

Maximum Marks: 100 Programme code: 04 Programme: BTECH IT	Semester: January 2024 - April 2024 Examination: ESE Examination	Duration: 3 Hrs.
	Class: TY BTECH	Semester: VI(SVU 2020)
Name of the Constituent College: <b>K. J. Somaiya College of Engineering</b>	Name of the department: IT	
Course Code: 116U04C601	Name of the Course: Object Oriented Software Engineering	
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question	Max. Marks
Q1	Solve any Four	20
i)	What is the significance of work breakdown structure?	5
ii)	What are the reasons for delivering project late?	5
iii)	What is Cohesion and Coupling?	5
iv)	Write five design quality guidelines.	5
v)	Write note on Software Reengineering	5
vi)	Explain test driven development.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	10
i)	Write advantages and disadvantages for Spiral model.	5
ii)	Explain CMMI model with all levels.	5
OR		
Q2 A	Explain Agile process model with diagram, advantages and disadvantages.	10
Q2 B	Solve any One	10
i)	Explain five process framework software engineering activities with diagram.	10
ii)	Which process model will be suitable for game development application? Explain with diagram in detail with its advantages.	10

Que. No.	Question	Max. Marks
Q3	Solve any Two	20
i)	What is COCOMO? Explain basic COCOMO with all formulas. Also write merits and demerits for the same.	10
ii)	Define risk. Write two characteristics of risk. Write two different approaches for risk Identification.	10
iii)	What are the functions of SCM repository? Write Toolset used on repository.	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Draw use case diagram for online food ordering and delivery system.	10
ii)	Explain MVC architecture with diagram, its advantages and disadvantages in detail.	10
iii)	Draw sequence diagram for Withdrawal of money from ATM. What is the difference between activity and sequence diagram?	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any four	20
i)	Software Engineering is layered technology.	5
ii)	Write note on SCI.	5
iii)	Write user interface design rules.	5
iv)	Write different types of maintenance.	5
v)	Draw deployment diagram <sup>for</sup> working of video player in the browser.	5
vi)	Write class level testing method.	5

09.05.2024 (E)

Maximum Marks: 100	Semester: January 2024 –April 2024 Examination: ESE Examination	Duration: 3 Hrs.
Programme code: 04 Programme: IT	Class: TY	Semester: VI (SVU 2020)
Name of the Constituent College: <b>K. J. Somaiya College of Engineering</b>		Name of the department: 1T
Course Code: 16UIT04C602 Name of the Course: Modeling and Simulation		
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question	Max. Marks
Q1	Solve any Four	20
i)	What is a random number? In the process of generation of pseudo random numbers what are the errors or departures from randomness?	5
ii)	What is an event? What is an exogenous and endogenous event? Give an example for banking system.	5
iii)	Write any five performance measures in Single server Grocery store system.	5
iv)	Using LCM, implement random number generation to get a period of 8.	5
v)	What is point estimate measure in output analysis?	5
vi)	Draw the pdf and cdf of uniform distribution. Give the expression for PDF, mean and variance	5

