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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9925 Roll No.

B. Pharm.

(SEM. II) EXAMINATION, 2006-07

ADVANCE MATHEMATICS

(SPECIAL CARRYOVER EXAMINATION)

Time : 3 Hours] *[Total Marks : 80*

Note : *(1) Attempt **all** the questions.*
*(2) All questions **carry** equal marks.*

1. Attempt any **four** of the following : **4×4**

(a) Evaluate : $\int \frac{\sin 2x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$

(b) Evaluate : $\int \frac{e^x (1 - \sin x)}{(1 - \cos x)} dx$

(c) Evaluate : $\int \frac{3x + 2}{(x+1)^2 (x-2)} dx$

(d) Evaluate : $\int_A^B \frac{1}{\sqrt{(x - A)(B - x)}} dx$

(e) Evaluate : $\int_0^{\pi} \frac{x}{1+\sin^2 x} dx$.

(f) Find whether the functions e^{3x} and e^{5x} are linearly dependent or linearly independent. If linearly independent, then determine a differential equation having the above functions as independent solutions.

2. Attempt any **four** of the following : **4×4**

(a) Solve : $y - x\frac{dy}{dx} = a\left(y^2 + \frac{dy}{dx}\right)$

(b) Solve : $\left(x + 2y^3\right)\frac{dy}{dx} = y$

(c) Solve : $y\left(x^2 y + e^x\right)dx = e^x dy$

(d) Solve : $\left(x^2 + y^2\right)\frac{dy}{dx} = xy$

(e) Solve : $\frac{dy}{dx} = \frac{x + 2y + 3}{2x + 3y + 4}$

(f) Solve : $\frac{dy}{dx} = \frac{e^y}{x^2} - \frac{1}{x}$

3. Attempt any **two** of the following : **8×2**

(a) Solve :

(i) $\left(D^2 + D + 1\right)^2 (D - 2)\, y = 0$

(ii) $\left(D^2 + 9\right)y = \cos 2x + \sin 2x$

(b) Solve : $\left(D^2 + a^2\right) y = \sec ax$

(c) Solve : $\frac{dx}{dt} + 5x + y = e^t$

$$\frac{dy}{dt} - x + 3y = e^{2t}$$

4. Attempt any **two** of the following : **8×2**

(a) The first of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15.60 and standard deviation $(13.44)^{\frac{1}{2}}$, find the standard deviation of second group.

(b) Find the mean, median, mode and coefficient of variation for the following distribution :

size	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40
Frequency	8	12	12	18	14	0

(c) Find the arithmetic mean, geometric mean and harmonic mean of the following data :

Items	1	2	3	4	5	6	7	8	9
Frequency	1	2	3	4	5	6	7	8	9

5. Attempt any **two** of the following : **8×2**

(a) Quality control records show that the average defect rate for product is 2.8%. Two hundred items are inspected and 5% are found to be defective in a new batch. Should the batch be rejected ? What would you do if you were the Director of quality control ? Place confidence limits on the percent defective and the number defective (out of 200).

(b) The contents of 3 urns A_1, A_2, A_3 are as follows :

	White Balls	Black Balls	Red Balls
A_1	1	2	3
A_2	2	1	1
A_3	4	5	3

An urn is selected at random and two balls are drawn. They happen to be white and red. What is probability that they come from urn 2 and 3. Also find the probability that the balls come from urn 1.

(c) A manufacturing company wishes to produce 3 new tablets of different makes and wishes to determine whether one of them is more effective than the others in curing the certain disease. Five months using figures are observed at random on each tablet and results are given below :

Observations	Tablet 1	Tablet 2	Tablet 3
1	25	31	24
2	30	39	30
3	36	38	28
4	38	42	25
5	31	35	28

Use ANOVA and determine whether the tablets are significantly different in their mean effect.

(Given : At 5% level $F_{2,12} = 3.89$)
