Register Number: ……..

M.TECH DEGREE EXAMINATIONS: MAY / JUNE 2013

Second Semester

BIOTECHNOLOGY

MAT508 : Applied Mathematics For Bio – Technologists

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

1. Find the P.I of $(D^2 + 3D + 5)\ y = \sinh 2x$
2. Solve: $x\ \frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
3. Evaluate: $\int_0^\infty te^{-3t} \sin 2t dt$
4. Find $L^{-1}\left[\tan^{-1}\left(\frac{\omega}{s}\right)\right]$
5. Calculate the median for the following data:

C.I	10-25	25-40	40-55	55-70	70-85	85-100
f	6	20	44	26	3	1

6. The mean and variance of a binomial distribution are 4 and $4/3$. Find $P(X \geq 1)$.
7. What is Type I error and Type II error?
8. Give the main use of ψ^2 test.
9. What do you understand by "Design of an experiment"?
10. Write any two differences between RBD and LSD.

PART B (5 x 16 = 80 Marks)

11. a) (i) Solve: $(D^2 - 4D + 13)\ y = e^{2x} \cos 3x$ (8)

(ii) Solve: $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = x^2 + \cos(\log x)$ (8)

(OR)

b) (i) Solve: $(2x + 3)^2 \frac{d^2y}{dx^2} - (2x + 3) \frac{dy}{dx} - 12y = 6x$ (8)

(ii) Solve: $\frac{dx}{dt} + y = \sin 2t$, $\frac{dy}{dt} - x = \cos 2t$ (8)

12. a) (i) Find $L\left[\ e^{-t}\int_0^t t\cos t\ dt\ \right]$ (8)

(ii) Find the Laplace transform $f(t)=\begin{cases}1, & 0<t<b\\ -1, & b<t<2b\end{cases}$ (8)

with $f(t+2b)=f(t)$.

(OR)

b) (i) Find $L^{-1}\left[\frac{2(s+1)}{(s^2+2s+2)^2}\right]$ (8)

(ii) Using convolution theorem find $L^{-1}\left(\frac{1}{(s+1)(s^2+1)}\right)$ (8)

13. a) Compute the standard deviation and mean deviation from the following data:

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	8	12	17	14	9	7	4

(OR)

b) Fit a second degree parabola $Y= a + bx + cx^2$ to the following population data o a city.

Year	1979	1980	1981	1982	1983	1984	1985
Population(in lakhs)	5	6	6	7	7	8	9

(Take the year 1983 as the origin)

14. a) (i) The height of six randomly chosen sailors are in inches 63, 65, 68, 69, 71 and72. Those of 10 randomly chosen soldiers are 61, 62, 65, 66, 69, 69, 70, 71, 72 and 73. Discuss the light that these data throw on the suggestion that sailors are on the average taller than soldiers. (8)

(ii) A random sample of 500 pineapples were taken from a large consignment and 65 were found to be bad. Find the percentage of bad pineapples in the consignment. (8)

(OR)

b) (i) The following data show the distribution of digits in the numbers chosen at random from a telephone directory. (8)

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory

(ii) Two independent samples of 8 and 7 items respectively had the following values of the variable (weight in kgs.) (8)

Sample I:	9	11	13	11	15	9	12	14
Sample II:	10	12	10	14	9	8	10	

Use 0.05 level of significance to test whether it is reasonable to assume that the variances of the two population sample are equal.

15. a) The following is a Latin square design when 4 varieties of seeds are being tested. Set up the analysis of variance table and state your conclusion. You may carryout suitable change of origin and scale.

A	105	B	95	C	125	D	115
C	115	D	125	A	105	B	105
D	115	C	95	B	105	A	115
B	95	A	135	D	95	C	115

(OR)

b) A completely randomized design experiment with 10 plots and 3 treatments gave the following results:

Plot No.	1	2	3	4	5	6	7	8	9	10
Treatment:	A	B	C	A	C	C	A	B	A	B
Yield :	5	4	3	7	5	1	3	4	1	7

Analyze the results for treatment effects.

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