2 & if\ 0 < x < 1 \\ 0 & if\ \ \ \ x > 1 \end{cases}$ (8)

5 a) Find the Laplace Transform of :

   (i) $e^{-t} \sin 3t \cos 2t$

   (ii) $t^2 \cos \omega t$ (7)

   (iii) $t^2 u(t-1)$

   b) Find the inverse Laplace Transform of :

   (i) $\dfrac{1-7s}{(s-3)(s-1)(s+2)}$

   (ii) $\ln \dfrac{s-a}{s-b}$ (8)

   (iii) $\dfrac{e^{-3s}}{(s-1)^3}$

6 a) Find the Fourier Sine Transform of $f(x) = e^{-|x|}$. Hence evaluate $\int_0^\infty \dfrac{\omega sinx\omega}{1+\omega^2} d\omega$.   (7)

   b) Solve by using Laplace Transform: $y'' + 2y' - 3y = 6e^{-2t}$, y(0) = 2, $y'(0) = -14$ (8)

PART C (**MODULES V AND VI**)
Answer two full questions.

7 a) Find the positive solution of $2\sin x = x$ using Newton Raphson (method correct to five decimal places).   (6)

   b) Find the value of tan 33^0 by using Lagrange's formula for interpolation   (7)

X	30^0	32^0	35^0	38^0
tan x	0.5774	0.6249	0.7002	0.7813

   c) A second degree polynomial passes through the points (1,-1) (2,-1) (3, 1) (4, 5). Find the polynomial $f(x)$, Also find $f(1.2)$.   (7)

8 a) A river is 80 metre wide. The depth y in metres at a distance x metres from one

bank is given by the following table. Find approximately the area of cross section.

(6)

X	0	10	20	30	40	50	60	70	80
Y	0	5	8	10	15	12	7	3	1

b) Using Improved Euler method find y at x = 0.1 and x = 0.2 for the equation (7)

$y' = y - \frac{2x}{y}, y(0) = 1.$

c) Solve the initial value problem $y' + y\,tanx = sin2x, y(0) = 1$ at $x = 0.2$ using (7)

Runge- Kutta method.

9 a) Solve the following system of equations using Gauss elimination method.

         10x + y + z =6
         x + 10y +z =6
         x + y +10z =6

(6)

b) Solve the system of equations using Gauss Seidel iteration method starting with (7)
the initial approximation x = y = z = 1.

         4x + 5z =12.5

         x + 6y + 2z = 18.5

         8x + 2y + z = -11.5

c) The population of a town is as follows

Year (x)	1941	1951	1961	1971	1981	1991
Population in lakhs(y)	20	24	29	36	46	51

(7)

Find the population increase during the period from 1946 to 1976

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: MA202
Course Name: PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS

Max. Marks: 100   Duration: 3 Hours

Normal distribution table is allowed in the examination hall.
PART A (MODULES I AND II)
Answer two full questions.

1 a) Let X be a discrete random variable with mean 10 and variance 25. Find the positive   7
       values of α and β such that $Y = \alpha X - \beta$ has mean 0 and variance 1.

   b) Derive the mean and variance of a Poisson Distribution.   8

2 a) If a continuous random variable has the probability distribution function   7

       $$f(x) = \begin{cases} ke^{-3x} & if\ x > 0 \\ 0 & if\ x \le 0 \end{cases}$$

       then find (i) value of k (ii) $P[0 \le X \le 2]$ (iii) $P[X > 1.5\ ]$

   b) In a Normal Distribution, if 6% of the items are below 60 and 39% are above 70,   8
       then find the mean and standard deviation.

3 a) Out of 2000 families with 4 children each, how many would you expect to have (i)   7
       at least one boy (ii) at most one boy

   b) If X follows a uniform distribution in $(-2, 2)$, then (i) find $P[|X - 1| \le 2]$ (ii) find 8
       k for which $P[X > k] = \frac{1}{3}$ (iii) Distribution function

PART B (MODULES III AND IV)
Answer two full questions.

4 a) Find the Fourier Sine Integral of $f(x) = \begin{cases} \sin x & if\ 0 \le x \le \pi \\ 0 & if\ \ x > \pi \end{cases}$ 7

   b) Find   the   Fourier   Cosine   Transform   of $f(x) = e^{-4x}$.   Hence   deduce   that   8
       $\int_0^\infty \frac{\cos 2x}{x^2+16} dx = \frac{\pi}{8} e^{-8}$

5 a) Using Convolution theorem, evaluate the Inverse Laplace Transform of $\frac{s}{(s^2+4)^2}$ 7

   b) Evaluate   (i) $L[t\ sin^2 2t]$ (ii) $L^{-|}\left[\frac{s+5}{s^2+4s+13}\right]$ 8

6 a) Find the Fourier Transform of $f(x) = \begin{cases} 1 & if \ |x| < 1 \\ 0 & if \ |x| > 1 \end{cases}$ Hence show that   7

   $\int_0^\infty \frac{\sin \omega}{\omega} \, d\omega = \frac{\pi}{2}$

   b) Solve using Laplace Transform: $y'' - 3y' + 2y = 4$ given $y(0) = 2, y'(0) = 3$ 8

PART C (MODULES V AND VI)
Answer two full questions.

7 a) Using Lagrange's interpolation formula, find a parabola of the form $y = ax^2 +$ 6
   $bx + c$ passing through the points $(0,0), (2,4)$ and $(3,12)$

   b) Using Newton-Raphson Method, find the real root lying between 0 and 1 of   7
   $3x - \cos x - 1 = 0$. (Correct to three decimal places)

   c) Apply Lagrange's interpolation formula to find y at $x = 2$ for the following values   7
   for $y = f(x)$. Given $f(0) = -12, f(1) = 0, f(3) = 6$ and $f(4) = 12$.

8 a) Solve by Gauss Elimination Method: 6

   $3x + 4y + 5z = 18$, $2x - y + 8z = 13$, $5x - 2y + 7z = 20$.

   b) Evaluate $I = \int_0^6 \frac{1}{1+x} dx$ using (i) Trapezoidal Rule (ii) Simpson's $\frac{1}{3}$ Rule (Take   7
   h=1). Also find the value of the integral by actual integration.

   c) Using Euler's Method compute the value of $y(0.1)$ given $y' = x + \frac{1}{y}$, $y(0) = 1$ 7
   (Take $h = 0.025$)

9 a) Using Newton's Interpolation Formula find $f(1.2)$ and $f(2.0)$ from the table.   10

x	1	1.4	1.8	2.2
$y = f(x)$	3.49	4.82	5.96	6.50

   b) Using Runge – Kutta Method of 4th order, find $y(0.8)$ correct to four decimal   10
   places if $\frac{dy}{dx} = y - x^2$ given $y(0.6) = 1.7379$ (Take $h = 0.1$)