Code No: 11686/MP

FACULTY OF ENGINEERING

M.E. (Civil – SE) II-Semester (AICTE) (Make-up) Examination, March 2021

Subject : FEM in Structural Engineering

Time : 2 Hours **Max. Marks: 70**

Note: i) First Question is compulsory and answer any Three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any may suitably be assumed.

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1. Answer any Four question from the following (4 x 4 = 16 Marks)

a) Differentiate between plane stress and plain strain problems with example

b) Briefly explain the procedure of solving a problem by FEM

c) Describe various types of forces (body force, traction force etc.) with examples

d) What is meant by mapping of elements in local and global coordinate systems.

e) Explain about material non-linearity

2. a) Explain about classification of elements based on dimensions, material properties and degree of freedom 6
b) A two bar truss element is subjects to load as shown in Figure 1. Determine
i) Nodal displacements ii) Element stresses
Take A- 250 mm^2; and E = 200 GPA 12

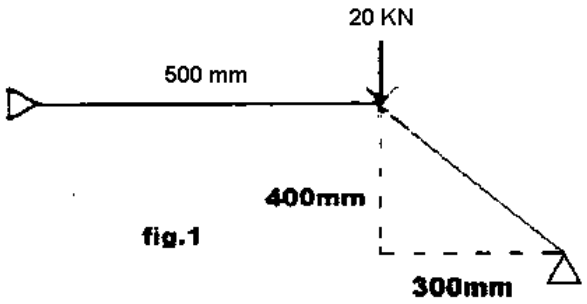

fig.1

3. a) What is meant by geometric invariance, explain with the help of pascal's triangle. 6
b) Derive the equations for shape functions for a constant strain triangle using polynomial functions. 12

4. a) What are serendipity family elements. Explain with examples. 6
b) Derive expressions for shape functions for a quadrilateral element using natural coordinate system. If the co-ordinates of the quadrilateral are 1(0.3, 04), 2(0.6, 0.4), 3(0.7, 0.7) and (0.35, 0.65). Calculate the shape functions 12

..2

5. a) Explain about ISO-parametric, Sub-parametric and super-parametric elements. 6
   b) A 2D Triangular element is subjected to traction force as shown in figure 2. Determine the nodal forces at node 1 and node 2. Take thickness of element as 12 mm. All dimensions are in mm. 12

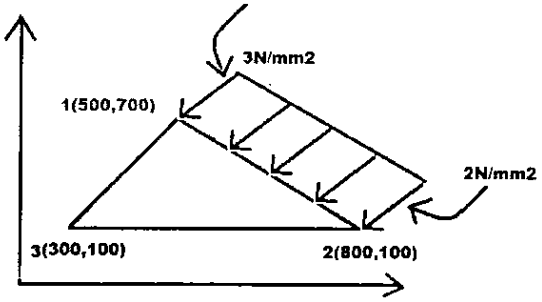

fig.2

6. a) What is Jacobian matrix. What is meant by Jacobian transformation? 6
   b) Find the Jacobin for a quadrilateral element whose Cartesian coordinates are 1(0,0), 2(50,0), 3(60,20) and 4(5,25) Corresponding to natural coordinate point (0.5,0.5) 12

7 a) Write short note on Gauss quadrature method of solving definite integrals 6
   b) Briefly explain about Tetrahedron and Hexahedron elements. 7
   c) White notes on convergence criteria for selection of displacement model 5

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Code No. 11691/MP

FACULTY OF ENIGNEERING

M.E. (Civil-TE) (AICTE) II-Semester (Makeup) Examination, March 2021

Subject: Pavement System Engineering

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following:** **(4x4=16 Marks)**

a) Explain the functional aspects of different layers used in pavements.
b) Explain the concept of ESWL.
c) Write the different methods of pavement evaluation.
d) Write about Quarter Car Model and its application.
e) Define the Mechanistic-Empirical (M-E) based pavement design approach.

