Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department / Faculty	Mathematics / FMPS	Programme	B. Tech.
Semester/Batch	4^{th} / 2017		
Course Code	BSC208A	Course Title	Engineering Mathematics – 4
Course Leader(s)	Mahesha Narayana, Somashekhara G., Hemanthkumar B., Sumanth Bharadwaj, Shivashankar C., T. N. Sakshath and Siddabasappa C.		

Assignment – 2

Reg. No.		**Name of Student**	

Questions		**Marking Scheme**	**Max Marks**	**First Examiner Marks**	**Moderator**
Q1	**1.1**	Mathematical form of given problem.	2		
	1.2	MATLAB function to solve the boundary value problem using finite difference method with $h = 1$ and $k = \frac{1}{4}$.	6		
	1.3	Plot of the solution $u(x,t)$ in the region $0 \leq x \leq 8$ and $0 \leq t \leq 2$	2		
		Max Marks	10		
Q2	**2.1**	Calculation of mean, median and mode	2		
	2.2	Calculation of quartiles and standard deviation	2		
	2.3	Scatter plot	2		
	2.4	Correlation coefficient	2		
	2.5	Regression Line	1		
	2.6	Identification of variability and justification	1		
		Max Marks	10		
Q3	**3.1**	Determination of probability that the first four marbles are yellow	1		
	3.2	Determination of probability that none of final four marbles is brown	1		
	3.3	Determination of probability that the first three marbles are of different colours	1		
	3.4	Determination of probability that all same colour marbles are together	2		
		Max Marks	05		
		Total Assignment Marks	25		

Course Marks Tabulation				
Component-1 (B) Assignment	**First Examiner**	**Remarks**	**Moderator**	**Remarks**
Question No. 1				
Question No. 2				
Question No. 3				
Marks (out of 25)				
Signature of First Examiner			**Signature of Moderator**	

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.
4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

Assignment – 2
Term-2

Instructions to students:

1. The assignment consists of **3** questions.
2. Maximum marks is **25**.
3. The assignment has to be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to **10**.
5. The printed assignment must be submitted to the course leader.
6. **Submission Date: 18/03/2019**
7. **Submission after the due date is not permitted.**
8. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
9. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question.

Preamble

This course deals with essentials probability, random process, statistics and numerical solutions to differential equations. Students are taught the probability theory and statistical distributions needed to quantify uncertainty and accuracy of information. The significance and utility of numerical methods for solution of differential and partial differential equations are emphasized in this course. Key considerations in the choice and adaptation of optimization methods for the solution of a problem are discussed in this course. The students will be able to suggest and apply probabilistic /numerical technique to solve a diverse range of mathematical problems.

Question No. 1. **(10 Marks)**

Consider a straight bar of uniform cross section made up of homogenous material. Let the x-axis be chosen to lie along the axis of the bar, and let $x = 0$ and $x = 8$ denotes the ends of the bar. Suppose that the sides of the bar are perfectly insulated so that no heat passes through them. The temperature $u(x, t)$ is a function of the axial coordinate x and the time t. Let the temperature of ends of bar held at zero temperature, the initial temperature distribution along the rod being $f(x) = 4x - \frac{1}{2}x^2$ and the time interval is $[0, 2]$. Perform the following:

Q1.1 Write the one dimensional heat equation with initial and boundary conditions.

Q1.2 Write the MATLAB code to solve the boundary value problem using finite difference method with $h = 1$ and $k = \frac{1}{4}$.

Q1.3 Plot the solution of the partial differential equation $u(x, t)$ for $0 \leq x \leq 8$ and $0 \leq t \leq 2$.

Question No. 2. **(10 Marks)**

Survey was conducted on cigarettes smoked by people in 43 states of Columbia together with death rates per thousand population from various forms of cancer. Take the data from the PDF file and perform the following:

Q2.1 Calculate the mean, median and mode for the column corresponding to smoking, bladder cancer, lung cancer and kidney cancer.

Q2.2 Calculate the quartiles and standard deviation for the column corresponding to smoking, bladder cancer, lung cancer and kidney cancer.

Q2.3 Draw the scatter plot for the following:

(i) Smoking vs bladder cancer
(ii) Smoking vs lung cancer
(iii) Smoking vs kidney cancer
(iv) Smoking leukemia

Q2.4 Determine the correlation coefficient between:

(i) Smoking and bladder cancer
(ii) Smoking and lung cancer
(iii) Smoking and kidney cancer
(iv) smoking and leukemia

Q2.5 Draw the regression line in scatter plot obtained in **Q2.3**.

