Second Semester B. Pharm. Examination

(Old)

MATHEMATICS AND STATISTICS

Paper – 2.6

(USC – 35148)

P. Pages : 4

Time : Three Hours] [Max. Marks : 60

Note : (1) All questions carry equal marks.
(2) Answer any **Five** questions.
(3) Use of slide rule, logarithmic tables, Steam tables, Mollier's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted. Use of calculator is permissible.
(4) Use pen of Blue/Black ink/refill only for writing the answer book.

1. Attempt any **Three** of following :—

(a) Prove that

$$\frac{1}{1-\cos\theta} + \frac{1}{1+\cos\theta} = 2 \operatorname{co}\sec^2 0$$ 4

(b) Area of circle is 25 π cm^2 and angle subtended by an arc at centre is 144^0 then find length of arc and area of corresponding sector. 4

(c) Evaluate

$$\lim_{x \to \pi/2} \frac{\sqrt{2} - \sqrt{1+\sin x}}{\cos^2 x}$$ 4

(d) Evaluate

$$\lim_{x \to 0} \frac{e^{5x} - e^{2x}}{\sin 3x}$$ 4

2. (A) Evaluate any **Two** of following :—

(a) Find $\frac{dy}{dx}$ if $y = (x^2 + 5) \sin x$ 3

(b) Find $\frac{dy}{dx}$ if $y = \frac{x^2 + 1}{x^2 - 1}$ 3

(c) Find $\frac{dy}{dx}$ if $y = \log (\sec x + \tan x)$ 3

(B) Attempt any **One** of following :—

(a) If $f(x) = \frac{x \cos x + \sin x}{x^2 + \tan x}$ for $x \neq 0$

$= k$ for $x = 0$

is continuous at $x = 0$ then find K 6

(b) Examine the function for maxima and minima $f(x) = x^3 - 18x^2 + 96x$. 6

3. Evaluate any **Three** of following :—

(a) Discuss the continuity of function at $x = 0$

where $f(x) = \frac{10^x - 5^x - 2^x + 1}{x^2}$ for $x \neq 0$

$= \log 10$ for $x = 0$ 4

(b) Find derivative of sin x by first principle w. r. t. x. 4

(c) $y = \frac{e^x + 1}{e^x - 1}$ find $\frac{dy}{dx}$ 4

(d) Evaluate $\int \sqrt{1 - \sin 2x}\ dx$ 4

4. Evaluate any **Two** of following :—

(a) Evaluate $\int_0^{\pi/4} \log (1 + \tan x)\ dx$ 6

(b) Find area of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ using definite integration. 6

(c) Solve the differential equation

$\sec^2 x \tan y \, dx + \sec^2 y \tan x \, dy = 0$ 6

5. (A) Attempt any **Two** of following :—

(a) Form the differential equation by removing arbitary constants from

$y = a \cos(\log x) + b \sin(\log x)$ 3

(b) Two dice are thrown simultaneously find the probability that sum of the score on uppermost face is even number. 3

(c) If $P(A) = {}^1/_4$ $P(B) = {}^2/_5$ $P(A \cup B) = {}^1/_2$ find $P(A \cap B)$ and $P(A' \cap B')$. 3

(B) Attempt any **One** of following :—

(a) The probability that a student will solve problem A is ${}^2/_3$ and he will not solve problem B is ${}^5/_9$. If the probability that student solve at least one problem is ${}^4/_5$. What is the probability that he will solve both the problems ? 6

(b) If A and B are two independent events and $P(A) = {}^3/_5$ $P(B) = {}^2/_3$ Find :—

(i) $P(A \cap B)$

(ii) $P(A \cup B)$

(iii) $P(A' \cap B')$ 6

6. (A) Write short notes on :—

(a) Histogram 3

(b) Variance 3

(B) Attempt any **One** of following :—

(a) Find mean, S. D. and coeff. of variance from data

Class	:	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	:	5	12	30	45	50	37	21

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(b) Find mean, mode and median from data :—

Class	:	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Frequency	:	12	18	26	14	6

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7. Attempt any **One** of following :—

(a) From the following data find two lines of regressions line X on Y and line Y on X where,

	Mean	S. D. (6)
X :	50	5
Y :	20	4

coefficent of correlation r = 0.8. 12

(b) Find the coefficient of correlation between X and Y from following data :

X :	29	23	25	15	27	29	24	31	22	28
Y :	8	3	7	5	8	19	10	7	5	11

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