ARKA JAIN University, Jharkhand

4th Semester Final Examination – 2018-19

Subject : Applied Mathematics

Time : 3 Hours

Course: Polytechnic
Full Marks : 70
Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question Paper is divided into **Three Parts –A, B & C**
- **Part-A** is compulsory.
- **Part- B** contains **Six** questions out of which **Four** questions are to be answered.
- **Part- C** contains **Four** questions out of which **Three** questions are to be answered.

PART A

Q.1) **All questions are compulsory** **(10x2=20Marks)**

i. Errors may occur in performing numerical computation on the computer due to

a) Rounding errors b) Power fluctuation c) Operator fatigue d) All of these

ii. In Regula-falsi method, the first approximation is given by

a) $x_1 = \frac{a f(a) - b f(a)}{f(b) - f(a)}$ b) $x_1 = \frac{b f(b) - a f(a)}{f(b) - f(a)}$ c) $x_1 = \frac{b f(a) - a f(b)}{f(a) - f(b)}$ d) $x_1 = \frac{a f(a) - b f(b)}{f(a) - f(b)}$

iii. Which of the following alter name of method of false position?

a) Method of chords b) Methods of tangents c) Method of bisection d) Regula falsi method

iv. The number of significant digits in the number 204.020050

a) 5 b) 6 c) 8 d) 9

v. Which relation is Correct?

a) $E = 1 + \Delta$ b) $E = 1 - \Delta$ c) $E = 1 + \nabla$ d) $E = 1 - \nabla$

vi. Define Relative error.

vii. Define Rounding error.

viii. Define significant figure.

ix. Write Newton Forward interpolation Formula.

x. Write Taylor's series formula.

PART B

Q 2) Answer any four: **(4x5=20)**

i) Evaluate $\sqrt{18}$ by Newton Raphson method.

ii) Evaluate $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x} dx$ by using Simpson's 1/3 rule.

iii) Find the first order derivative of the function tabulated below, at the point x=1.5

x	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$	3.375	7.000	13.625	24.000	38.875	59.000

iv) Solve $\frac{dy}{dx} = x + y^2$ where y=0 when x=0, by picard's method.

v) What is the difference between $\left(\frac{\Delta}{E}\right)^2 u_x$ and $\left(\frac{\Delta^2 u_x}{E^2 u_x}\right)$ if $u = x^3$, the interval of difference being h.

vi) Use Rungee-Kutta method to find y(0.1) given that $\frac{dy}{dx} = \frac{1}{x+y}$, y(0)=1.

PART C

Answer any three: **(3x10=30)**

Q 3) Using Taylor's method, solve $\frac{dy}{dx} = 1 + xy$ with y(0) = 2. Find y(0.1) , y(0.2), y(0.3)

Q 4) Apply Gauss-Seidel iteration method to solve the equations

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

Q 5) Solve the equations, by factorization method.

$$2x + 3y + z = 9$$
$$1x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

Q6) Find the real root of the equation $x\log_{10}x - 1.2 = 0$ by false position method.

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- **Part-A** is compulsory.
- **Part- B** contains **SIX** questions out of which **FOUR** questions are to be answered.
- **Part- C** contains **SIX** questions out of which **THREE** questions are to be answered.

PART A

Q.1) **All questions are compulsory**

A] Multiple Choice Questions:(10x1=10)

a) Which of these sorting algorithms has the best (lowest) asymptotic running time when the input list is already sorted?
I. insertion sort
II. Selection sort
III. Quicksort (choosing the first element of the array as the pivot)
IV. Merge sort

i) I
ii) II and III
iii) III and IV
iv) none of the above

b) Complexity of binary search
i) $O(n^2)$
ii) $O(n)$
iii) $O(n^{\log n})$
iv) $O(\log n)$

c) Which among the following have complexity $O(n^2)$
i) Bubble sort
ii) Quick sort
iii) Heap sort
iv) Merge sort

d) Which of the following data structure is linear type?
i) Array
ii) Stacks
iii) Graph
iv) Both a and b

e) Match the following.

a) Asymptotic notation	i) Dynamic programming
b) O/1 knapsack problem	ii) Dived and conquer.
c) Quick sort	iii)big oh (O), omega(ω), theta(Θ)

i) a-iii, b-ii, c-i
ii) a-i, b-ii, c-iii
iii) a-iii, b-i, c-ii
iv) a-i, b-iii, c-ii

f) State True or False.

a) Binary search is used for searching in a sorted array.

b) The time complexity of binary search is $O(n^2)$.

