International Institute of Health Management Research (IIHMR)
NEW DELHI
Batch- 2016-18
Term Exams: October 2016

Time – 3 Hrs **Total marks: 70**

Bio-Statistics -604

Instruction:

All answers are to be written on the answer sheet only. Answers written on the question paper will not be marked. Please mention the roll number on your answer sheet.

MCQ / True – False / Fill in the blanks (Attempt all questions) **(30 Marks)**

Q1.1 *Number of Birth, Number of Death are* ----------

(1) *Discrete Quantitative Data* (2) Continuous *Quantitative Data*

(3) None of the above

Q1.2 *Variance* is used to measure the dispersion of values relative to the ----------

(1) Median (2) Mean (3) Mode

Q1.3 ---------- *is not as drastically affected by extreme values*

(1) Median (2) Mean (3) Mode

Q1.4 *t-distribution converges to a normal distribution when sample size are* -----

(1) Greater than 50 (2) Greater than 30 (3) Greater than 100 (iv) Greater than 500

Q1.5 ----------*is formula to calculate sample standard deviation*

(a)	$s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$	(b)	$\sigma^2 = \frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}$
(c)	$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$	(d)	$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}}$

Q1.6 One Card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will **not a red card**

(a) 1/2 (b)13/52 (c)3/4 (d) 12/13

Q1.7 **<u>In Chi-Square test,</u>** we have to calculate expected frequency of each cell and in the below table, expected frequency of **three cell** is given as E2= 35.6, E3=41.6 & E4=33.4, what will be expected frequency of **fourth cell E1?**

Table: Utilization of antenatal clinics by women living far from and near the clinic

Distance from clinic	**Used ANC**	**Did not use ANC**	**Total**
Less than 10 km	O1= 51 **E1=?**	O2=29 E2=35.6	80
10 km or more	O3=35 E3=41.6	O4=40 E4=33.4	75
Total	**86**	**69**	**155**

(a) 32.9 (b) 44.4 (c) 59.3 (d) 41.6

Q1.8 The events A and B are mutually exclusive, so:

a) Probability (A or B) = Probability (A) + Probability (B).
b) Probability (A and B) = Probability (A). Probability (B).
c) Probability (A) = Probability (B)
d) Probability (A) + Probability (B) = 1

Q1.9 Coefficient of correlation between height and weight is 2.6, it signifies that:

i) Relationship is present between two
ii) There is no relation between the two
iii) Coefficient has been calculated in a wrong way
iv) None of the above

Q1.10 All the following are method of presentation of statistical data ***except***:

a) Bar chart
b) Pie diagram
c) Normal curve
d) Frequency polygon

Q1.11 Which of the following is true about regression analysis?

a) Regression analysis provides only correlation between two variables
b) Regression analysis is used to compare mean of two groups
c) Regression analysis provides estimates of values of dependent variable from values of independent variable
d) Regression analysis is used to compare standard deviation of two groups

Q1.12 . For calculation of a sample size for a prevalence study all of the following is necessary ***except***

a) Power of the study
b) Prevalence of the disease in a population
c) Significance level
d) Desired precision

Q 1.13 A correlation coefficient r = 0 indicates that:

i) There is no linear relationship between the two variables of the sample studied
ii) The sample was to small to arrive at any tangible conclusion
iii) The relationship is highly significant
iv) There is absolutely no relationship between the two variables

Q1.14 Variable is a an object, characteristic or property that takes on different values in different persons, places, or things **True / False**

Q1.15 If two cards are selected, without replacement, from a deck, then the probability of selecting a diamond and then selecting a spade is **<u>169/2704</u>.** **True / False**

Q1.16 Two events, A and B, are mutually exclusive if they occur at the same time. **True / False**

Q1.17 **<u>Chi-Square test</u>** is used for numerical data when comparing the means of two groups **True / False**

Q1.18 In Binomial distribution, each trial can have only two outcomes which can be considered success or failure **True / False**

Q1.19 The standard normal distribution has μ =0 and σ= 1 **True / False**

Q1.20 Statistics deals with Planning Research, Collecting Data, Describing Data, Summarizing-Presenting Data, Analyzing Data, Interpreting Results and Reaching decisions or discovering new Knowledge **True / False**

Q1.21 A vertical bar chart is sometimes called a column bar chart **True / False**

Q1.22 Convenience Sampling is also a type of probability sampling **True / False**

Q1.23 Excel Function: **CORREL (array1; array2)** can be used to calculate Pearson correlation coefficients (r) **True / False**

Q1.24 Excel Function: **STDEVA (datarange**) can be used to calculate **SD (σ)** **True / False**

Q1.25 We can generate rand number through using Excel function: **Randbetween (top, Bottom)** formula **True / False**

Q1.26 Rural Health Statistics can be download from……portal

(1) MHFW, GOI (2) NFHS

(3) Both (4) None of the above

Q1.27 Poisson distribution can be used to approximate the binomial distribution if ---------

(1) λ =p (2) λ =np

(3) λ $= p^x q^{n-x}$ (4) None of the above

Q1.28 ------ filename extensions is used for output file in SPSS

(1) .dat (2) .sps

(3) .sav (3) None of the above

Q1.29 In a cricket match, Mr Dhoni hits a boundary 6 times out of 30 balls he plays. Find the probability that he did not hit a boundary ?

