J.D.B Govt. Girls College, Kota
Sample Question Paper
B.Sc. Part III
P-I Linear algebra and Complex analysis

Max. Marks-20

Q.1 Attempt all questions(each question for 01 marks)

(a) Define the Harmonic function?

(b) If in a domain harmonic functions u and v satisfy C-R equations, then u+iv is an analytic function in that domain?

(c) Write the procedure to determine the conjugate function?

(d) Find the harmonic conjugate of u(x, y)=2x(1-y)?

(e) Prove that the function u(x, y)=e^x (x cosy-y siny).

Q.2 Short answer questions (each question for 02 marks)

(a) Define Milne Thomson Method?

(b) If (u-v) =(x-y)(x^2+4xy+y^2) and f(z)= u+iv is an analytic function of z=x+i y, find f(z) in terms of z.

(c) Show that an analytic function with constant modulus is constant.

(d) If f(z) is analytic, then prove that

(e) If f(z) is analytic, then prove that$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$

Q.3 Descriptive Questions (05 marks)

(a) Derived the methods to construct an analytic function when one conjugate function is given?

Janki Devi Bajaj Government Girls College, Kota
Sample Question Paper
B.Sc. Part III
P-II Mathematical statistics and linear programming

Max. Marks-20

Q.1 Attempt all questions
(a) Prove that dual of a dual is a prime number
(b) Define assignment problem.
(c) Define fundamental theorem of duality in L.P.P
(d) Define infeasible assignment
(e) Write the dual of the following problem

$$Min\ z = 3x_1 + x_2$$
$$x_1 + x_2 \geq 1$$
$$2x_1 + 3x_2 \geq 2$$
$$x_1, x_2 \geq 0$$

Q.2 Short answer questions
(a) Describe mathematical formulation of assigned problem.
(b) solve the following assignment problem

Jobs →

Persons ↓

	I	**II**	**III**	**IV**
A	2	3	4	5
B	4	5	6	7
C	7	8	9	8
D	3	5	8	4

(c) Find the DP of the following LPP,

$$Max\ z = 2x_1 + 3x_2 + x_3$$
$$s.t \quad 4x_1 + 3x_2 + x_3 = 6$$
$$x_1 + 2x_2 + 5x_3 = 4$$
$$\& \quad x_1, x_2, x_3 \geq 0$$

(d) Find the DP of the following LPP,

$$Min\ z = x_1 + x_2 + x_3$$
$$s.t \quad x_1 - 3x_2 + 4x_3 = 5$$

$$2x_1 - 2x_2 \leq -3$$
$$2x_2 - x_3 \geq 5$$

& $x_1, x_2 \geq 0$, x_3 is unrestricted in sign.

(e) State & prove the reduction theorem of assignment.

Q.3 Descriptive Questions

(a) Use DP to solve the following LPP,

$$Min\; z = 3x_1 + x_2$$
$$x_1 + x_2 \geq 1$$
$$2x_1 + 3x_2 \geq 2$$
$$x_1, x_2 \geq 0$$

<u>**Janki Devi Bajaj Government Girls College, Kota**</u>
<u>**Sample Question Paper**</u>
<u>**B.Sc. Part III**</u>
<u>**P-III Numerical Analysis & C-Programming**</u>

Max. Marks-20

Q.1 Attempt all questions

(a) Define Boundary condition

(b) Define initial value problem.

(c) Write formula of Picard's method.

(d) Define Ordinary differential equation.

(e) Write formula of Euler's method.

Q.2 Short answer questions

(a) Use Picard's method to solve $\frac{dy}{dx} = 1 + xy$ passing through (0,1), correct to three places of decimal for x=0.1

(b) Use Picard's method to solve $\frac{dy}{dx} = 1 + xy$ passing through (0,1), with $x_0=2$, $y_0=0$.

(c) Use Picard's method to solve $\frac{dy}{dx} = x + y$ with $x_0=x=0$, $y_0=y=1$

(d) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with y=1 for x=0, find y approximately for x= 0.1 by Euler's method(two steps)

(e) Use Euler's method to solve $\frac{dy}{dx} = \frac{y^2-x}{y^2+x}$, x=0, y=1, compute y(0.1), y(0.2), y(0.3)

Q.3 Descriptive Questions

(a) Use Euler's method with h=0.1 to find the solution of the question

$\frac{dy}{dx} = x^2 + y^2$, with y(0)=0, in the range $0 \leq x \leq 0.5$