B.Sc sem-IV
2023

B.Sc.(Honours) Examination-2023

Semester-IV

Mathematics

Course: SECMA-2

(Tensor Calculus)

Time: Two Hours **Full Marks: 25**

Questions are of values as indicated in the margin.
Notations and symbols have their usual meaning.

Answer ***any five*** questions.

1. Define covariant, contravariant, mixed tensor fields, their order, and rank. Transform the contravariant components of a tensor field $(2xy, x+y, y^2z)$ in Cartesian coordinates to components in cylindrical polar coordinates. [3+2]

2. Define symmetric and skew-symmetric tensors. Prove that every tensor of rank two can be expressed as the sum of a symmetric and a skew-symmetric tensor. Let A^{ijk} and B_{lmn} be two skew-symmetric tensors. Verify the nature of $C^{ij}_{lm} = A^{ijk}B_{lmk}$. [1+2+2]

3. Define inner multiplication and quotient law of tensor fields. If A^{pqr}_i and B^{lm}_{st} are two tensor fields, examine which one among their sum, difference $A^{pqr}_i \pm B^{lm}_{st}$, and the product $A^{pqr}_i B^{im}_{st}$ is a tensor field. Justify your answer. Prove that contraction of B^l_t is a scalar field. [1+1+1+2]

4. What do you mean by the line element of a curve in space? Show that square of the line element can be expressed as a quadratic form. What is the name of the coefficients involved in the quadratic form? Do they behave like tensors? Give the order and rank if yes. Find the coefficients in the square of the line element described in the spherical polar coordinates. [1+1+1+1+1]

5. Let a quantity $B(i,j,k)$ be such that $B(i,j,k)C^{jl}_i = A^l_k$, where C^{jl}_i is an arbitrary tensor field. Prove that $B(i,j,k)$ is a tensor field. Determine its rank. [4+1]

6. Give the parametric representation of a surface $\mathcal{S} \subset \mathbb{R}^3$ and a curve $\Gamma \subset \mathcal{S}$ in $\mathbb{R}^3$. Derive the second derivative of the position vector of a curve on a surface $\mathcal{S} \subset \mathbb{R}^3$ with respect to the parameter appearing in its parametric representation. Examine whether the second derivative of the position vector of Γ with respect to the parameter at any point on it lies in the tangent plane at that point of the surface. [1+1+2+1]

7. Prove that the partial derivative of a scalar field is a tensor field while the partial derivative of a vector or a tensor field is not a tensor field. [5]

8. Write the formula for the second-order covariant derivatives of a vector field B_i with respect to two variables u^l, u^n (say). Is it commutative under the interchange of derivatives with respect to u^l, u^n? If no, find the difference $(B_{i,ln} - B_{i,nl})$, and examine whether this difference can be written as a sum of B_l. Hence or otherwise define Riemann-Christoffel tensor. [5]

Use separate answer script for each unit

B. Sc. (Honours) Examination-2023

Semester-IV
Mathematics (Major)
Paper : CC-9 (Mechanics-I)
(Dynamics of a Particle and Statics)

Time: Three Hours

Full Marks: 60

Questions are of values as indicated in the margin.
Notations and symbols have their usual meanings.

Unit-I [Dynamics of a Particle (Marks: 30)]

Answer *any three* questions.

1. (a) Obtain the resultant of two simple harmonic motions in the same straight line having slightly different periods. [5]

   (b) A particle of mass m is attached to a light wire which is stretched tightly between two fixed points with a tension T. If a and b be the distances of the particle from the two ends, then prove that the period of small transverse oscillation of m is $2\pi\sqrt{\frac{mab}{T(a+b)}}$. [5]

2. (a) Define harmonic oscillator with an illustration. Discuss the motion of a particle of mass m moving in a simple harmonic motion when it is disturbed by a periodic disturbing force of the form $mk\cos pt$. [1+4]

   (b) A particle is describing a circle of radius a in such a way that its tangential acceleration is k times the normal acceleration, where k is a constant. If the speed of the particle at any point be u, then prove that it will return to the same point after a time $\frac{a}{ku}\left(1-e^{-2\pi k}\right)$. [5]

3. Deduce the expressions for radial and cross-radial components of velocity and acceleration in plane polar coordinates. [10]