Q2.6 Identify the minimum variability (greatest consistency) and maximum variability in scatter plot obtained in **Q2.3**. Justify your choices.

Note: Solve in MS EXCEL

Question No. 3. **(5 Marks)**

Let 9 yellow, 4 magenta and 7 brown marbles are arranged randomly in a line. Assume all marbles are distinct, even if with the same colour. Determine the following:

Q3.1 The probability that the first 4 marbles are yellow

Q3.2 The probability that none of final 4 marbles is brown

Q3.3 The probability that the first 3 marbles are of different colours

Q3.4 The probability that all same colour marbles are together

Go Main Menu | Power Search | Data subjects

Datafile Name: Smoking and Cancer
Datafile Subjects: Health , Medical , Social science
Story Names: Smoking and Cancer
Reference: J.F. Fraumeni, "Cigarette Smoking and Cancers of the Urinary Tract: Geographic Variations in the United States," Journal of the National Cancer Institute, 41, 1205-1211.
Authorization: free use
Description:

The data are per capita numbers of cigarettes smoked (sold) by 43 states and the District of Columbia in 1960 together with death rates per thouusand population from various forms of cancer.

Number of cases: 44
Variable Names:

1. CIG = Number of cigarettes smoked (hds per capita)
2. BLAD = Deaths per 100K population from bladder cancer
3. LUNG = Deathes per 100K population from lung cancer
4. KID = Deaths per 100K population from bladder cancer
5. LEUK = Deaths per 100 K population from leukemia

The Data:

STATE	CIG	BLAD	LUNG	KID	LEUK
AL	18.20	2.90	17.05	1.59	6.15
AZ	25.82	3.52	19.80	2.75	6.61
AR	18.24	2.99	15.98	2.02	6.94
CA	28.60	4.46	22.07	2.66	7.06
CT	31.10	5.11	22.83	3.35	7.20
DE	33.60	4.78	24.55	3.36	6.45
DC	40.46	5.60	27.27	3.13	7.08
FL	28.27	4.46	23.57	2.41	6.07
ID	20.10	3.08	13.58	2.46	6.62
IL	27.91	4.75	22.80	2.95	7.27
IN	26.18	4.09	20.30	2.81	7.00
IO	22.12	4.23	16.59	2.90	7.69
KS	21.84	2.91	16.84	2.88	7.42
KY	23.44	2.86	17.71	2.13	6.41
LA	21.58	4.65	25.45	2.30	6.71
ME	28.92	4.79	20.94	3.22	6.24
MD	25.91	5.21	26.48	2.85	6.81
MA	26.92	4.69	22.04	3.03	6.89
MI	24.96	5.27	22.72	2.97	6.91
MN	22.06	3.72	14.20	3.54	8.28
MS	16.08	3.06	15.60	1.77	6.08
MO	27.56	4.04	20.98	2.55	6.82
MT	23.75	3.95	19.50	3.43	6.90
NB	23.32	3.72	16.70	2.92	7.80
NE	42.40	6.54	23.03	2.85	6.67
NJ	28.64	5.98	25.95	3.12	7.12
NM	21.16	2.90	14.59	2.52	5.95
NY	29.14	5.30	25.02	3.10	7.23
ND	19.96	2.89	12.12	3.62	6.99
OH	26.38	4.47	21.89	2.95	7.38
OK	23.44	2.93	19.45	2.45	7.46
PE	23.78	4.89	12.11	2.75	6.83

RI	29.18	4.99	23.68	2.84	6.35
SC	18.06	3.25	17.45	2.05	5.82
SD	20.94	3.64	14.11	3.11	8.15
TE	20.08	2.94	17.60	2.18	6.59
TX	22.57	3.21	20.74	2.69	7.02
UT	14.00	3.31	12.01	2.20	6.71
VT	25.89	4.63	21.22	3.17	6.56
WA	21.17	4.04	20.34	2.78	7.48
WI	21.25	5.14	20.55	2.34	6.73
WV	22.86	4.78	15.53	3.28	7.38
WY	28.04	3.20	15.92	2.66	5.78
AK	30.34	3.46	25.88	4.32	4.90