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FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2022 **HONOURS IN MATHEMATICS GMAH1B03T: PROBABILITY AND STATISTICS**

Maximum Marks: 80 **Time: 3 Hours**

PAR ₁	A: Answer all the questions. Each carries 1 ma	rk	
Choos	se the correct answer.		
1.	In a frequency distribution of a large number of v	alues, the mode is:	
	a) Largest observation	b) Smallest value	
	c) Observation with maximum frequency	d) Maximum frequence	cy of an observation
2.	Geometric mean of regression coefficients will be		* 3 1 37
	a) Coefficient of regression	b) Coefficient of corre	elation
	c) Coefficient of determination	d) Coefficient of non	-determination
3.	For comparison of two different series the best me	easure of dispersion is:	
	a) Mean deviation	b) Quartile deviation	
	c) Standard deviation	d) Range	
4.	From a study related to degree of association, the	coefficient of correlation	was equal to 0.92. It
	means that there is:		
	a) Very high positive correlation	b) Very high negative	correlation
	c) No correlation	d) Perfect positive con	rrelation
5.	The two regression lines are mutually perpendicu	lar when r =	's loss'
	a) 0 b) -1	c) +1	d) 0.8
Fill	in the Blanks.		
6.	If A and B are independent events such that P(A)	= P(B) = 1/3, then P(A)	U B) =
7.	If $Q_1 = 20$ and $Q_3 = 60$, then QD is		
		. 1 701 .1 .1 .01	

- 8. A random variable X has the p.d.f f(x) = k, 0 < x < 1. Then the value of k is......
- 9. If $F(x) = \frac{x^2}{25}$; 0 < x < 5then its pdf $f(x) = \dots$
- 10. If $f(x) = \begin{cases} \frac{1}{b-a}, & a \le x \le b \\ 0, & otherwise \end{cases}$ then the distribution function is

 $(10 \times 1 = 10 \text{ Marks})$

PART B: Answer any eight questions. Each carries 2 marks

- 11. For a moderately asymmetrical distribution Mean and Mode are respectively 12 and 15.1. Find median.
- 12. Calculate MD about Mean of 6, 13, 11, 8, 12, and 22.
- 13. A computer while calculating the correlation coefficient between two variables X and Y from 25 pairs of observations obtained the following results.

$$n = 25, \Sigma X = 125, \Sigma Y = 100, \Sigma X^2 = 650, \Sigma Y^2 = 436, \Sigma XY = 520$$

Find the correlation coefficient.

- 14. If $b_{yx} = 0.54$, r = 0.75, SD of y = 7, find SD of x.
- 15. Given the regression lines to be 2x + 18y = 326 and x + 2y = 33. Find mean of x and Y.
- 16. In a box there are 6 white balls, 5 green and 4 red balls. Out of them 3 are chosen at random. Find the chance that they all belong to different verities.
- 17. A purse contains 2 red balls and 5 white balls and a second purse contains 5 red and 4 white balls. If a ball is selected from one of the purse. What is the probability that it is a white ball?
- 18. Examine whether the following is a distribution function

$$F(x) = \begin{cases} 0 & , x < -a \\ \frac{1}{2} \left(\frac{x}{a} + 1 \right) & , -a \le x < a \\ 1 & , x > a \end{cases}$$

19. Find the p.m.f of $Y = X^2$, when the p.m.f of X is as follows:

X = x	- 2	4, - 1	0	3
P(X = x)	1/4	1/4	1/4	0 500 1/4 01 1.0

20. Given
$$f(x) = \begin{cases} \frac{x^2}{9}, & 0 < x < 3 \\ 0, & otherwise. \end{cases}$$

Find the density of $Y = X^3$

 $(8 \times 2 = 16 \text{ Mar})$

PART C: Answer any six questions. Each carries 4 marks

21. Compute harmonic mean for the following data:

Class	0 - 10	10 - 20	20 - 30	30 -40	40 - 50	50 - 60
Frequency	14	16	10	12	6	4 8/ 100

22. Obtain the equation of the lines of regression for the data given below:

X	1	2	3	4	5	6	7	8	9
Y	5	4	5	6	7	2	9	8	3

- 23. A Company has 35 female employees and 65 male employees. If two employees are selected at random, what is the probability that :
 - (i) Both will be males.
 - (ii) Both will be females.
 - (iii) There will be one of each sex.
- 24. A letter is known to have come either from HYDERABAD or from AHMEDABAD. On the envelope just two consecutive letters AD are visible. What is the probability that the letter came from HYDERABAD?
- 25. Define distribution function of a random variable. Write down its properties.
- 26. X has the density function $f(x) = \begin{cases} \frac{1}{4}, & -2 < x < 2 \\ 0, & otherwise \end{cases}$

Determine P (X < 1), P(|X| > 1) and P(2X + 3 > 5).

27. Evaluate the pdf of Y = 2X + 4 if the pdf of X is given by

$$f(x) = \begin{cases} x; & 0 < x1 \\ \frac{3-x}{4}; & 1 \le x < 3 \\ 0; & otherwise. \end{cases}$$

28. f(x)=k(x+2), $1 \le x \le 5$ is the p.d.f of a random variable. Find k and hence find the p.d.f of Y = X^2 .

 $(6 \times 4 = 24 \text{ Marks})$

PART D: Answer any two questions. Each carries 15 marks.

29. Calculate Pearson's coefficient of skewness from the following data.

Size	15	12	10	22	25	32	35
f	5	10	17	10	12	6	10

30. Judges X and Y have given the following marks to 10 candidates participated in beauty contest.

Candidate	A	В	С	D	Е	F	G	Н	I	J
Judge X	45	62	73	60	87	85	90	92	40	96
Judge Y	60	74	75	64	80	82	86	94	50	95

Find the rank correlation coefficient.

- 31. (a) State Boole's inequality.
 - (b) It is 7:4 against the wife who is 35 years old living till she is 65 and 4:3 against her husband now 50 living till he is 80. Find the probability that:
 - (i) Both will be alive.

(iv) Only husband will be alive.

(ii) None will be alive.

- (v) Only one will be alive.
- (iii) Only wife will be alive.
- (vi) At least one will be alive.

 $(2 \times 15 = 30 \text{ Marks})$