4. (a) An insect crawls at a constant rate u along the spoke of a cart wheel, of radius a. The cart is moving with a constant velocity v. Find the acceleration along and perpendicular to the spoke. [5]

   (b) If the radial and transverse velocities of a particle be always proportional to each other, then show that the path is an equiangular spiral. If, in addition to the above, the radial and the transverse accelerations too be proportional to each other, then show that the velocity of the particle varies as some power of radius vector. [2+3]

5. (a) Obtain the polar equation of a central orbit. Prove that, in a central orbit, the angular momentum is constant. [5]

   (b) A particle of unit mass is projected with velocity u at an inclination α above the horizon in a medium, the resistance of which is k times the velocity. Show that the time to the greatest height is less than half the time of flight. [5]

Unit-II [Statics (Marks: 30)]

Answer *any three* questions.

1. If $P_1, P_2, ..., P_n$ be a given system of coplanar forces acting, respectively, at the points $A_1, A_2, ..., A_n$ of a body, then show that the system can be reduced to a single force R at any base point O and a single couple G. Show further that they can be reduced to a single force R in which the point of application of R is displaced. [7+3]

2. A system of coplanar forces has the total moments $H, 2H$ and $3H$ about the points (0,0), (0,1) and (2,4) respectively. Find the magnitude and the equation of the line of action of the resultant. [10]

3. State the principle of virtual work for a particle and hence deduce the conditions for equilibrium. [3+7]

4. A square framework formed of heavy uniform rods of equal weight W jointed together is hung up by one corner. A weight W is suspended from each of the three lower corners and the shape of the square is preserved by a light rod along the horizontal diagonal. Find the thrust of the light rod. [10]

5. (a) What is meant by Poinsot's central axis? [5]

   (b) Two forces act, one along the line $y = 0, z = 0$ and the other along the line $x = 0, z = c$. Show that the locus of the central axis is

   $$(x^2 + y^2)\, z = cy^2.$$

   [5]

B. Sc. (Honours) Examination-2023

Semester-IV (CBCS)

Mathematics

Paper: CCMA 10

(Probability Theory)

Time: Three Hours **Full Marks: 60**

Questions are of values as indicated in the margin.
Notations and symbols have their usual meanings.

Answer question no. 1 and ***any five*** from the rest.

1. Answer ***any five*** questions. [5 × 2 = 10]
   (a) For any two events A and B connected with a random experiment E, prove that (i) $P(\overline{A}+B) = 1-P(A)+P(AB)$ and $P(\overline{A}B) = P(B)-P(AB)$.
   (b) Prove or disprove the statement: If any three events A, B, and C are mutually independent, then the events A and $B+C$ are also independent.
   (c) Let the probability of an event A vanish, i.e., $P(A)=0$. Does it imply that A is an impossible event? Justify your answer with an example.
   (d) If $F(x)$ denotes the distribution function of a random variable X and α is any fixed point in the spectrum of X, then prove that $F(\alpha+0) = F(\alpha)$.
   (e) Define variance of a random variable X. Does it exist for the Cauchy distribution? Give reasons.
   (f) Prove the Schwartz's inequality for the expectations of two random variables X and Y: $[E(XY)]^2 \leq E(X^2)\,E(Y^2)$.
   (g) If ρ denotes the correlation coefficient between two random variables X and Y, then prove that $-1 \leq \rho(X,Y) \leq 1$.
   (h) Define the characteristic function $\chi(t)$ of a random variable X and obtain its expression for the Poisson-μ variate.

2. (a) State the axioms of mathematical probability and hence deduce that for any two events A and B, $P(A+B) = P(A)+P(B)-P(AB)$. [3+2]
   (b) Define conditional probability of an event. Show that the conditional probability satisfies the axioms of probability. [3]
   (c) Two cards are drawn from a well-shuffled pack. Find the probability that at least one of them is a spade. [2]

3. (a) Define Bernoulli's sequence of trials. Show that the probability of i successes in a Bernoullian sequence of n trails is given by the binomial law. Hence show that if p is the probability of success in each trail, the most probable number of successes i_m satisfies the inequality: $(n+1)p-1 \leq i_m \leq (n+1)p$. [1+3+4]
   (b) The probability of hitting a target is 1/5. If 10 shots are fired, find the probability of at least two hits. [2]

