International Institute of Health Management Research (IIHMR)
NEW DELHI
Batch- 2017-19
Supplementary Exams: March 2018

Time – 3 Hrs **Total marks: 100**

Bio-Statistics

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.

Q1. Define (Attempt all questions) **(30 Marks)**

(i) Statistics and Biostatistics
(ii) Population & Sample
(iii) Variable and Indicator
(iv) Correlation and Simple linear regression
(v) When Chi test and t test can be used
(vi) Full Form –SPSS, SRS
(vii) Full Form –CEB, PSU
(viii) Rate and Ratio
(ix) Quantitative and Qualitative Variable
(x) Mean and Standard Deviation

(Attempt **Any five** questions) **(70 Marks)**

Q1. Describe in detail **any 4 ways** (Simple Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Multistage Sampling etc) of drawing most common probability samples.

Q 2: What are characteristics of binomial and normal distribution?

Q 3: What do you understand about data and Describe different source of data in detail? **(Not more than 2 page)**

Q4. Find Pearson correlation coefficients (r) of Height and CV variables?

Table : Height and Spine SEP Measurement (Cv) from Stimulation of Digit for 42 Subjects

Height (X)	CV (Y)	X2	Y2	XY	Height (X)	CV (Y)	X2	Y2	XY
149	14.4	22201	207.36	2145.6	171	16.5	29241	272.25	2821.5
155	13.5	24025	182.25	2092.5	172	17.0	29584	289.00	2924.0
156	13.0	24336	169.00	2028.0	173	16.8	29929	282.24	2906.4
157	14.3	24649	204.49	2245.1	174	15.5	30276	240.25	2697.0
158	14.0	24964	196.00	2212.0	175	16.6	30625	275.56	2905.0

160	15.4	25600	237.16	2464.0	175	17.0	30625	289.00	2975.0
160	14.7	25600	216.09	2352.0	176	17.3	30976	299.29	3044.8
161	15.8	25921	249.64	2543.8	177	17.2	31329	295.84	3044.4
162	14.7	26244	216.09	2381.4	179	17.8	32041	316.84	3186.2
163	15.1	26569	228.01	2461.3	180	18.0	32400	324.00	3240.0
163	14.6	26569	213.16	2379.8	181	18.4	32761	338.56	3330.4
164	17.0	26896	289.00	2788.0	181	16.4	32761	268.96	2968.4
164	16.3	26896	265.69	2673.2	182	18.0	33124	324.00	3276.0
165	15.7	27225	246.49	2590.5	182	17.9	33124	320.41	3257.8
166	14.1	27556	198.81	2340.6	184	18.4	33856	338.56	3385.6
166	14.2	27556	201.64	2357.2	185	19.0	34225	361.00	3515.0
167	16.7	27889	278.89	2788.9	187	19.1	34969	364.81	3571.7
167	16.5	27889	272.25	2755.5	187	19.2	34969	368.64	3590.4
168	16.3	28224	265.69	2738.4	188	17.5	35344	306.25	3290.0
170	17.0	28900	289.00	2890.0	189	18.8	35721	353.44	3553.2
170	16.4	28900	268.96	2788.0	190	18.3	36100	334.89	3477.0
Total					**7199**	**690.4**	**1238589**	**11459.46**	**118975.6**
Average					**171.40**	**16.44**			

Q 5: In a study to determine the factors affecting the utilization of antenatal clinics we found that 64% of the women who lived within 10 km of the clinic came for antenatal care, compared to only 47% of those who lived more than 10 km away. This suggests that ANC is used more often by women who live close to the clinics and there seems to be a difference in utilization of antenatal care between those who live close to and those who live fare from the clinics (64% vs 47%). If we want to know whether this observed difference is statistically significant then Chi square test can provide the answer.

Table 1: 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	51(64%)	29 (36%)	80
10 km or more	35(47%)	40 (53%)	75
Total	86	69	155

If calculated Chi square value is 4.55, p-value is 0.05 and null hypothesis is women living within a distance of 10 km from the clinic does not use antenatal care significantly more than the women living more than 10 km away then use **Chi square table given on page 4 and Interpret the result.**

Q 6: The data from the North Carolina State Centre for Health Statistics show that 15 percent of mothers admitted to smoking one or more cigarettes per day during pregnancy. If a random sample of size 10 is selected from this population, what is the probability that it will contain **exactly four mothers** who admitted to smoking during pregnancy? **(Note: Use formula).**

Q 7: A district medical officer seeks to estimate the proportion of children in the district receiving appropriate childhood vaccination. 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? **Note: Use Below table to estimate the sample size**

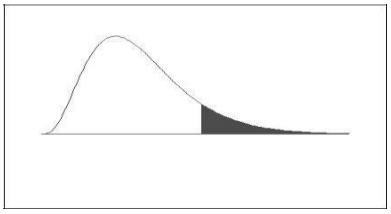
Table 1b: Sample Size to Estimate P to Within **d** Absolute Percentage Points with **95%** Confidence

Anticipated Population Proportion (**P**)

d	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.01	1825	3457	4898	6147	7203	8067	8740	9220	9508	9604	9508	9220	8740	8067	7203	6147	4898	3457	1825
0.02	456	864	1225	1537	1801	2017	2185	2305	2377	2401	2377	2305	2185	2017	1801	1537	1225	864	456
0.03	203	384	544	683	800	896	971	1024	1056	1067	1056	1024	971	896	800	683	544	384	203
0.04	114	216	306	384	450	504	546	576	594	600	594	576	546	504	450	384	306	216	114
0.05	73	138	196	246	288	323	350	369	380	384	380	369	350	323	288	246	196	138	73
0.06	51	96	136	171	200	224	243	256	264	267	264	256	243	224	200	171	136	96	51
0.07	37	71	100	125	147	165	178	188	194	196	194	188	178	165	147	125	100	71	37
0.08	29	54	77	96	113	126	137	144	149	150	149	144	137	126	113	96	77	54	29
0.09	23	43	60	76	89	100	108	114	117	119	117	114	108	100	89	76	60	43	23
0.10	18	35	49	61	72	81	87	92	95	96	95	92	87	81	72	61	49	35	18
0.11	15	29	40	51	60	67	72	76	79	79	79	76	72	67	60	51	40	29	15
0.12	13	24	34	43	50	56	61	64	66	67	66	64	61	56	50	43	34	24	13
0.13	11	20	29	36	43	48	52	55	56	57	56	55	52	48	43	36	29	20	11
0.14	9	18	25	31	37	41	45	47	49	49	49	47	45	41	37	31	25	18	9
0.15	8	15	22	27	32	36	39	41	42	43	42	41	39	36	32	27	22	15	8
0.20	5	9	12	15	18	20	22	23	24	24	24	23	22	20	18	15	12	9	5
0.25	*	6	8	10	12	13	14	15	15	15	15	15	14	13	12	10	8	6	*

* Sample size less than 5

Chi-Square Distribution Table



The shaded area is equal to α for $\chi^2 = \chi^2$

Df	χ^2 :995	χ^2 :990	χ^2 :975	χ^2 :950	χ^2 :900	χ^2 :100	χ^2 :050	χ^2 :025	χ^2 :010	χ^2 :005
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750