R2019/CBCS/SE/Sem IV/ COMP/CSC401 / Engineering Mathematics IV/ Part2_Subjective

University of Mumbai Online Examination 2021
Scheme: R2019/CSC401
Year and Branch: SE/COMP
Semester: IV
Subject code and Name: CSC401/Engineering Mathematics

Please note before you attempt the examination
1. The paper consists of two parts: i) MCQ for 40 minutes and ii) Subjective for 80 minutes. Once responses of MCQs get submitted, another link will get activated for Subjective Questions.
2. All 20 questions from MCQ examination are compulsory and each question carries 2 marks.
3. MCQ examination is of 40 marks for 40 minutes duration.
4. Each question has only one correct answer and there is no negative marking.
5. Subjective examination is of 40 marks for 80 minutes having TWO questions. Each question is of 20 marks.
6. Answers for Subjective questions need to be written on A4 size papers.
7. Every page, at the top side mention "Subject Name, Semester, Seat Number, and Page number (1 of N, 2 of N and so on...., where N is total number of pages including answers for both Q2 and Q3) and your signature.
8. Scan all the pages and prepare only two files in PDF format question-wise. That is, you need to have one PDF file of complete Q2 (including all its sub-questions) and another PDF file of complete Q3 (including all its sub-questions). The file names will be "Seat Number_Name of subject_Q2" and "Seat Number_Name of subject_Q3" for respective files. Upload them at appropriate places in the google form itself against each question.
9. Use only college email ID to appear for this examination.
10. Keep your Hall Ticket or College ID or Aadhaar Card or PAN card with you while appearing for this examination.

* Required

1. Email *

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Student Details

2. Select Examination *

Mark only one oval.

◯ R2019/CBCS/SE/Sem IV/COMPS

3. Select Subject Code and Name *

Mark only one oval.

◯ CSC401/Engineering Mathematics-IV

4. Student Name (in CAPITALS as mentioned in ERP, eg. <Surname> <First name> <Father's Name>) *
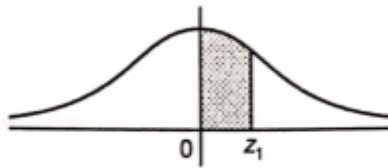
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5. Seat Number *

_____

6. Student Contact Number (Preferably WhatsApp) *

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Statistical Tables

7. Statistical Table1

Area Under Standard Normal Curve

The table gives the area under the standard normal curve from $z = 0$ to $z = z_1$ which is the probability that z will lie between $z = 0$ and $z = z_1$.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.8832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.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	.4415	.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	.4841	.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	.4560	.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

8. Statistical Table2
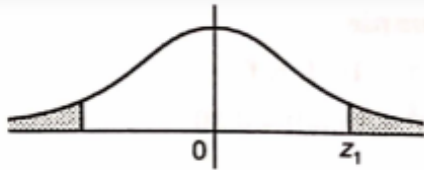
Example

For $\Phi = 10$ d. o. f.

$P(\,|\,t\,|\,>1.812\,)=0.1$

F \ P	0.20	0.10	0.05	0.02	0.01
1	3.078	6.314	12.706	31.812	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.287
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.325	2.576

9. Statistical Table 3

Percentage Points of χ^2 - Distribution
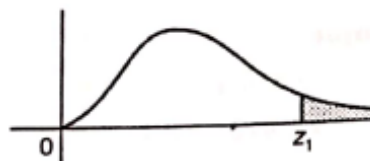
Example

For $\Phi = 10$ d. o. f.