4. (a) If $F(x)$ is a distribution function, then prove that for any $h \neq 0$, the function
$$G(x) = \frac{1}{2h}\int_{x-h}^{x+h} F(t)dt$$
   is also a distribution function.
   (b) Show that a function $f(x)$, defined corresponding to a random variable X by, [4]
$$f(x) = \begin{cases} x & 0<x<1 \\ k-x & 1<x<2 \\ 0 & \text{elsewhere} \end{cases}$$
   is a probability density function for a suitable value of the constant k. Calculate $P(1/2 < X < 3/2)$. [1+2]
   (c) A point X is chosen at random on a line segment AB whose middle point is O. Find the probability that the segments AX, BX, and AO can form the sides of a triangle. [3]

5. (a) The joint probability density function of the random variables X and Y is given by
$$f(x) = \begin{cases} 2 & 0<x<1,\ 0<y<x \\ 0 & \text{elsewhere} \end{cases}.$$
   Find the marginal and conditional density functions. Compute $P\left(\frac{1}{4} < X < \frac{3}{4} \middle/ Y = \frac{1}{2}\right)$. [2+2+2]

(b) If X_1 and X_2 are independent random variables, each having the density function $2x\exp(-x^2)$, $0 < x < \infty$, find the density function for the random variable $\sqrt{X_1^2 + X_2^2}$. [4]

6. (a) If X is a Poisson variate with parameter μ and n is any positive integer, then prove that [3]

$$P(X \leq n) = \frac{1}{n!}\int_{\mu}^{\infty} e^{-x}x^n.$$

(b) If $f(x,y) = x + y$ $(0 < x < 1,\ 0 < y < 1)$ is the joint density function of the variates X and Y, find the distribution of $X + Y$. [3]

(c) The numbers $X_1, X_2, ..., X_n$ are independently choasen at random in the interval (a, b). Prove that the probability density function of the random variable $X = \min\{X_1, X_2, ..., X_n\}$ is given by [4]

$$f(x) = \frac{n(b-x)^{n-1}}{(b-a)^n}, \quad (a < x < b).$$

7. (a) If μ_k denotes the k-th central moment and p the probability of success in a binomial (n,p) distribution, prove that

$$\mu_{k+1} = p(1-p)\left(nk\mu_{k-1} + \frac{d\mu_k}{dp}\right).$$

Hence obtain the coefficient of skewness γ_1. [3+1]

(b) Define mode of a distribution. Show that the mode M of a Poisson distribution with parameter μ is the integer(s) determined by the inequalities: $\mu - 1 \leq M \leq \mu$. [1+3]

(c) Prove that the moment generating function of a uniform distribution over the interval $(-a, a)$ is $\sinh at/at$. [2]

8. (a) Define correlation coefficient $\rho(X,Y)$ of two random variables X and Y. Write down the equations for the least square regression lines of "X on Y" and "Y on X". Show that the angle θ between these regression lines is given by

$$\tan\theta = \frac{1-\rho^2}{\rho}\frac{\sigma_x\sigma_y}{\sigma_x^2 + \sigma_y^2},$$

where σ_x (σ_y) denotes the standard deviation of X (Y). Discuss the cases for $\rho = 0$ and $\rho = 1$. [1+2+2+2]

(b) If the least square regression lines corresponding to X and Y are $x + 6y = 6$ and $3x + 2y = 10$, find the means and the correlation coefficient. [2+1]

9. (a) State and prove the Tchebycheff's inequality for a discrete random variable X. [1+3]

(b) Use Tchebycheff's inequality to show that in 2000 throws with an unbiased coin, the probability that the number of heads lies between 900 and 1100 is at least 19/20. [4]

(c) Define convergence in probability and state the weak law of large numbers (WLLN) for a sequence of random variables $\{X_n\}$. [1+1]

Use separate answer script for each unit

B. Sc. (Honours) Examination-2023

Semester-IV (CBCS)
Mathematics
Paper: CCMA 8
[Analysis-IV and Differential Equations-II (N)]

Time: Three Hours **Full Marks: 60**

Questions are of values as indicated in the margin.
Notations and symbols have their usual meanings.