2 a) Draw neat cross sections of rigid and flexible pavements, also differentiate between flexible and rigid pavements. [9]
b) Write the principles, assumptions and limitations of Boussinesq's theory. [9]

3 a) Calculate EALF and VDF in axle load survey. The axles of a sample of about 10% of randomly chosen trucks are weighed using axle load pads, different configuration of axle loads are represented in the sample below. [10]

Single axle		Tandem axle	
Axle load (T)	No. of Axles	Axle Load (T)	No. of Axles
2	10	4	12
4	25	8	24
6	65	12	38
8	362	16	126
10	189	20	60
12	115	24	50
14	85	28	15
16	45	30	13
18	25	32	8
20	15	34	6

b) Write in detail any two types of NDT instruments used for measuring Pavement deflection along with its specifications. [8]

4 a) What is the significance of temperature stresses in rigid pavement design. Describe various recommended temperature differences suggested by IRC based on the concept of Zones. [8]
b) Compute the radius of relative stiffness & equivalent radius of resisting section for a C.C. pavement. Take the following data thickness of pavement = 50cm, $E = 3x10^5$ kg/cm^2, $\mu = 0.15$, Modulus of subgrade reaction is 7.2 kg/cm^3, Design wheel load, P = 4000 kg and tyre pressure is 6.5 kg/cm^2. [10]

5 a) Explain in detail about fatigue cracking model of flexible pavement as per IRC standard. [10]

b) Determine the actual deflections from the dial gauge readings (mm) of the Benkelman beam. [8]

S.No of Test Station	1	2	3
Initial reading	0.00	0.00	0.00
Intermediate reading	0.38	0.40	0.43
Final reading	0.45	0.48	0.40

6 Determine required thickness of Airfield flexible pavement based on Burmister's theory using following Plate Load Test data and other input parameters: [18]
Diameter of plate used = 90 cm;
Pressure observed at 1.25 mm deflection when Plate Load test conducted on subgrade =0.82 kg/cm^2;
Pressure observed at 1.25 mm deflection when Plate Load test conducted on base course of 15 cm thickness = 2.1 Kg/cm^2;
Design wheel load = 26000kg;
Tire pressure = 16 kg/cm^2;
Take the allowable deflection = 0.125 cm.

7 a) Calculate the maximum warping stresses at the edge and interior of a slab of 5.0 m length and 3.8 m width. Take the elastic modulus of concrete as 3x10^4 MPa, radius of relative stiffness as 0.96 m, temperature difference between the top and bottom surface of the slab as 19^{o}C, coefficient of thermal expansion of concrete as 10x10^{-6} per ^{o}C and Poisson's ratio of concrete as 0.15. [9]

b) Write the applications and uses of pavement performance models. Discuss about the deterioration models based on their approach of modeling. [9]

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Code No: 11695/MP

FACULTY OF ENGINEERING

M.E. (Civil-CEM) II-Semester (AICTE) (Make-up) Examination, March 2021

Subject : Quantitative methods in Construction Management

Time : 2 Hours **Max. Marks: 70**

Note: i) First Question is compulsory and answer any Three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any may suitably be assumed.

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1. Answer any Four question from the following (4 x 4 = 16 Marks)

a) What is operational research?

b) What are the various characteristics of a linear programming problem in standard from?

c) What is meant by optimum solution?

d) When does degeneracy occur in transportation problem?

e) Define slack and surplus variable.

g) What do you understand by game theory?

h) What are the various costs involved in crashing of network?

2. a) The automobile company manufacturers around 150 scooters. The daily production varies from 146 to 154 9

Production per day	146	147	148	149	150	151	152	153	154
Probability	0.04	0.09	0.12	0.14	0.11	0.10	0.20	0.12	0.08

The finished scooters are transported in a lorry accommodating 150 scooters using the following random variables

80	81	76	75	64	43	18	26	10	12	65	68	69	61	57

Simulate the following
i) Average number of scooters waiting in the factory
ii) Average number of empty space in the lorry.

b) Find the maximum and minimum value of f(x, y) = 3x+4y subject to $x^2+y^2=100$ by using Lagrange Multipliers 9

..2

3. Solve the following LLP using simplex method. 18

Minimize $Z=-40x1-100x_2$,

subjected to $10\ x_1 + 5\,x_2 \le 250$

$2\,x_1 + 5\,x_2 \le 100$

$2\,x_1 + 3\,x_2 \le 90$

$x_1, x_2 \ge 0$

4. Solve the following Transportation problem for its optimal solution 18

	S1	S2	S3	S4	Supply
F1	3	1	7	4	40
F2	2	6	5	9	50
F3	8	3	3	2	60
Demand	20	30	50	50	

5. a) Explain Degeneracy and Non Degeneracy in Transportation problem. 6
   b) Solve the following assignment problem using Hungarian Method 12

	Machines			
Operator	A	B	C	D
I	8	26	17	11
II	13	28	4	26
III	38	19	18	15
IV	19	26	24	10

6. a) What are the applications of dynamic programming in construction industry? 9
   b) What is the need for Dynamic programming? What are the characteristics of Dynamic programming? 9

7 a) Explain Strategy, Saddle Point and value of the game with respect to Game Theory. 9
   b) Write about the Modifications and improvements on CPM/PERT techniques. 9

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Code No: 11664/MP

FACULTY OF ENGINEERING

M.E (EEE-PE/PES) II-Semester (AICTE) (Make-up) Examination, March 2021

Subject : Advanced Topics in Power Electronics

Time : 2 Hours **Max. Marks: 70**

Note: i) First Question is compulsory and answer any Three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any may suitably be assumed.

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1. Answer any Four question from the following (4 x 4 = 16 Marks)

a) List the differences between Sic and Si devices
b) Represent an ideal unity power factor single phase rectifier in the form of two – port model
c) Explain the need of an isolated transformer in isolated converters
d) What do you understand by the term resonant switch? List different types of resonant switches.
e) List the advantages of interleaved converters

2. a) Find the maximum turn-off current density for the BRT structure 9
b) Explain the on-state characteristics of a 5kV silicon thyristor considering the effect of end region recombination. Give appropriate waveforms and equations 9
7

3. a) Determine the critical value of inductance required for PWM Flyback converter in discontinuous mode 9
b) Explain the model of a near ideal rectifier with supporting equations and wave forms 9

4. a) Obtain state space model for a Push-Pull Converter. 9
b) Discuss the steps involved in designing a state feedback controller 9

5. a) With a neat circuit and waveforms explain the principle of operation of series resonant converter 10
b) How zero current switching technique is used to improve the efficiency of DC-DC converter. 8

6. With a neat circuit explain the diode clamped multilevel inverter for 7 level output. Give the modified version of diode clamped multilevel inverter 18

7. a) List the advantages of vertical GaNFET compared to lateral GaNFET 9
b) List the different control methods used to obtain the emulated resistance? Among them explain about any one method with neat diagram 9

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Code No. 11671/MP

FACULTY OF ENIGNEERING

M.E. (ECE-DS) (AICTE) II-Semester (Makeup) Examination, March 2021

Subject: VLSI Design & Technology

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following: (4x4=16 Marks)**

a) Define the Body Effect give its expression. How does it influence the threshold voltage of a MOS Transistor?
b) Draw the cross sectional view of n-well/p-well of CMOS inverter.
c) Draw a D-Flip Flop using Transmission Gate.
d) Mention the importance of scaling of MOS transistor.
e) Calculate the gate capacitance value of 2 μm technology with relative in minimum sized transistor with gate to channel capacitance value of 8×10^{-4} pF /μm^2.
f) Draw a Bi CMOS inverter.
g) Differentiate between RAM and CAM.

2 a) Derive the ratio for NMoS inverter driven with another inverter Z pu & Zpd as 4:1 or 8:1. [9]
b) Define and Explain the Channel length Modulation of MOSFET and derive its expression. [9]

3 a) Explain with D-Latch with an example of Level Triggering with a timing diagram. [8]
b) Explain the explain about AOI and OAI Logic's with an example. [5]
c) Draw 4 : 1MUX using Transmission Gate. [5]

4 a) Discuss about lamda-based design rules and draw the stick and layout diagram for CMOS NOR gate. [10]
b) Define and explain about Rise time, Fall time of inverter and write the expressions for the same. [8]

5 a) Draw and Explain the Content Addressable Memory (CAM) architecture. [9]
b) Explain the following shifter: (a) Basic Shifter (b)4 –bit Barrel Shifter [9]

6 a) What is mean by Cross Talk? What is Miller Effect? List out how to avoid the cross-talk? [9]
b) Explain Interconnect Coupling Capacitance? Give an Example of Elmore delay calculations? [9]

7 a) Draw the voltage transfer characteristics of CMOS Inverter. Give its region of Operation. [8]
b) Explain about read and write operation of 6T- SRAM. [5]
c) Draw and Explain the Bi-CMOS Inverter. [5]

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Code No. 11678/MP

FACULTY OF ENIGNEERING

M.E. (ECE-ES,ES & VLSI) (AICTE) II-Semester (Makeup) Examination, March/April 2021

Subject: Programming and Interfacing with Micro Controller

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following:** **(4x4=16 Marks)**
(a) What is Interfacing with Micro Controller and explain the need for Interfacing?
(b) Distinguish Accuracy and Precision with bull's eye diagram.
(c) Define Internal and External Communication.
(d) What are wired and Wireless networks? List the advantages and disadvantages of them.
(e) Compare and contrast UDP & TCP.

