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PY 1322010

Roll No. of candidate

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2017



B. Pharm 2nd Semester End-Term Examination

MATHEMATICS AND STATISTICS

Full Marks – 100 Pass Marks – 35 Time – Three hours

The figures in the margin indicate full marks
for the questions.

1. Choose the correct answer : $2 \times 15 = 30$

(a) The differential equation of $y = cx + c^2$ is

(i) $y = x \frac{dy}{dx} + \left(\frac{dy}{dx} \right)^2$

(ii) $y = x \frac{dy}{dx}$

(iii) $y = x$

(iv) None of these

[Turn over

(b) The complementary function of the equation $(D^2 - 2D + 1)y = \cos 2x$ is

(i) $C_1 e^x + C_2 e^{-x}$

(ii) $(C_1 + C_2 x)e^x$

(iii) $C_1 \cos 2x + C_2 \sin 2x$

(iv) None of these

(c) The Laplace transform of e^{-3t} is

(i) $\frac{1}{s-3}$

(ii) $\frac{1}{s+3}$

(iii) $\frac{s}{s^2+9}$

(iv) None of these

(d) The inverse Laplace transform of $\frac{1}{s^2+4}$ is

(i) $\cos 2t$

(ii) $\sin t$

(iii) $\frac{\sin 2t}{2}$

(iv) None of these

(e) If $L\{f(t)\} = \bar{f}(s)$ then $L\{e^{at}f(t)\}$ is

(i) $\bar{f}(s+a)$

(ii) $\bar{f}(s-a)$

(iii) $\bar{f}(s-3)$

(iv) None of these

(f) If $L\{f(t)\} = \bar{f}(s)$ then $L\{f'(t)\}$ is

(i) $s\bar{f}(s) - f(0)$

(ii) $s^2\bar{f}(s) - sf(0) - f'(0)$

(iii) $\frac{1}{s+a}$

(iv) None of these

(g) If $L^{-1}\{\bar{f}(s)\} = f(t)$ then $L^{-1}\left\{\frac{\bar{f}(s)}{s}\right\}$ is .

(i) $\int_0^{\infty} f(u) du$

(ii) $\int_0^t f(u) du$

(iii) $\int_0^s f(u) du$

(iv) None of these

(h) If A and B are two independent events then

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

(ii) $P(A \cap B) = P(A)+P(B)$

(iii) $P(A \cap B) = 0$

(iv) None of these

(i) If A and B are two events with $P(A) = \frac{1}{2}$,
 $P(B) = \frac{1}{3}$ and $P(A \cup B) = \frac{7}{12}$, then $P(A/B)$ is

(i) $\frac{3}{4}$

(ii) 0

(iii) $\frac{2}{3}$

(iv) None of these

(j) From a well shuffled pack of playing cards,
the probability of drawing a spade is

(i) $\frac{2}{52}$

(ii) $\frac{4}{52}$

(iii) $\frac{1}{4}$

(iv) None of these

(k) Fill in the blanks : Mode = 3 _____ - 2 _____

(i) Mean, Median

(ii) Median, Mean

(iii) Mean, Standard Deviation

(iv) None of these

(l) The value of the variable corresponding to maximum frequency is

(i) Mean

(ii) Median

(iii) Mode

(iv) None of these

(m) For the coefficient of correlation $\rho(X, Y) =$

$$\frac{\text{Cov}(X, Y)}{\sigma_x \sigma_y}, \text{ we have}$$

(i) $0 < \rho(X, Y) \leq 1$

(ii) $-1 < \rho(X, Y) < 1$

(iii) $-1 \leq \rho(X, Y) \leq 1$

(v) None of these

(n) For the Poisson's distribution $P(X=r) = \frac{\lambda^r e^{-\lambda}}{r!}, r = 0, 1, 2, \dots$

(i) Mean = Variance = λ

(ii) $\lambda = 0$, always

(iii) Mean = λ^2

(iv) None of these

(o) For a normal distribution

(i) Mean > Mode

(ii) Mean = Mode = Median

(iii) Mean < Median

(iv) None of these.

2. Answer any *eight* :

$5 \times 8 = 40$

(a) Solve : $(x + y + 1)^2 \frac{dy}{dx} = 1$

(b) Solve : $(y \cos x + 1) dx + \sin x dx = 0$

- (c) Solve : $(D^2 - 4D + 3)y = e^{2x}$
- (d) Solve : $(D^2 - 4)y = x^3$
- (e) Find $L \{ \cos^2 2t \}$
- (f) Find $L^{-1} \left\{ \frac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right\}$
- (g) State and prove Bayes' theorem.
- (h) A problem in Statistics is given to 5 students. Their chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{4}, \frac{1}{5}$. What is the probability that the problem will be solved ?
- (i) An insurance company insured 3000 scooter drivers, 5000 car drivers and 8000 truck drivers. The probability of accidents is 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a car driver ?
- (j) If the probability of a bad reaction from a certain injection is 0.002, determine the chance that out of 3000 individuals, more than 3 will get a bad reaction.

3. Answer any three :

10×3=30

(a) State Convolution theorem. Apply it to find

$$L^{-1} \left\{ \frac{s}{(s^2 + 1)^2} \right\}$$

(b) Apply Laplace transform to solve the following differential equation :

$$y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1$$

(c) Find the mean deviation from the mean of the following distribution :

class	0-6	6-12	12-18	18-24	24-30
frequency	8	10	12	9	5

(d) If the two regression coefficients are 0.8 and 0.2, what would be the value of coefficient of correlation ? Also find the two lines of regression.