Unit-I (Analysis-IV)
(Full Marks: 30)
Answer ***any three*** questions.

1. (a) Prove that if $\lim_{(x,y)\to(a,b)} f(x,y)$ exists finitely then $f(x,y)$ is necessarily bounded in some deleted neighbourhood of the point (a,b). [3]
   (b) Using $\epsilon-\delta$ definition, show that $\lim_{(x,y)\to(0,0)} \frac{xy}{|x|+|y|} = 0$. [3]
   (c) Prove that if $f(x,y)$ is continuous at a point (a,b) then so is $|f(x,y)|$. Show by an example the converse may not be true. [2+2]

2. (a) Show that the function $f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2+y^2}} & \text{for} \quad (x,y)\neq(0,0) \\ 0 & \text{for} \quad (x,y)=(0,0) \end{cases}$ is continuous at the $(0,0)$. [2]
   (b) Show by an example for a function $f(x,y)$ of two variables x and y that $f_x(a,b)$ and $f_y(a,b)$ both exist but $f(x,y)$ is not continuous at (a,b). [4]
   (c) State Euler's theorem for a homogeneous function of degree n. If $f(x,y)$ is homogeneous function of degree n and if $f(x,y)$ possesses continuous partial derivatives upto second order then show that $x^2\frac{\partial^2 f}{\partial x^2} + 2xy\frac{\partial^2 f}{\partial x\partial y} + y^2\frac{\partial^2 f}{\partial y^2} = n(n-1)f$. [1+3]

3. (a) When a function $f(x,y)$ is said to be differentiable at a point (a,b). If $f(x,y)$ is differentiable at a point (a,b) then show that the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ both exist finitely at (a,b). [1+2]
   (b) State and prove Schwarz's theorem for equality of two mixed second order partial derivatives of a function $f(x,y)$ at a point (a,b). [1+4]
   (c) Show that $x^2 - xy^2 - 2y^5 = 0$ determines x uniquely as a function of y near the point $(-1,1)$. [2]

4. (a) If $f(x,y) = x^2 - 3xy + 2y^2$, then by using mean value theorem express the difference $f(1,2) - f(2,-1)$ by partial derivatives. Also compute θ and check that it lies between 0 and 1. [3]
   (b) State and prove Taylor's theorem for a function of two variables. [5]
   (c) Expand $x^4 + x^2y^2 - y^4$ about $(1,1)$ up to terms of the second degree. [2]

5. (a) Show that the function $f(x,y) = 2x^4 - 3x^2y + y^2$ has neither a maximum nor a minimum at $(0,0)$. [4]
   (b) Use Lagrange method to find the shortest distance from the point $(1,0)$ to the parabola $y^2 = 4x$. [3]
   (c) Evaluate $\int\int_R x^3 y\,dx\,dy$ over $R: \{(x,y): 0\le x\le 1; 0\le y\le 2\}$. [3]

Unit-II (Differential Equations-II)
(Full Marks: 30)
Answer question number 1 and ***any two*** from the rest.

1. Answer ***any five*** questions. [5 × 2 = 10]
   (a) Let $y_1(x) = 1/x$ and $y_2(x) = x^{3/2}$ be a fundamental set of solutions of the following ordinary differential equation (ODE), and c_1 and c_2 be any two arbitrary constants.

$$2x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - 3y = 0.$$

   Use the principle of superposition to show that the function $y(x) = c_1y_1(x) + c_2y_2(x)$ is also a solution of the ODE.

(b) Factorize the operator of the differential equation: $[D^2 + (2x - 3)D - 6x]y = 0$ and hence solve. Here, $D^2 \equiv d^2/dx^2$ and $D \equiv d/dx$.

(c) Define Pfaffian differential equation in n variables and define its integrating factor in the case of two variables.

(d) Define regular and irregular singular points of a second order ODE of the form:

$$a_0(x)\frac{d^2y}{dx^2} + a_1(x)\frac{dy}{dx} + a_2(x)y = 0,$$

and give examples.

(e) State the basic differences between the conditions of integrability and exactness of the differential equation: $P(x, y, z)dx + Q(x, y, z)dy + R(x, y, z)dz = 0$.

(f) Convert the following second order ODE into two first-order ODEs.