2 (a) What is a sketch? Explain loop () & setup (). 6
(b) Interface any two sensors with Arduino UNO, Draw the interfacing diagram showing the pins used for communication. Write the code/sketch for the same. 12

3 Interface AD0808 with 8051 Microcontroller with circuit description, working and program for the same. 18

4 (a) What are Git Repositories? What are the states of a file in a working tree? 11
(b) Discuss the steps to add files to a Git Repository. 7

5 (a) What is open Frameworks? 6
(b) Explain the design philosophy of open Frameworks. 12

6 (a) What is peer to peer networking? 6
(b) Discuss the steps to forge a peer to peer connection using Wifi Direct. 12

7 (a) Support the following statement with relevant examples: 'Python is a programming language as well as a scripting language'. 9
(b) Compare the two Internal wired communication methods I2C and SPI. 9

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Code No. 11676/MP

FACULTY OF ENIGNEERING

M.E. (ECE – ES, ES & VLSI / ES VLSI Design)(AICTE) II-Semester (Makeup) Examination, March / April 2021

Subject: Real Time Operating Systems

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following:** **(4x4=16 Marks)**

a) Describe how the operating system acts as a resource manager.
b) Differentiate between preemptive and non preemptive kernels.
c) What is reentrancy ? Explain with example.
d) List the features of VxWorks.
e) Define terms i) Debugging ii) Cross compiler iii) Cross Assembler

2 a) Describe the UNIX architecture. [9]
b) Explain about fork( )? What are the similarities and differences between the child process and parent process? Summarize the advantages of Fork()? [9]

3 a) Differentiate between hard and soft real time systems with the help of examples. [7]
b) Consider the following set of four independent real-time periodic tasks.

Task	Start-Time(mSec)	Processing-time(mSec)	Period (mSec)
T1	20	25	150
T2	40	10	50
T3	20	15	50
T4	60	50	200

Assume that task T3 is more critical than task T2.Check whether the task set can be feasibly scheduled using RMS algorithm. Draw the Gantt Chart. [11]

4 a) What is priority inversion? Explain different protocols available to prevent priority Inversions. [9]
b) Discuss about inter task communication [9]

5 a) Explain the tasks and task states in VxWorks. [9]
b) Discuss about the binary semaphores in Vxworks. [9]

6 a) Elaborate the operation of In Circuit Emulator. [9]
b) Compare the features of various commercially available RTOSs. [9]

7 a) Mention the features required for an operating system to be POSIX compliant. [9]
b) Explain the Modes of Logic Analyzer in detail. [9]

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Code No. 11654/MP

FACULTY OF ENIGNEERING

M.E. (Mech.-CAD/CAM) (AICTE) II-Semester (Makeup) Examination, March 2021

Subject: Computer Aided Mechanical Design and Analysis

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following:** **(4x4=16 Marks)**
a) What are the assumptions made in theory of bending of thin plates?
b) What is autofrettage of thick cylinders ?
c) What is the effect of supports on elastic buckling of cylinders?
d) Give the properties of eigen values and eigen vectors.
e) Write about Rayleigh damping.

2 If a rectangular plate is bent in two perpendicular directions with bending moment M1=M2=M, show that the curvature of the spherical surface, $\frac{1}{r} = \frac{M}{D(1+\mu)}$ [18]

3 Derive the equation $\sigma_t - \sigma_r - r\frac{d\sigma_r}{dr} = 0$ for a thick cylinder where σ_t and σ_r are tangential and radial stresses respectively. [18]

4 Determine tangential stresses at the inner, mating and outer surfaces of a builtup cylinder with dimensions a =100mm, b = 150mm, c = 250mm which is subjected to an internal pressure of 120 MPa. Take shrinkage as 0.1mm, E = 0.2 x 10^6 MPa. Show the stresses on the cylinder. [18]

5 Find the eigen values and eigen vectors of the matrix. [18]

$$[A] = \begin{bmatrix} 1 & -1 & -1 \\ -1 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$$

6 Find the response of the 2-DOF system given below by Central Difference method : [18]

$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\{\ddot{u}_t\} + \begin{bmatrix} 2 & 2 \\ 2 & 5 \end{bmatrix}\{u_t\} = \{F(t)\}$, initial conditions are :

$\{u_0\} = \begin{Bmatrix} 1 \\ 0 \end{Bmatrix}$, $\{\dot{u}_0\} = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ and $\{F(0)\} = \{0\}$

7 Write short notes on any THREE of the following. [3x6=18]
a) Thermal stresses in plates
b) Shrink-fit stresses in builtup cylinders
c) Buckling phenomenon in cylinders
d) Wilson- θ method
e) Newmark method

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Code No. 11661/MP

FACULTY OF ENIGNEERING

M.E. (Mech-HVAC) (AICTE) II-Semester (Makeup) Examination, March 2021

Subject: Ventilation and Indoor Air Quality

Time : 2 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may suitably be assume.