$P(\chi^2 > 15.99) = 0.10$

P / F	0 = .99	0.95	0.50	0.10	0.05	0.02	0.01
1	.000157	.00393	.455	2.706	3.841	5.214	6.635
2	.0201	.103	1.386	4.605	5.991	7.824	9.210
3	.115	.352	2.366	6.251	7.815	9.837	11.341
4	.297	.711	3.357	7.779	9.488	11.668	13.277
5	.554	1.145	4.351	9.236	11.070	13.388	15.086
6	.872	1.635	5.348	10.645	12.592	15.033	16.812
7	1.339	2.167	6.346	12.017	14.067	16.622	18.475
8	1.646	2.733	7.344	13.362	15.507	18.168	20.090
9	2.088	3.325	8.343	14.684	16.919	19.679	21.666
10	2.558	3.940	9.340	15.987	18.307	21.161	23.209
11	3.053	4.575	10.341	17.275	19.675	22.618	24.725
12	3 571	5.226	11.340	18.549	21.026	24.054	26.217
13	4.107	5.892	12.340	19.812	22.362	25.472	27.688
14	4.660	6.571	13.339	21.064	23.685	26.873	29.141
15	4.229	7.261	14.339	22.307	24.996	28.259	30.578
16	5.812	7.962	15.338	23.542	26.296	29.633	32.000
17	6.408	8.672	16.338	24.769	27.587	30.995	33.409
18	7.015	9.390	17.338	25.989	28.869	32.346	34.805
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191
20	8.260	10.851	19.337	26.412	31.410	35.020	37.566
21	8.897	11.591	20.337	29.615	32.671	36.349	38.932
22	9.542	12.338	21.337	30.813	33.924	37.659	40.289
23	10.196	13.091	22.337	32.007	35.172	38.968	41.638
24	13.856	13.848	23.337	32.196	36.415	40.270	42 980
25	11.524	14.611	24.337	34.382	37.652	41 566	44.314
26	12.198	15.379	25.336	35.363	38.885	41.856	45.642
27	12.879	16.151	26.336	36.741	40.113	44.140	46.963
28	13.565	16.928	27.336	37.916	41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42.557	46.693	49.588
30	14.953	18 493	29.336	40.256	43.773	47.962	50.892

Subjective Part: CSC401/Engineering Mathematics-IV

10. Q. 2 Note: Upload the file with answers in PDF format only 20 points
(Maximum file size upto 100 MB). Keep the file name as "Seat
Number_Name of subject_Q2". *

Q2 (20 Marks)	Solve any Four out of Six (5 marks each)
A	In an exam taken by 800 candidates, the average and standard deviation of marks obtained (normally distributed) are 40% and 10% respectively. What should be the minimum score if 350 candidates are to be declared as passed
B	If A= $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$, By using Cayley-Hamilton theorem find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 + 2A + I$
C	Evaluate the following integral using Cauchy-Residue theorem. $I = \int_C \frac{z^2+3z}{\left(z+\frac{1}{4}\right)^2 (z-2)} dz$ where c is the circle $\left\|z - \frac{1}{2}\right\| = 1$
D	Obtain inverse z-transform $\frac{z+2}{z^2-2z-3}$, $1 < \|z\| < 3$
E	Solve by the Simplex method Maximize $z = 10x_1 + x_2 + x_3$ Subject to $x_1 + x_2 - 3x_3 \le 10$ $4x_1 + x_2 + x_3 \le 20$ $x_1, x_2, x_3 \ge 0$
F	Using Lagrange's multipliers solve the following NLPP Optimise $z = 4x_1 + 8x_2 - x_1^2 - x_2^2$ Subject to $x_1 + x_2 = 2$ $x_1, x_2 \ge 0$

Files submitted:

11. Q. 3 Note: Upload the file with answers in PDF format only (Maximum file size upto 100 MB). Keep the file name as "Seat Number_Name of subject_Q3". *   20 points

Q3 (20 Marks)	Solve any Four out of Six (5 marks each)
A	When the first proof of 392 pages of a book of 1200 pages were read, the distribution of printing mistakes were found to be as follows. Fit a poisson distribution to the above data and test the goodness of fit.
B	Show that the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ is not diagonalizable.
C	If $f(z) = \frac{z-1}{(z-3)(z+1)}$ obtain Taylor's and Laurent's series expansions of f(z) in the domain $\|z\| < 1 \, \& \, 1 < \|z\| < 3$ respectively.
D	If $f(k) = \frac{1}{2^k} * \frac{1}{3^k}$ find $z\{f(k)\}, \; k \geq 0$
E	Solve using dual simplex method Minimize $z = 2x_1 + 2x_2 + 4x_3$ $2x_1 + 3x_2 + 5x_3 \geq 2$ Subject to $3x_1 + x_2 + 7x_3 \leq 3$ $x_1 + 4x_2 + 6x_3 \leq 5$ $x_1, x_2, x_3 \geq 0$
F	Solve following NLPP using Kuhn-Tucker method Maximize $z = 2x_1^2 - 7x_2^2 - 16x_1 + 2x_2 + 12x_1x_2 + 7$ Subject to $2x_1 + 5x_2 \leq 105$ $x_1, x_2 \geq 0$

Table for part A:

No of mistakes in page (X)	0	1	2	3	4
No. of pages (f)	275	72	30	7	5

Files submitted: