Ganpat University
M. Tech. III Sem. (AMT and CAD/CAM) CBCS (New)
Regular Examination Non/Dec. 2015
(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 Attempt the followings.

(a) Distinguish clearly between research techniques and research methods with reference to library research, field research and laboratory research. [5]

(b) Explain the following types of research. [5]
   (i) Quantitative vs. Qualitative
   (ii) Applied vs. Fundamental

OR

Que.1 Attempt the followings.

(a) What do you mean by Empirical research? "Empirical research in India in particular creates so many problems for the researchers". State these problems that are usually faced by such researchers. Also enlist the solutions to overcome these problems. [5]

(b) Write a short (1-2) page paper on the literature review in your area of research. Also explain the outcome of your literature review in brief. [5]

Que.2 Attempt the followings.

(a) What do you mean by research problem? State the components of a research problem. Explain the steps involved in defining a research problem in detail. [5]

(b) What do you mean by research plan? How research plan helps to researcher? What must be contained by research plan? Explain in detail. [5]

OR

Que.2 Attempt the followings.

(a) "Research design in exploratory studies must be flexible but in descriptive studies, it must minimise bias and maximise reliability." Discuss. [5]

(b) Explain the problem formulation of your research work on which you are doing your dissertation. Enlist the research gap found by you. Also write the objectives of your research work. [5]

Que.3 Attempt the followings.

(a) Explain brain storming method as a problem solving technique used for idea generation. [3]

(b) Point out the possible sources of error in measurement. Describe the tests of validity in detail. [3]

(c) Distinguish clearly between questionnaires and schedules as data collection methods. [4]

SECTION-II

Que.4 **Attempt the followings.**

(a) Explain the following terms with reference to sampling fundamentals. [5]
    (i) Universe (ii) Statics and parameters (iii) Precision (iv) Sampling distribution (v) Sampling frame

(b) Explain the followings: [5]
    (1) Null hypothesis and alternative hypothesis
    (2) Type I and type II error

OR

Que.4 **Attempt the followings.**

(a) Simple of a sales in similar shops in two towns are taken for a new product with the following results: [5]

Town	Mean sales	Variance	Size of sample
A	57	5.3	5
B	61	4.8	7

Is there any evidence of difference in sales in two towns? Use 5 per cent level of significance for testing this difference between the means of two samples.

(b) The sales data of an item in six shops before and after a special promotional campaign are: [5]

Shops	A	B	C	D	E	F
Before the promotional campaign	53	28	31	48	50	42
After the promotional campaign	58	29	30	55	56	45

Can the campaign be judged to be a success? Test at 5 cer cent level of significance. Use paired t-test.

Que.5 **Attempt the followings.**

(a) What is ANOVA? Explain short-cut method for one-way ANOVA. [5]

(b) Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety differences are significant. [5]

Plot of land	Per acre production data		
	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

OR

Que.5 **Attempt the followings.**

(a) What do you mean by ANOCOVA? Write assumptions and describe the technique of ANOCOVA. [5]

(b) Explain the ANOVA technique in context of two-way design when repeated values are not present. [5]

Que.6 **Attempt the followings.**

(a) Why do we do mathematical modelling? Explain different methods of mathematical modelling. [3]

(b) Enlist the type of reports. Explain the general outline for each report separately. [3]

(c) What you understand by Meta- heuristic? Enlist and explain the properties that characterize most meta- heuristics. Also explain applications of meta- heuristics. [4]

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

z	.0	.001	.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	.2903	.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
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Ganpat University
M.Tech SEM III Mechanical Engineering (CAD/CAM)
CBCS Regular Examination Nov-Dec 2015
3ME312 Dynamics of Mechanical System

Duration: 3hr

Total Marks: 60

Instructions:
1. Write you answer precisely and to the point.
2. Assume Suitable engineering data.

SECTION I

1.   **Attempt following questions**   [10]

   (a) Derive the equations for derivation pertaining to spatial curve and their respective unit associate vector with respect to space coordinate.

   (b) A radar station at the origin measures the azimuth angle θ, the elevation angle λ, and the radial distance r to a target as shown in Figure A. At the instant when a high-performance aircraft is at point B it has a velocity of 500 m/s directed from point B to point A and an acceleration of 8g directed upward. Determine the values of $\dot{r}$, $\ddot{r}$, $\dot{\lambda}$, $\ddot{\lambda}$, $\dot{\theta}$, and $\ddot{\theta}$ that are observed at this location.
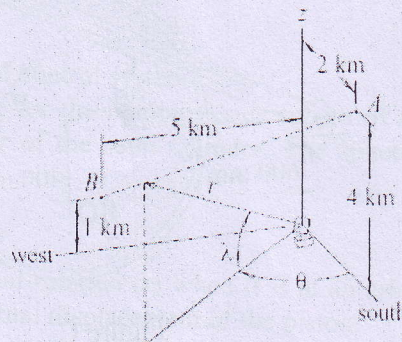

Figure A

OR

1.   **Attempt following questions**   [10]

   (a) Derive the velocity and acceleration formulae for cylindrical coordinate system.

   (b) Pin P, whose mass is 10 g, moves in the horizontal plane within a groove defined by $xy = 2$, where x and y are in meters as shown in figure B. The motion is actuated by arm ABC, which translates to the right at the constant speed of 30 m/s. (a) Determine the velocity and acceleration of the collar when $x = 2$ m. (b) Determine the forces exerted on the pin by the groove and arm ABC when $x = 2$ m.