

KATHMANDU UNIVERSITY
End Semester Examination [C]
November, 2018

NOV 19 2018

Level : B. Sc.
Year : II
Time : 2 hrs. 30 mins.

(Special Compl.)

Course : STAT 201
Semester: I
F.M. : 55

SECTION "C"

[3 Q. × 7 = 21 marks]

1. Let X and Y be independent gamma random variables with parameters (α, λ) and (β, λ) respectively. Let $Z = X+Y$ and $W = \frac{X}{X+Y}$. [2+4+1]
Find the joint probability density function of Z and W
Find the marginal of Z and W
Are Z and W independent

2. The joint density function of two continuous random variable X and Y is
 $f(x) = \{Cxy, \quad 0 < x < 4, \quad 1 < y < 5\}$
i) Find the value of the constant C.
ii) Find $P(X \geq 3, Y \leq 2)$.
iii) Find the marginal distribution function of X

3. What is exponential distribution? Let X represent the lifetime of a component in a piece of lab equipment and suppose that X is exponentially distributed with a mean of $\mu = 1000$ hours.
(a) Find $P(X < 1000)$
(b) Find $P(50 < X < 250)$
(c) Find the 90 th percentile of X
(d) Why might this information be important to the lab personnel?

SECTION "D"

[6 Q. × 4 = 24 marks]

4. Let X be a continuous random variable with PDF

$$f(x) = \left\{ \frac{x}{12} \quad \text{if} \quad 1 < x < 5 \right\}$$

Find the probability density function of $Y = 2X-3$.

5. Let X and Y be two random variables taking three values -1, 0 and 1, and having the joint probability distribution

Y	-1	0	1
X			
-1	2/16	1/16	2/16
0	2/16	2/16	2/16
1	2/16	1/16	2/16

Find $COV(X, Y)$ and interpret the result

[3+1]

6. The joint density function of two continuous random variable X and Y is
 $f(x,y) = \begin{cases} Cxy, & 0 < x < 4, & 1 < y < 5 \end{cases}$ [2+2]
- a. Find the value of the constant C.
 b. Find $P(X \geq 3, Y \leq 2)$.

7. Find the correlation coefficient for the following data and fit a line of regression of Y on X.

X	10	14	18	22	26	30
Y	18	12	24	6	30	36

8. For the bi-variate distribution [2+2]
 $f(x,y) = \frac{k}{(1+x+y)^n}, \quad x \geq 0, \quad y \geq 0, \quad n > 2$
 Evaluate the constant k. Find F(x, y)

9. The joint density function of X and Y is given by
 $f(x,y) = e^{-(x+y)}, \quad x > 0, y > 0$
 Find the Probability Density Function of $U = \frac{X+Y}{2}$. Are X and Y independent?

SECTION "E"

[5Q. \times 2 = 10 marks]

10. The joint density function of two continuous random variables X and Y is
 $f(x,y) = \begin{cases} Cxy, & 0 < x < 4, 1 < y < 5 \\ 0, & \text{otherwise} \end{cases}$
 Find the value of C.

11. If X is a random variable with the probability distribution

x	0	1	2	3
f(x)	1/5	2/5	1/5	1/5

Find the probability distribution of the random variable $Y = 3X - 2$

12. Let X and Y be independent random variables, then prove that $\text{cov}(X, Y) = 0$.
13. Two random variables X and Y have the joint density function
 $f(x,y) = \begin{cases} 25, & .95 < x < 1.15, .95 < y < 1.15 \\ 0, & \text{otherwise} \end{cases}$
 Find $P(XY < 1)$

14. Find the moment generating function of an exponential random variable with parameter λ

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Registration No.:

Date **NOV 19 2018**

SECTION "A"
[10 Q. × 1 = 10 marks]

Fill in the blanks space(s) by most appropriate word(s) or symbol(s).