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 143y = 0,$$

with the initial conditions: $y = -13$ and $dy/dx = 11$ at $x = 0$.

(g) Show that the following nonlinear ODE is exact and find its first integral.

$$2x^2 \cos y \frac{d^2y}{dx^2} - 2x^2 \sin y \left(\frac{dy}{dx}\right)^2 + x \cos y \frac{dy}{dx} - \sin y = x^2.$$

(h) Identify the number of independent arbitrary constants in the general solution of the following system of equations:

$$\begin{aligned} \phi_1(D)x + \phi_2(D)y &= \phi(t), \\ \psi_1(D)x + \psi_2(D)y &= \psi(t), \quad D \equiv d/dt. \end{aligned}$$

2. (a) If $y = u(x)$ is a solution of the differential equation:

$$\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = 0,$$

then show that $y = c_1u(x) + c_2v(x)$ is its general solution, where c_1 and c_2 are two arbitrary constants, and

$$v(x) = u(x) \int \frac{\exp\left[-\int P(x)dx\right]}{[u(x)]^2}.$$

[5]

(b) Solve the following system of differential equations by evaluating the eigenvalues and the corresponding eigenvectors of the coefficient matrix.

$$\frac{dx}{dt} = -x - y, \quad \frac{dy}{dt} = x - y.$$

Given that $x(t = 0) = -4$, and $y(t = 0) = 2$. [5]

3. (a) Solve the differential equation:

$$\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + (x^2 - 8)y = x^2e^{-\frac{x^2}{2}}$$

by reducing it to its normal form. [4]

(b) Using the power series method, solve the following ODE about an ordinary point $x_0 = 0$.

$$\frac{d^2y}{dx^2} + (9 - x)y = 0.$$

[6]

4. (a) Find the complete integral of the following set of differential equations and hence give its geometrical interpretation.

$$\frac{dx}{y-zx} = \frac{dy}{yz+x} = \frac{dz}{x^2+y^2}.$$

[1+4]

(b) Verify that the following differential equation is integrable and hence find its solution.

$$(ye^x + e^z)\,dx + (ze^y + e^x)\,dy + (e^y - ye^x - ze^y)\,dz = 0.$$

[2+3]

Use separate answer script for each unit

B. Sc. Examination-2023

Semester-IV

Mathematics

Course: GEC-4

(Linear Programming Problem and Numerical Methods)

Time: Three Hours **Full Marks: 60**

Questions are of values as indicated in the margin.
Notations and symbols have their usual meanings.

Unit-I [Linear Programming Problem(Marks:30)]

Answer ***any five*** questions.

1. Prove that the set of all feasible solutions of an LPP is a convex set. Sketch the domain in $\mathbb{R}^2$ where points satisfy the following set of constraints

$$\begin{aligned} 7x_1 + 5x_2 &\leq 35, \\ 5x_1 + 7x_2 &\leq 35, \\ 4x_1 + 3x_2 &\geq 12, \\ 3x_1 + x_2 &\geq 3, \\ x_1, x_2 &\geq 0. \end{aligned}$$

Find the vertices of the feasible region, if exists. Then obtain the optimal solution to the problem graphically if the objective function is given by $Z = 6x_1 + 4x_2$. [2+2+1+1]

2. Given the linear system of equations

$$\begin{aligned} 2x_1 - x_2 + 2x_3 &= 10, \\ x_1 + 4x_2 &= 18 \end{aligned}$$

with the non-negative restriction $x_1,\ x_2,\ x_3 \geq 0$. Verify whether (2, 4, 5) is a solution to this system of equations. Is this a basic feasible solution? Find the basic feasible solution of the equation if not. [1+2+3]

3. Use the simplex method to solve the given LPP:

$$\begin{aligned} \text{Maximize} \quad & Z = 5x_1 + 8x_2 \\ \text{subject to} \quad & 3x_1 + 2x_2 \geq 3, \\ & x_1 + 4x_2 \geq 4, \\ & x_1 + x_2 \leq 5, \\ & x_1, x_2 \geq 0. \end{aligned}$$

Verify your result by solving this problem using a graphical method. [4+2]

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4. Prove that dual of the dual is primal. Justify this statement for the following LPP

$$\begin{aligned} \text{Maximize} \quad & Z = 2x_1 + 3x_2 + x_3 \\ \text{subject to} \quad & x_1 - 5x_2 + 3x_3 = 7, \\ & 2x_1 - 5x_2 \leq 3, \\ & 3x_2 - x_3 \geq 5, \\ & x_1, x_2 \geq 0 \end{aligned}$$

[3

and x_3 is unrestricted in sign.

