Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (CBCSS – Reg./Supp./Imp.)
Examination, April 2019
(2014 Admission Onwards)
COMPLEMENTARY COURSE IN MATHEMATICS
4C04 MAT-BCA : Mathematics for BCA – IV

Time : 3 Hours

Max. Marks : 40

Instruction : *Non programmable scientific calculator may be* **used**.

SECTION – A

All the **first 4** questions are **compulsory**. They carry **1** mark **each**.

1. If there are 6 red and 4 white balls and one ball is drawn at random. What is the probability of a red ball ? 1

2. When do you call a solution to be degenerate solution ? 1

3. Write Lagrange's interpolation formula. 1

4. State Newton's forward difference interpolation formulae. 1

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. These questions carry **2** marks **each**.

5. Define a discrete random variable. 2

6. Find the probability function corresponding to the random variable X of tossing a coin twice. 2

P.T.O.

7. Find the feasible solution of the transportation problem using North West Corner method. 2

From	To			Supply
	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Demand	7	9	18	

8. Define a feasible region in a graphical method. 2

9. Find the value of $\sin \frac{\pi}{6}$, using Lagrange's interpolation formula. The function $y = \sin x$ is given below :

x	y = sin x
0	0
$\frac{\pi}{4}$	0.70711
$\frac{\pi}{2}$	1.0

2

10. Give the geometric significance of the trapezoidal rule. 2

11. State the Lipschitz condition in Picards method. 2

12. Solve the equation $y' = x + y^2$, subject to the condition $y = 1$ when $x = 0$. 2

13. State Simpson's $\frac{1}{3}$ rule. 2

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. **Each** question carries 3 marks.

14. Determine the probability of three 6's in five tosses of a fair die. 3

15. A company has two grades of inspectors 1 and 2, the members of which are to be assigned for a quality control inspection. It is required that at least 2000 pieces be inspected per 8 hour day. Grade 1 inspector can check pieces at the rate of 40 per hour, with an accuracy of 97 percent. Grade 2 inspectors check at the rate of 30 pieces per hour with an accuracy of 95 percent. The wage rate of Grade 1 inspector is Rs. 5 per hour while that of a Grade 2 inspector is Rs. 4 per hour. An error made by an inspector costs Rs. 3/- to the company. There are only a Grade I inspectors and II Grade 2 inspectors available to the company. The company wishes to assign work to the available inspectors so as to minimize the total cost of the inspection. Formulate this as an LP model.   3

16. Find the initial basic feasible solution by VAM.   3

		Warehouse				
		W_1	W_2	W_3	W_4	Capacity
	F_1	21	16	25	13	11
Factory	F_2	17	18	14	23	13
	F_3	32	27	18	41	19
Requirements		6	10	12	15	43

17. Find the real root of the equation $x^3 - 2x - 5 = 0$.   3

18. Find the missing term in the following table :   3

x	y
0	1
1	3
2	9
3	–
4	81

19. Given the differential equation $\dfrac{dy}{dx} = \dfrac{x^2}{y^2 + 1}$ with initial condition $y = 0$ when $x = 0$. Use Picards method to obtain y for $x = 0.25, 0.5$ and 1.0 correct to three decimal places.   3

SECTION – D

Answer **any 2** questions from among the questions **20 – 23**. These questions carry 5 marks **each**.

20. Define variance. Find the variance and standard deviation of the random variable

    X given by $f(x) = \begin{cases} \frac{1}{2}x, & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$.   5

21. Anita Electrical Company produces two Products P_1 and P_2. Products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for Product P_1 and 35 for Product P_2. The company employs total of 60 workers Product P_1 requires 2 man-weeks of labour, which P_2 requires one man-week of labour. Profit margin of P_1 is Rs. 60 and on P_2 is Rs. 40. Formulate this problem as an LP problem and solve it graphically.   5

22. Calculate the first and second derivative of the function tabulated in the table below at the point x = 2.2 and also $\frac{dy}{dx}$ at x = 2.0.   5

x	y
1.0	2.7183
1.2	3.3201
1.4	4.0552
1.6	4.9530
1.8	6.0496
2.0	7.3891
2.2	9.0250

23. Find a double root of the equation $f(x) = x^3 - x^2 - x + 1 = 0$.   5

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