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Anna University Exams April/May 2015 – Regulation 2013
Rejinpaul.com Unique Important Questions – 4th Semester BE/BTECH
MA6452 - STATISTICS AND NUMERICAL METHODS
Part 1 /2 - Topic Wise Important Questions

UNIT 1	TESTING OF HYPOTHESIS	
	PART-B TOPICS	PART-A TOPICS
1	Problem based on t-distribution	Application ,uses ,properties, condition of all distribution
2	Problem based on chi-square-distribution	Definitions of all terms
3	Problem based on F-distribution	
4	Goodness of fit –Attributes-contingency table	
UNIT 2	DESIGN OF EXPERIMENTS	
	PART-B TOPICS	PART-A TOPICS
1	Latin square design	Definition of CRD,RBD,LSD
2	2 ² factorial design	Advantage and Disadvantage of CRD,RBD,LSD
3	Completely randomized design	
4	Randomized block design	
UNIT 3	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	
	PART-B TOPICS	PART-A TOPICS
1	Newton Raphson method	Differences between iteration and elimination
2	Eigen values of a matrix by Power method and Jacobi methods	Differences between gauss Jacobi and seidel
3	Iterative methods of Gauss Jacobi and Gauss Seidel	
4	Gauss elimination method	
UNIT 4	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	
	PART-B TOPICS	PART-A TOPICS
1	Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules	All model formulas
2	Numerical integration using Trapezoidal, Simpson's 1/3 rule	Error and order of all methods
3	Newton's forward and backward difference formulae for differentiation	
4	Lagrange's interpolation	
5	Newton's divided difference interpolation	
6	Newton's forward and backward difference formulae	
UNIT 5	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	
	PART-B TOPICS	PART-A TOPICS



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1	Milne's predictor corrector methods for solving first order equations.	All model formulas
2	Fourth order Runge-Kutta method for solving first order equations	
3	Taylor's series method	
4	Euler's method - Modified Euler's method	
5	Finite difference methods for solving second order equations	

Part 2/2 – Question Wise Important Questions

UNIT 1 TESTING OF HYPOTHESIS

1. Two independent samples are chosen from two schools A and B and a common test is given in a subject. The scores of the students are as follows:

School A :	76	68	70	43	94	68	33	
School B :	40	48	92	85	70	76	68	22

Is the difference between the sample means significant?

2. Two independent samples of 8 and 7 items respectively had the following values of the variables:

Sample 1:	39	41	43	41	45	39	42	44
Sample 2:	40	42	40	44	39	38	40	

Do the estimates of the population variance differ significantly?

3. A survey of 800 families with 4 children each revealed the following distribution:

No. of boys :	0	1	2	3	4
No. of girls :	4	3	2	1	0
No. of families:	32	178	290	236	64

Is this result consistent with the hypothesis that the male and female births are equally probable? (Test the hypothesis at 5% level).

4. Two researchers A and B adopted different techniques while rating the students level.

Can you say that the techniques adopted by them are significant?

Researchers	Below average	Average	Above average	Genius
A	40	33	25	2
B	86	60	44	10

5. The mean value of a random sample of 60 items was found to be 145, with an SD of 40. Find the 95% confidence limits for the population mean. What size of the sample is required to estimate the population mean within 5 of its actual value with 95% or more confidence, using the sample mean?

UNIT 2 DESIGN OF EXPERIMENTS

1. Analyze the variance in the Latin square of yields (in kgs) paddy where P,Q,R,S denote the different methods of cultivation.

S122	P121	R123	Q122
Q124	R123	P122	S125
P120	Q119	S120	R121
R122	S123	Q121	P122

Examine whether the different methods of cultivation have given significantly different yields.





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2. An experiment was designed to study the performance of 4 different detergents for cleaning fuel injectors. The following *cleanness* readings were obtained with specially designed equipment for 12 tanks of gas distributed over 3 different models of engines.

	Engine 1	Engine 2	Engine 3
Detergent A:	45	43	51
Detergent B:	47	46	52
Detergent C:	48	50	55
Detergent D:	42	37	49

Perform the ANOVA and test at 0.01 level of significance whether there are differences in the detergents or in the engines.

3. As part of the investigation of the collapse of the roof of a building, a testing laboratory is given all the available bolts that connected the steel structure at three different positions on the roof. The forces required to shear each of these bolts (coded values) are as follows.

Position 1:	90	82	79	98	83	91	
Position 2:	105	89	93	104	89	95	86
Position 3:	83	90	80	94			

Perform an analysis of variance to test at the 0.05 level of significance whether the differences among the sample means at the three positions are significant.

UNIT 3 SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

- 1..Solve the system of equations using Gauss Seidel iterative methods. $20x - y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$.

- 2.Find the largest eigen values and its corresponding vector of the matrix

$$\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix} \text{ by power method.}$$

3. Using Newton-Raphson's method, solve $x \log_{10} x = 1.2$

- 4.Solve the following equations by Jacobi's iteration method $x + y + z = 9$, $2x - 3y + 4z = 13$, $3x + 4y + 5z = 40$.

UNIT 4 INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION

1. The following data are taken from the steam table:

Temp ^o C:	140	150	160	170	180
Pressure :	3.685	4.854	6.502	8.076	10.225

Find the pressure at temperature $t = 142^{\circ}$ and at $t = 175^{\circ}$

2. Using Lagranges interpolation formula find $y(10)$ given that $y(5) = 12$, $y(6) = 13$, $y(9) = 14$ and $y(11) = 16$.

3. Use Newton's divided difference formula find $u(3)$ given $u(1)=-26$, $u(2)=1$, $u(4)=256$, and $u(6)=844$

- 4.The following data gives the velocity of a particle for 20 seconds at an interval of five seconds. Find initial acceleration using the data given below

Time(secs) :	0	5	10	15	20
Velocity(m/sec):	0	3	14	69	228

5. Evaluate $\int_1^2 \int_1^2 \frac{dx dy}{x^2 + y^2}$ numerically with $h = 0.2$ along the x direction and $k = 0.25$ along y direction by

Trapezoidal Rule





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6. Evaluate $\int_0^{\pi/2} \sqrt{\sin x} dx$ by (i) Trapezoidal Rule (ii) Simpson's 1 – 3rd rule

7. Evaluate $\iint \frac{dx dy}{1+x+y}$ by Simpson's 1/3 rule with $\Delta x = \Delta y = 0.5$ where $0 < x, y < 1$.

UNIT 5 NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

1. Using R.K. method of 4th order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, with $y(0) = 1$ at $x = 0.2$

2. Using Taylor series method, find $y(1.1)$ and $y(1.2)$ correct to four decimal places given $\frac{dy}{dx} = xy^{1/3}$ and $y(1) = 1$

3. Determine the value of $y(0.4)$ using Milne's method given $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$, use Taylor's series to get the value of y at $x = 0.1$, Euler's method for y at $x = 0.2$ and RK 4th order method for y at $x = 0.3$.

4. Using Euler's method find the solution of the IVP $\frac{dy}{dx} = \log(x + y)$, $y(0) = 2$ at $x = 0.2$ taking $h = 0.2$.

5. Using the finite differences methods find $y(0.25), y(0.5), y(0.75)$ satisfying the differential equation $y'' + y = x$, $y(0) = 0, y(1) = 2$

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