Que. No.	Question	Max. Marks																																																												
Q2 A	Solve the following	10																																																												
i)	Draw flow chart and explain the arrival event in discrete event simulation.	5																																																												
ii)	Considering a single channel queuing system for a car wash, determine the state variables, events (any two for each). What is the necessary condition for the system to be stable? OR	5																																																												
Q2 A	Draw neat flowchart for steps in simulation study. Explain the first two steps.	10																																																												
Q 2 B	Solve any One	10																																																												
i)	Given the following sequence of numbers, can the hypothesis that the numbers are independent be rejected on the basis of length of runs up and down at $\alpha = 0.05$ . $\chi^2 0.05, 1 = 3.84$	10																																																												
	<table border="1" data-bbox="246 1573 1219 1784"> <tr><td>0.30</td><td>0.48</td><td>0.36</td><td>0.01</td><td>0.54</td><td>0.34</td><td>0.96</td><td>0.06</td><td>0.61</td><td>0.85</td></tr> <tr><td>0.48</td><td>0.86</td><td>0.14</td><td>0.86</td><td>0.89</td><td>0.37</td><td>0.49</td><td>0.60</td><td>0.04</td><td>0.83</td></tr> <tr><td>0.42</td><td>0.83</td><td>0.37</td><td>0.21</td><td>0.90</td><td>0.89</td><td>0.91</td><td>0.79</td><td>0.57</td><td>0.99</td></tr> <tr><td>0.95</td><td>0.27</td><td>0.41</td><td>0.81</td><td>0.96</td><td>0.31</td><td>0.09</td><td>0.06</td><td>0.23</td><td>0.77</td></tr> <tr><td>0.73</td><td>0.47</td><td>0.13</td><td>0.55</td><td>0.11</td><td>0.75</td><td>0.36</td><td>0.25</td><td>0.23</td><td>0.72</td></tr> <tr><td>0.60</td><td>0.84</td><td>0.70</td><td>0.30</td><td>0.26</td><td>0.38</td><td>0.05</td><td>0.19</td><td>0.73</td><td>0.44</td></tr> </table>	0.30	0.48	0.36	0.01	0.54	0.34	0.96	0.06	0.61	0.85	0.48	0.86	0.14	0.86	0.89	0.37	0.49	0.60	0.04	0.83	0.42	0.83	0.37	0.21	0.90	0.89	0.91	0.79	0.57	0.99	0.95	0.27	0.41	0.81	0.96	0.31	0.09	0.06	0.23	0.77	0.73	0.47	0.13	0.55	0.11	0.75	0.36	0.25	0.23	0.72	0.60	0.84	0.70	0.30	0.26	0.38	0.05	0.19	0.73	0.44	
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ii)	Determine whether there is excessive number of runs above and below the mean for the sequence of numbers. Use $\alpha = 0.05, Z_{0.025} = 1.96$	10																																																												
	<table border="1" data-bbox="262 1890 1262 2023"> <tr><td>0.09</td><td>0.41</td><td>0.23</td><td>0.68</td><td>0.89</td><td>0.72</td><td>0.12</td><td>0.45</td><td>0.08</td><td>0.32</td></tr> <tr><td>0.53</td><td>0.13</td><td>0.65</td><td>0.97</td><td>0.14</td><td>0.49</td><td>0.55</td><td>0.46</td><td>0.77</td><td>0.28</td></tr> <tr><td>0.81</td><td>0.63</td><td>0.40</td><td>0.57</td><td>0.02</td><td>0.16</td><td>0.33</td><td>0.86</td><td>0.99</td><td>0.22</td></tr> <tr><td>0.76</td><td>0.48</td><td>0.61</td><td>0.39</td><td>0.43</td><td>0.78</td><td>0.20</td><td>0.35</td><td>0.17</td><td>0.93</td></tr> </table>	0.09	0.41	0.23	0.68	0.89	0.72	0.12	0.45	0.08	0.32	0.53	0.13	0.65	0.97	0.14	0.49	0.55	0.46	0.77	0.28	0.81	0.63	0.40	0.57	0.02	0.16	0.33	0.86	0.99	0.22	0.76	0.48	0.61	0.39	0.43	0.78	0.20	0.35	0.17	0.93																					
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Que. No.	Question	Max. Marks																						
Q3	<p>Solve any Two</p> <p>i) Results of six replications of bank model collected at same time period (from 11.00am to 1pm) on six days based on average delay in minutes is as follows:  <b>2.79, 1.12, 2.24, 3.45, 3.13, 2.38</b>  The validation test consists of comparing the system response, namely the average delay equal to 4.3 minutes, to the model responses. Conduct a statistical test using level of significance <math>\alpha = 0.05</math> and <math>t_{0.025,5} = 2.571</math></p>	20 10																						
ii)	<p>The data of average lead time (<math>X_1</math>) to deliver in months and annual demand (<math>X_2</math>) for a machine obtained for the past ten years are as follows:</p> <table border="1"> <tr> <td><b><math>X_1</math></b></td><td>6.5</td><td>4.3</td><td>6.9</td><td>6.0</td><td>6.9</td><td>6.9</td><td>5.8</td><td>7.3</td><td>4.5</td><td>6.3</td></tr> <tr> <td><b><math>X_2</math></b></td><td>103</td><td>83</td><td>116</td><td>97</td><td>112</td><td>104</td><td>106</td><td>109</td><td>92</td><td>96</td></tr> </table> <p>Determine the correlation between these data and comment on the results.</p>	<b><math>X_1</math></b>	6.5	4.3	6.9	6.0	6.9	6.9	5.8	7.3	4.5	6.3	<b><math>X_2</math></b>	103	83	116	97	112	104	106	109	92	96	10
<b><math>X_1</math></b>	6.5	4.3	6.9	6.0	6.9	6.9	5.8	7.3	4.5	6.3														
<b><math>X_2</math></b>	103	83	116	97	112	104	106	109	92	96														
iii)	<p>The weights (in kg.) of students are normally distributed. The sample data for 20 students is collected. Determine the maximum likely hood estimator for this distribution.</p> <table border="1"> <tr> <td><b>49.18</b></td><td>44.9</td><td>47.87</td><td>52.76</td><td>54.25</td><td>62.34</td><td>53.14</td><td>45.56</td><td>48.18</td><td>60.71</td></tr> <tr> <td><b>53.21</b></td><td>39.86</td><td>70.18</td><td>51.21</td><td>49.54</td><td>41.15</td><td>56.71</td><td>53.35</td><td>47.20</td><td>46.75</td></tr> </table>	<b>49.18</b>	44.9	47.87	52.76	54.25	62.34	53.14	45.56	48.18	60.71	<b>53.21</b>	39.86	70.18	51.21	49.54	41.15	56.71	53.35	47.20	46.75	10		
<b>49.18</b>	44.9	47.87	52.76	54.25	62.34	53.14	45.56	48.18	60.71															
<b>53.21</b>	39.86	70.18	51.21	49.54	41.15	56.71	53.35	47.20	46.75															

