17P270 (Pages: 3) Name……………………….…….

Reg. No……………………..

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, MAY 2018

(CUCSS - PG)

(Computer Science)

CC17P CSS2 E05 - NUMERICAL AND STATISTICAL METHODS

(2017 Admissions: Regular)

Time: Three Hours Maximum: 36 Weightage

I. Answer *all* questions.

1. Explain random variables with suitable examples.
2. What do you mean by unbalanced transportation problem? How we can convert it in to a balanced one?
3. Explain the primal-dual relationship in Operation research.
4. Write statistical definition of probability.
5. Explain absolute and relative errors.
6. Compare mass function and density function in probability.
7. Find the dual of the following LPP
   Maximize $z = 2x_1 + x_2$
   Subject to:
   $x_1 + x_2 \leq 4$
   $x_1 + x_2 \leq 2$
   $x_1 \geq 0, x_2 \geq 0$
8. Define Slack and Surplus variables.
9. Explain the convergence of bisection method.
10. What do you mean by blunders in arithmetic?
11. Derive the false position formula using the equation of line joining two points.
12. What do you mean by unbalanced assignment problem? Explain with suitable example.

(12 × 1 = 12 Weightage)

II. Answer *any six* questions.

13. What are the different iterative methods to find the solution of non linear equations? Explain any one method.
14. Use Secant Method to estimate the root of the equation $x^2 - 4x - 10 = 0$, with initial estimate $x_1 = 4$ and $x_2 = 2$.
15. Explain addition theorem on probability for two events.
16. Explain Simpson's 1/3 rule.

17. Luminous lamps have three factories - F_1, F_2, and F_3 with production capacity 30, 50, and 20 units per week respectively. These units are to be shipped to four warehouses W_1, W_2, W_3, and W_4 with requirement of 20, 40, 30, and 10 units per week respectively. The transportation costs (in Rs.) per unit between factories and warehouses are given below.

Factory	**Warehouse**				**Supply**
	W_1	W_2	W_3	W_4	
F_1	1	2	1	4	30
F_2	3	3	2	1	50
F_3	4	2	5	9	20
Demand	20	40	30	10	

Find an initial basic feasible solution of the given transportation problem using North-West Corner rule.

18. Let X be a continuous random variable with the following PDF

$$F_x(x) = \begin{cases} ce^{-x} & x \geq 0 \\ 0, & otherwise \end{cases}$$ where c is a positive constant. Find the value of c?

19. Solve the following LPP using graphical method

Maximize $Z = X_1 + 1.5X_2$

Subject to:

$$2X_1 + 2X_2 \leq 16$$
$$X_1 + 2X_2 \leq 12$$
$$4X_1 + 2X_2 \leq 28$$
$$X_1, X_2 \geq 0$$

20. Construct backward and forward difference table for the following

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

21. Solve the linear system by Gauss elimination method.

$$y + z = 2$$
$$2x + 3z = 5$$
$$x + y + z = 3$$

(6 × 2 = 12 Weightage)

III. Answer any ***three*** questions.

22. Find a root of the equation $x^2 - 4x - 10 = 0$ using bisection method.
23. Obtain the Newton's forward interpolating polynomial, $P_5(x)$ for the following tabular data and interpolate the value of the function at $x = 0.0045$.

x	0	0.001	0.002	0.003	0.004	0.005
y	1.121	1.123	1.1255	1.127	1.128	1.1285

24. Compare Gauss Elimination and Gauss Jordan methods.
25. Find the root of the equation $f(x) = x^2 - 3x + 2$ in the vicinity of $x = 0$ using Newton Raphson Method correct to 4-decimal places.
26. Compute f (0.3) for the data using Lagrange's interpolation formula.

x	0	1	3	4	7
f	1	3	49	129	813

27. Solve the following using Big-M method

Minimize $z = 2x_1 + 3x_2$

Subject to

$$0.5\,x_1 + 0.25\,x_2 \leq 4$$
$$x_1 + 3\,x_2 \geq 20$$
$$x_1 + x_2 = 10$$
$$x_1, x_2 \geq 0$$

(3 × 4 = 12 Weightage)

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