

Date: 16/11/2016.

Student Exam. No.: \_\_\_\_\_

GANPAT UNIVERSITY

M. Tech. III Sem. (AMS and CAD/CAM) CBCS (New)

Regular Examination Nov./Dec. 2016

(3ME301/3ME311) Research Methodology

Time: 3 hours

Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Right figure indicate full marks.
- (3) Only scientific calculator is allowed.
- (4) Assume suitable data if necessary.

SECTION-I

Que.1

- (a) Enlist the criteria of good research. Write the short note on 'Ex post facto' research. [5]
- (b) Explain the factors which are considered for selection of appropriate method for data collection. [5]

OR

Que.1

- (a) Write three different definitions of research. Explain in detail the types of research. [5]
- (b) Are you in agreement with the following statements? If so, give reasons. [5]
  - (1) Validity is more critical to measurement than reliability.
  - (2) Stability and equivalence aspects of reliability essentially mean the same thing.
  - (3) Content validity is the most difficult type of validity to determine.
  - (4) There is no difference between concept development and concept specification.
  - (5) Reliable measurement is necessarily a valid measurement.

Que.2

- (a) Define model and mathematical modelling. What objectives can modelling achieve? Explain different methods of mathematical modelling. [5]
- (b) What you understand by Meta- heuristic? Enlist and explain the properties that characterize most meta- heuristics. Also explain applications of meta- heuristics. [5]

OR

Que.2

- (a) Why we do mathematical modelling? What data should we use for testing a model? Explain importance of assumptions taken in mathematical modelling. [5]
- (b) What do you mean by discrete-event simulation? Explain components and organization of a discrete-event simulation model. [5]

Que.3 Attempt following (Any two).

- (a) A market research survey in which 64 consumers were contacted states that 64 per cent of all consumers of a certain product were motivated by the product's advertising. Find the confidence limits for the proportion of consumers motivated by advertising in the population, given a confidence level equal to 0.95. [5]

- (b) What issues can be solved by brainstorming? Highlights the common mistakes may arise when working with brainstorming and explain how to avoid them. [5]
- (c) Explain key characteristics of Delphi method. Explain steps of Delphi method identified by Brooks. [5]

### SECTION-II

Que.4

- (a) What do you mean by factorial experiments? Differentiate between the symmetrical experiments and asymmetrical factorial experiments. Enlist the main uses of design of experiments. [5]
- (b) What do you understand by randomization in factorial design? Enlist the check points you need to keep in mind while choosing a factorial design. [5]

OR

Que.4

- (a) Explain the following terms related to DOE: [5]  
 (1) Experimental domain (2) Factors (3) Independent variables  
 (4) Continuous variables (5) Discrete variables (6) Responses (7) Residual  
 (8) Nuisance factors (9) Interaction (10) Simple effect.
- (b) List out the objectives of the full factorial DOE. List out the reasons for doing factorial experiments. How to determine the number of runs needed for factorial experimental designs? Explain. [5]

Que.5

- (a) What do you mean by ANOCOVA? Explain ANOCOVA technique with considering assumptions. [5]
- (b) Explain the following basic concepts concerning testing of hypothesis: [5]  
 1. Null hypothesis and alternative hypothesis.  
 2. The level of significance  
 3. Decision rule or test of hypothesis  
 4. Simple hypothesis and composite hypothesis  
 5. Acceptance region and rejection region

OR

Que.5

- (a) What do you mean by the additive property of the technique of the analysis of variance? Explain how this technique is superior in comparison to sampling. [5]
- (b) Briefly described the important parametric tests used in context of testing hypotheses. How such tests differ from non-parametric tests? Explain. [5]

Que.6 Attempt following (Any two).

- (a) Suppose we are interested in a population of 20 industrial units of the same size, all of which are experiencing excessive labour turnover problems. The past records show that the mean of the distribution of annual turnover is 320 employees, with a standard deviation of 75 employees. A sample of 5 of these industrial units is taken at random which gives a mean of annual turnover as 300 employees. Is the sample mean consistent with the population mean? Test at 5% level. [5]
- (b) Describe, in brief, the layout of a research report, covering all relevant points. [5]
- (c) What points will you keep in mind while preparing a research report? Explain. What are the different forms in which a research work may be reported? Describe. [5]

Table 1: z-distribution (Normal curve area table)

z	0	0.01	.02	.03	.04	.05	.06	.07	.08	.09
0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
10	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
11	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
12	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
13	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
14	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
15	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
16	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
17	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
18	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
19	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
20	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
21	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
22	.4861	.4864	.4868	.4871	.4873	.4878	.4881	.4884	.4887	.4890
23	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
24	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
25	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
26	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
27	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
28	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
29	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
30	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Table 2: t-distribution

Critical Values of Student's t-Distribution						
d.f	Level of significance for two-tailed test					d.f
	0.20	0.10	0.05	0.02	0.01	
	Level of significance for one-tailed test					
	0.10	0.05	0.025	0.01	0.005	
1	3.078	6.314	12.706	31.821	63.657	1
2	1.886	2.920	4.303	6.965	9.925	2
3	1.638	2.353	3.182	4.541	5.841	3
4	1.533	2.132	2.776	3.747	4.604	4
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15
16	1.337	1.746	2.120	2.583	2.921	16
17	1.333	1.740	2.110	2.567	2.898	17
18	1.330	1.734	2.101	2.552	2.878	18
19	1.328	1.729	2.093	2.539	2.861	19
20	1.325	1.725	2.086	2.528	2.845	20
21	1.323	1.721	2.080	2.518	2.831	21
22	1.321	1.717	2.074	2.508	2.819	22
23	1.319	1.714	2.069	2.500	2.807	23
24	1.318	1.711	2.064	2.492	2.797	24
25	1.316	1.708	2.060	2.485	2.787	25
26	1.315	1.706	2.056	2.479	2.779	26
27	1.314	1.703	2.052	2.473	2.771	27
28	1.313	1.701	2.048	2.467	2.763	28
29	1.311	1.699	2.045	2.462	2.756	29
Infinity	1.282	1.645	1.960	2.326	2.576	Infinity

END OF PAPER