1 **Answer any four questions from the following:** **(4x4=16 Marks)**
(a) What are the principles to control air quality in mechanical ventilation system?
(b) What is the difference between a register, grill and a diffuser?
(c) What are the different duct design methods?
(d) Explain the applications of electrostatic precipitators.
(e) How many types of exhaust fans are there?
(f) How to calculate the theoretical required ventilation performance?
(g) What is the normal minute ventilation?
(h) Explain method to calculate the basement ventilation system design.

2 (a) Explain the role of relative humidity in building ventilation and its effects. 9
(b) Explain the need for ventilation in Air conditioning systems with all technical details. 9

3 (a) What are the factors affecting grill performance? 9
(b) Discuss noise attenuation in ducts. 9

4 (a) Explain different types of ventilation systems and explain at least one in detail. 9
(b) Enumerate the principles of contamination control. Also explain the role of fan in exhaust system. 9

5 (a) Explain the design factors of hood and give the detailed steps involved in the design. 9
(b) What are the major steps involved in the ventilation of kitchen and explain them? 9

6 (a) Explain different air cleaning devices used in case of residential applications and give their range of applications. 9
(b) With the help of a neat line diagram explain the design and ventilation required for the commercial building. 9

7 (a) Discuss the term contaminated air and how to eliminate. Explain. 9
(b) What is the difference between exhaust system and supply system. 9

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Code No: 11698/MP

FACULTY OF ENGINEERING

M.Tech (CSE-CSE) II-Semester (AICTE) (Make-up) Examination, March 2021

Subject : Advanced Algorithms

Time : 2 Hours **Max. Marks: 70**

Note: i) First Question is compulsory and answer any Three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any may suitably be assumed.

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1. Answer any Four question from the following (4 x 4 = 16 Marks)

a) Define asymptotic notation, (O) Big oho

b) Write control abstraction for greedy?

c) Define augmenting path, residual network?

d) What is schur compliment? Explain with example

e) Find Inverse of following matrix

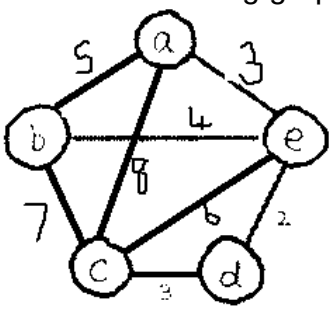
$$\begin{vmatrix} 1 & 2 \\ -1 & -3 \end{vmatrix}$$

f) When do you say 2 no's are relatively prime? List out 2 pairs of such no's

g) List out the applications of linear programming

2. a) Write Heapsort algorithm apply on below string of values 12
25, 20, 35, 15, 40, 30, 5, 10
b) Compare Heapsort, Merge sort, Quicksort algorithms w.r.t different parameters such as Time & Space complexities 6

3 a) Construct Minimum Spanning Tree for the following graph. 10



b) Explain Edmond Blossom's algorithm to compute augmenting paths 8

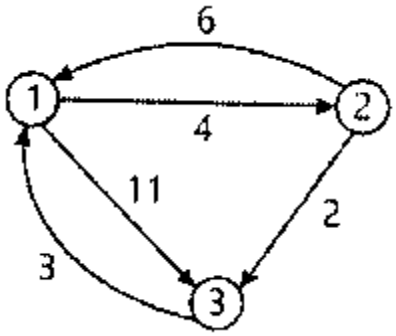
4. a) Write Edmomd karp maximum flow algorithm. 10
b) Write Strassen's matrix multiplication algorithm. 8

..2

5. a) Write iterative/recursive Fast Fourier Transform algorithm. 10
   b) Write schonhage - strassen integer multiplication algorithm 8

6. a) Write Simplex algorithm 10
   b) Explain Approximation algorithm with an example 8

7 a) Write Floyd-Warshall's algorithm for all pair shortest path. Find the path matrix for the following graph using the same 12



b) Find all solutions of the equation $35\,x \equiv 10 \pmod{50}$? 6

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