1. If X is a gamma random variable with probability density function $f(x) = \frac{1}{2!} x^2 e^{-x}$ for $x > 0$, then the $E(X) = \dots\dots\dots$
2. In the previous problem the $V(X) = \dots\dots\dots$
3. The time (in hours) X required to repair a machine is exponentially distributed with parameter $\lambda = \frac{1}{3}$. Probability that the repair time exceeds 3 hours is
.....
4. Two discrete random variables X and Y have $P[X=0, Y=0] = 2/9$, $P[X=0, Y=1] = 1/9$, $P[X=1, Y=0] = 1/9$, $P[X=1, Y=1] = 5/9$ then $P[X=0|Y=0] = \dots\dots\dots$
5. The moment generating function of Gamma distribution is given by $M_X(t) = (1 - \frac{t}{\lambda})^{-\alpha}$ Then the mean of this distribution is given by $\dots\dots\dots$
6. If the Cumulative distribution function of X is F(x) then the Cumulative Distribution Function of $Y = X^3$, G(y) is $\dots\dots\dots$
7. Let X be a random variable denoting the number of time face six appears in a single roll of a die. Then the probability distribution of X can be completed in the table as.....

X
P(X)

8. The probability distribution of $Y = (X - 1)^2$ is to be filled up in the following table. Here X is the random variable mentioned in problem 7.

Y
P(Y)

9. The regression lines Y on X and X on Y are respectively $Y = a x + b$ and $X = c y + d$ then correlation coefficient between X and Y is.....
10. The correlation coefficient for distribution in which standard deviation of X = 3 units, standard deviation of y = 1.4 units and coefficient of regression of Y on X is .28 is.....

SECTION "B"
[10 Q.×1=10 marks]

11. If the cumulative distribution function of X is F(x) then the cumulative distribution function G(y) of Y = X-a is
- a) F(y-a) b) F(y+a) c) F(y/3) d) $F\left(\frac{y}{a}\right)$
12. Suppose the regression equation for predicting Y from X is given by Y=20-5X. Then all the following are true except.....
- a) the intercept is 20
b) the slope of the regression line is negative
c) the predicted value of Y for X=4 is 0
d) the correlation between X and Y is positive
13. The regression coefficients are b₁ and b₂. Then the correlation coefficient r is
- a) $\frac{b_1}{b_2}$ b) $\frac{b_2}{b_1}$ c) b₁b₂ d) $\pm\sqrt{b_1b_2}$
14. The normal equation corresponding to X₃ on X₁ and X₂ in the linear regression X₃ = A + BX₁ + CX₂ is not
- a) $\sum X_3 = A + B \sum X_1 + C \sum X_2$ b) $\sum X_1 X_3 = A \sum X_1 + B \sum X_1^2 + C \sum X_1 X_2$
c) $\sum X_2 X_3 = A \sum X_2 + B \sum X_1 X_2 + C \sum X_2^2$ d) $\sum X_3 = nA + B \sum X_1 + C \sum X_2$
15. For two random variables X and Y, the relation E [XY] = E[X] E[Y] holds
- a) If X and Y are statistically independent b) For all X and Y
c) If X and Y are identical d) If Y = 2x
16. Cauchy Schwarz inequality states that
- a) $[E[XY]]^2 \leq E[X^2] E[Y^2]$ b) $[E[XY]]^2 = E[X^2] E[Y^2]$
c) $[E[XY]]^2 \geq E[X^2] E[Y^2]$ d) None of these
17. The joint distribution of (X, Y) is equivalent to probability
- a) P(X = x, Y = y) b. P(X ≤ x, Y ≤ y) c. P(X ≤ x, Y = y) d. P(X ≥ x, Y ≥ y)
18. The conditional expectation of Y given X, E(Y | X = x), is calculated as follows:
- a. $\sum_{i=1}^k y_i \Pr(X = x_i | Y = y)$. b) E[E(Y | X)].
c) $\sum_{i=1}^k y_i \Pr(Y = y_i | X = x)$. d) $\sum_{i=1}^l E(Y | X = x_i) \Pr(X = x_i)$.
19. If X and Y are two independent random variables, the cumulative distribution function F(x, y) is equal to.....
- a) F₁(x) F₂(y) b) P(X≤x, Y≤y) c) both a and b d) P(X≤x, Y≥y)
20. For a distribution for two dimensional random variables (X, Y) following a continuous or discrete distribution, the Cumulative Distribution Function F(x, y) is defined as
- a) P(X = x, Y = y) b) P(X ≤ x, Y ≤ y)
c) P (X < x, Y < y)) d) P(X ≥ x, Y ≥ y)