(1) 0.8 (2) 6

(3) 0.2 (4) None of the above

Q1.30 The percentage of marks obtained in the term exam are given by the following table:

Subject	Bio-statistics	Health & Development	Epidemiology	Health Policy and Health Care delivery system	Principles of Management
Percentage of marks obtained	69	71	73	68	74

Based on this data, find the probability that the student gets more than 70% marks in a term exam

(1) 0.6 (2) 0.7

(3) 0.4 (4) None of the above

Q2. Define (Attempt any six questions) (9 Marks)

i.	Statistics and Bio-statistics	**Vi**	Bar chart, Histogram and Pie Chart
Ii	Population and Sample	**Vii**	Confidence Interval
iii.	Quantitative and Qualitative Variables	**Viii**	Type I and Type II Error
Iv	Indicator	**Ix**	Non- probability Sampling
v.	Rates, Ratio, Proportions and Percentages	**x**	One tailed and two tailed tests

Q3. <u>Short Note</u> (Attempt any Two questions) (6 Marks)

(i) What are characteristics of the Binomial distribution and the normal distribution?

(ii). What do you understand about data and Describe different source of data <u>in detail</u>?

(iii). Describe Mapping and Listing activities under the National Family Health Survey (NFHS)-4, 2015-16

Q4. (Attempt any three questions) (9 Marks)

(i). Three card are drawn successively, without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are queen and the third card drawn is king?

(ii). What proportion of z values are between -2.74 and 1.53? **(Refer Table D)**

(iii). **The Probability of Dying after a Heart Attack-** The likelihood that a patient with a heart attack dies of the attack is 0.04 (i.e., 4 of 100 die of the attack). Suppose we have 5 patients who suffer a heart attack, what is the probability that all will survive?

(iv). A district medical officer seeks to estimate the proportion of children in the district receiving appropriate childhood vaccinations. Assuming a simple random sample of a community is to be selected, how many children must be studied if the resulting estimate is to fall within 10 percentage points of the true proportion with 95% confidence?

(v). 100 college students were surveyed and asked how many hours a week they spent studying. The results are in the table below. Find the probability that a student spends between 5 and 10 hours or more than 10 hours studying.

	Less then 5	5 to 10	More than 10	Total
Male	11	22	16	49
Female	13	24	14	51
Total	24	46	30	100

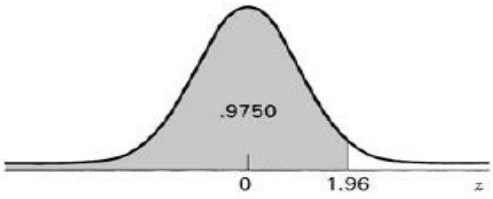
Q5. Describe in detail **any 3 methods** of drawing most common probability samples **(8 Marks)**

Q6. A small study is conducted involving 17 infants to investigate the association between gestational age at birth, measured in weeks, and birth weight, measured in grams.. Find Pearson correlation coefficients (r) of Gestational Age and Birth Weight? **(8 Marks)**

Infant ID #	**Gestational Age (wks) X**	**Birth Weight (gm) Y**	**Xy**	**x2**	**y2**
1	34.7	1895	65756.5	1204.09	3591025
2	36.0	2030	73080	1296	4120900
3	29.3	1440	42192	858.49	2073600
4	40.1	2835	113683.5	1608.01	8037225
5	35.7	3090	110313	1274.49	9548100
6	42.4	3827	162264.8	1797.76	14645929
7	40.3	3260	131378	1624.09	10627600
8	37.3	2690	100337	1391.29	7236100
9	40.9	3285	134356.5	1672.81	10791225
10	38.3	2920	111836	1466.89	8526400
11	38.5	3430	132055	1482.25	11764900
12	41.4	3657	151399.8	1713.96	13373649
13	39.7	3685	146294.5	1576.09	13579225
14	39.7	3345	132796.5	1576.09	11189025
15	41.1	3260	133986	1689.21	10627600
16	38.0	2680	101840	1444	7182400
17	38.7	2005	77593.5	1497.69	4020025
Total			**1921163**	**25173.21**	**150934928**
Average	**38.35882**	**2902**			

Note: SQRT (1238329496) = 35189.9062

TABLE D Normal Curve Areas $P(z \le z_0)$. Entries in the Body of the Table Are Areas Between $-\infty$ and z



z	−0.09	−0.08	−0.07	−0.06	−0.05	−0.04	−0.03	−0.02	−0.01	0.00	z
−3.80	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.80
−3.70	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.70
−3.60	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002	−3.60
−3.50	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	−3.50
−3.40	.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	−3.40
−3.30	.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005	−3.30
−3.20	.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007	−3.20
−3.10	.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	−3.10
−3.00	.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013	−3.00
−2.90	.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019	−2.90
−2.80	.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026	−2.80
−2.70	.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035	−2.70
−2.60	.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	−2.60

TABLE D *(continued)*

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	z
0.00	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359	0.00
0.10	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753	0.10
0.20	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141	0.20
0.30	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517	0.30
0.40	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879	0.40
0.50	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224	0.50
0.60	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549	0.60
0.70	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852	0.70
0.80	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133	0.80
0.90	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389	0.90
1.00	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621	1.00
1.10	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830	1.10
1.20	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015	1.20
1.30	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177	1.30
1.40	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319	1.40
1.50	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441	1.50
1.60	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545	1.60
1.70	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633	1.70
1.80	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706	1.80
1.90	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767	1.90