5. State and prove the fundamental theorem of duality. Use duality to obtain an optimal solution, if any, to the LPP:

$$\begin{aligned} \text{Minimize} \quad & Z = 4x_1 + 3x_2 + 6x_3 \\ \text{subject to} \quad & x_1 + x_3 \geq 2, \\ & x_2 + x_3 \geq 5, \\ & x_1, x_2, x_3 \geq 0. \end{aligned}$$

[3

6. For the following transportation problem obtain the different starting solutions by adopting

	D_1	D_2	D_3	a_i
O_1	5	1	8	12
O_2	2	4	0	14
O_3	3	6	7	4
b_j	9	10	11	

the North-West corner rule and Vogel's approximation method. Furthermore, find out which solution is better or more profitable. [2+3

7. Five operators A, B, C, D, E have to be assigned to five machines I, II, III, IV, V. The assignment costs are given below:

	I	II	III	IV	V
A	5	5	–	2	6
B	7	4	2	3	4
C	9	3	5	–	3
D	7	2	6	7	2
E	6	5	7	9	1

Operator A cannot operate Machine III, and Operator C cannot operate Machine IV. Find the optimal assignment schedule.

8. Write the conditions for getting an optimal solution for traveling salesman problems. Solve the following traveling salesman problem: [2+4]

	1	2	3	4	5
1	∞	2	5	7	1
2	6	∞	3	8	2
3	8	7	∞	4	7
4	12	4	6	∞	5
5	1	3	2	8	∞

UNIT-II [Numerical Methods(Marks:30)]

Answer ***any three*** questions.

1. (a) Write down the approximate representation of $\frac{2}{3}$ correct up to four significant figures and then find : absolute, relative and percentage errors. [3]

   (b) Find the number of significant figures in V_A with respect to V_T where $V_A = 0.05411$, $V_T = 0.05418$. [2]

   (c) Find the polynomial $f(x)$ satisfying the following data and hence find the value of $f(2.5)$.

x	1	2	3	4	5	6
$f(x)$	3	24	99	288	675	1368

[4+1]

2. (a) Establish Newton's backward interpolation formula without error term. [5]

   (b) From the following values of x and $f(x)$

x	0.20	0.22	0.24	0.26	0.28	0.30
$f(x)$	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

   calculate the value of $f(0.23)$ by using Newton's forward interpolation formula. [5]

3. (a) Derive composite Trapizoidal rule for the numerical integration. [5]

   (b) Evaluate $\int_0^1 \sqrt{1-x^3}dx$ using Simpson's One-third rule, taking six equal intervals, correct up to two decimal places. [5]

4. (a) Find one root of $e^x - 3x = 0$, by Method of Bisection, lying between 1 and 2, correct up to two decimal places. [3]

   (b) Explain graphically, the condition of convergence of the Fixed-Point Iteration method. [5]

   (c) From the equation $x^5 - a = 0$, deduce Newtonian iterative procedure

$$x_{n+1} = \frac{1}{5}\left(4x_n + \frac{a}{x_n^4}\right)$$

   for $\sqrt[5]{a}$. [2]

5. (a) Using Gauss-Seidel Iteration Method, solve the following system

$$\begin{aligned} 5x_1 + 3x_2 + x_3 &= 2 \\ 4x_1 + 10x_2 + 4x_3 &= -4 \\ 2x_1 + 3x_2 + 8x_3 &= 20 \end{aligned}$$

correct upto 3-significant figures. [5]

(b) Solve the system

$$\begin{aligned} 3x_1 + x_2 + x_3 &= 7 \\ 2x_1 + x_2 + 5x_3 &= 13 \\ x_1 + 4x_2 + x_3 &= 9.4 \end{aligned}$$

using Gauss-Jacobi Iteration Method, correct up to 2-significant figures. [5]