KATHMANDU UNIVERSITY

OFFICE OF THE CONTROLLER OF EXAMINATIONS

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NOTICE

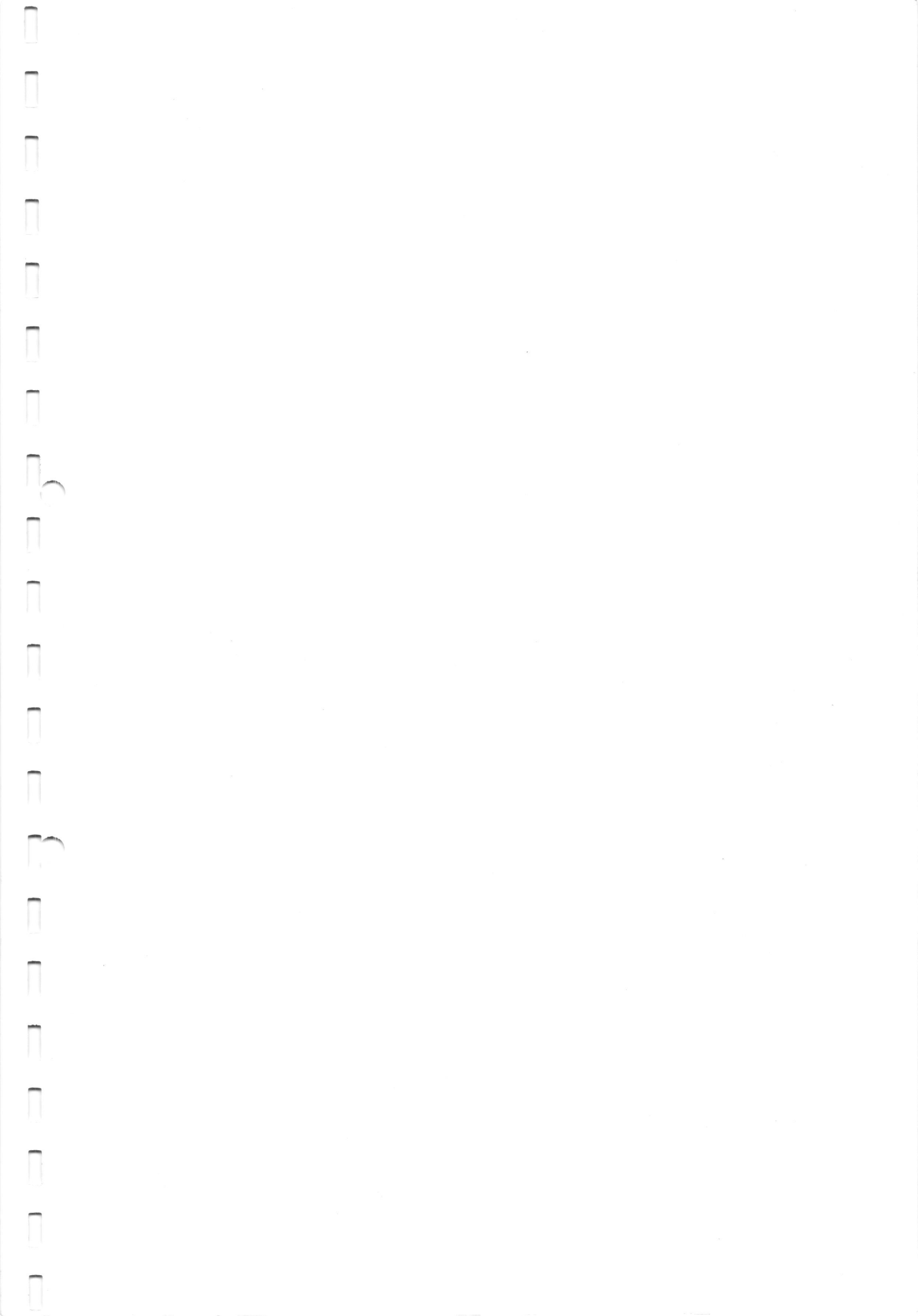
December 17, 2018

End-Semester Compartmental Examinations of B.E.\B.Sc.\B.Pharm.\B.Tech.\B.Arch. is scheduled accordingly.

Date	Day	Courses
December 26, 2018	Wednesday	PHYS 102, MATH 208, INAN 211, COEG 301, PHYS 313, BIOT 306, CIEG 310, MATH 322, INAN 301, ETEG 304, COMP 307, COMP 409
December 27, 2018	Thursday	BIOL 206, CIEG 208, GEOM 204, COMP 201, CHEG 210, PHAR 214, PHYS 212, ETEG 303
December 28, 2018	Friday	ARCH 112, ENGG 112, CHEM 102, MCSC 202, PHAR 311, CHEG 313, MEEG 306, COMP 314, MGTS 303, MGTS 301, CIEG 308
December 30, 2018	Sunday	ENGT 102, BIOT 207, CHEG 212, CIEG 206, MEEG 206, COMP 204, CHEM 203, EEG 214, CHEM 212, COMP 315, CIEG 313, COMP 484, PHYS 213
December 31, 2018	Monday	COMP 116, COMP 102, EPEG 318, ETEG 305, BIOT 309, PHAR 313, PHAR 315, MEEG 302, COMP 341
January 1, 2019	Tuesday	MEEG 207, CHEG 211, GEOM 206, BIOT 209, CIEG 207, PHYS 211, COMP 232, COMP 342, MEEG 317, GEOM 319
January 2, 2019	Wednesday	MATH 104, MATH 102, MATH 103, BIOT 208, EPEG 315, MEEG 309, BIOT 308, PHAR 316, COMP 323, CIEG 312
January 3, 2019	Thursday	BIOT 101, CHEG 213, MATH 217, COMP 231, EPEG 301, MEEG 308, COMP 306, COMP 317, GEOM 315
January 4, 2019	Friday	ENVE 101, PHAR 111, BIOT 206, MATH 207, PHAR 212, EEG 215, MEEG 202, EEG 309, MEEG 318

Examination Time : 11.00 A.M. to 2.00 P.M.
Venue : Kathmandu University, Dhulikhel.

Professor PANNA THAPA, PhD
Controller of Examinations





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November 05, 2018

NOTICE

This is to notify that all the students of School of Engineering and School of Science who have filled up the form for Compartmental and GPA makeup Examinations, November 2018 (notice published on October 25, 2018), the examinations will be held according to the following schedule.

(Special compartment)

Date	Day	Courses
November 15, 2018	Thursday	CHEM 101, COMP 407, EEG 202, CIEG 405, CIEG 403, PHYS 202, PHYS 421, PHYS 212, CHEM 203, <i>MEPP-412, MCSC-202</i>
November 16, 2018	Friday	EEEG 102, EEG 207, GEOM 402, CIEG 204, PHYS 213, PHYS 412, ENVE 209, BIOT 202
November 18, 2018	Sunday	COEG 304, EPEG 318, COMP 409, GEOM 411, PHYS 405, PHYS 302, MATH 201, <i>MEEG-206</i>
November 19, 2018	Monday	PHAR 316, STAT 201, PHYS 431, COMP 342

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