i) True, False
ii) False, True
iii) False, False
iv) True, True

g) A pivot element to partition unsorted list is used in
i) Merge Sort
ii) quick sort
iii) Insertion Sort
iv) Selection Sort

h) A data structure where elements can be added or removed at either end but not in the middle is called ...
i) linked lists
ii) stacks
iii) queues
iv) dequeue

i) visiting each position of a node is called
i) search
ii) complexity
iii) traversal
iv) none of the above

j) What is the recurrence relation for worst case in quick sort
i) $T(n)= T(n-2)+O(n)$
ii) $T(n)=T(n/2)$
iii) $T(n)=2T(n/2)+O(n)$
iv) None of the above

B] Very Short question (5x2=10)

a) What is minimum spanning tree?
b) Explain the properties/characteristics of an algorithm?
c) What is an algorithm?
d) State the 0/1 Knapsack Problem.
e) Define Time and space complexity?

PART B

Q2. Answer any four: **(4x5=20)**

i) Write insertion sort algorithm?
ii) Write kruskel's algorithm?
iii) Write primes algorithm?
iv) State and explain recurrence relation? State masters theorem?
v) What is searching in array? Write an algorithm for binary search?
vi) Write the quick sort algorithm. Trace the same on data set 5, 3, 1, 9, 8, 2, 4, 7. Take the last element as pivot element?

PART C

Answer any three: **(3x10=30)**

Q.3) Write an algorithm on maxima and minima? Perform the algorithm on following array?

32	59	02	18	64	23	51	48	50

Q.4) Write an algorithm on knapsack problem using greedy method and Find an optimal solution to the knapsack instance n=7 objects and the capacity of knapsack m=15. The profits and weights of the objects are (P1,P2,P3, P4, P5, P6, P7)= (10, 5,15,7,6,18,3) (W1,W2,W3,W4,W5,W6,W7)= (2,3,5,7,1,4,1)?

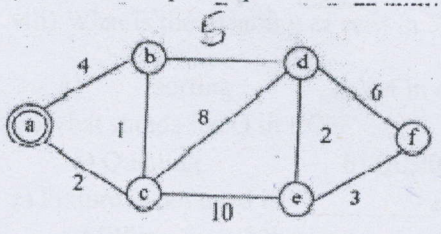
Q.5) Write an algorithm on linear search and binary search (using divide and conquer)? Drive its complexity?

Q.6) What is graph? State and Explain Breadth first search and depth first search?

Q.7) write sort notes on

a) MULTISAGE GRAPH
b) N-Queen problem
c) graph coloring
d) Hamiltonian cycle

Q.8) Draw 4- queen problem? convert the below graph into spanning tree using kruskel's method



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4th Semester Final Examination – 2018-19

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Course: Polytechnic

Time : 3 Hours

Full Marks : 70

Pass Marks: 28

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- Question Paper is divided into **Three Parts –A, B & C**
- **Part-A** is compulsory.

PART A

Q.1) All questions are compulsory **(10x1=10Marks)**

i) What is the meaning of seiton in 5S system.
a) sorting b)set in order c)shining d)stanardizing

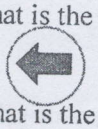
ii) What is the symbol used for operation cum transportation
a)  b)  c)  d) 

iii) What is the symbol used for inspection cum operation
a)  b)  c)  d) 

iv) In DMAIC I stands for
a) Integrated b)Important c)intense d)Include

v) What is the symbol used for inspection in process chart
a)  b)  c)  d) 

vi) What is the symbol used for transportation in process chart
a) b)  c)  d) 

vii) What is the symbol used for storage
a)  b)  c)  d) 

viii) What is the meaning of seiri in 5S
a) sorting b)set in order c)shining d)stanardizing

ix)What stands for Q in EOQ
a) Queuing b) Quality c)Quantity d)Non of these

x) Fixture is not used in _____related operation
a)Milling b)boxing c)Turning d)Shaping

[B] Answer all question [5X2=10]

a) Differentiate between jig and fixture.
b) List the type of locating and clamping devices.
c) What is Jig?
d) What is the meaning of DMAIC explain its all term
e) List out the type of waste

PART B

(4x5=20)

Q 2) Answer any four:

i) what is the use of KAIZEN in Industry Explain ?

ii) Define: routing, Scheduling, Dispatching.

iii) Explain the benefits of "just in time manufacturing" system.

iv) Differentiate between jig and fixture.

v) Write a short note on concept of line balancing.

vi) Explain with suitable sketch 3-2-1 principle of location used in jig and fixture.

PART C

(3x10=30)

Answer any three:

Q 3) Explain about all clamping device used in Industry .

Q 4)What is process planning? What information required for process planning.

Q 5) What is EOQ? Briefly discuss its concept and state it application in inventory management system.

Q 6) Define material requirement planning (MRP). State its objective.

Q 7) what is waste reduction and explain the type of waste reduction