Que. No.	Question	Max. Marks																												
Q4	<p>Solve any Two</p> <p>i) Consider a single server system (ATM). Let the arrival distribution be uniformly distributed between 1 and 10 minutes.</p> <p>The service distribution be distributed as follows:</p> <table border="1"> <tr> <td><b>Service Time (min)</b></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr> <td><b>Probability</b></td><td>0.05</td><td>0.1</td><td>0.20</td><td>0.30</td><td>0.25</td><td>0.1</td></tr> </table> <p>Develop the simulation table using event scheduling approach and analyse the system simulating it for 15 minutes. Compute the server utilization. Assume that the first customer is arriving at the system at 0<sup>th</sup> time.</p> <p>Random digits for Inter Arrival Time (IAT) and Service Time (ST) are:</p> <table border="1"> <tr> <td><b>IAT</b></td><td>501</td><td>352</td><td>61</td><td>888</td><td>721</td><td>201</td></tr> <tr> <td><b>ST</b></td><td>11</td><td>35</td><td>43</td><td>1</td><td>81</td><td>53</td></tr> </table>	<b>Service Time (min)</b>	1	2	3	4	5	6	<b>Probability</b>	0.05	0.1	0.20	0.30	0.25	0.1	<b>IAT</b>	501	352	61	888	721	201	<b>ST</b>	11	35	43	1	81	53	20 10
<b>Service Time (min)</b>	1	2	3	4	5	6																								
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<b>ST</b>	11	35	43	1	81	53																								

- ii) A newspaper seller buys the paper for 35 cents each and sells them for 50 cents each. Newspapers that are not sold at the end of the day are sold as scrap for 5 cents each. The lost profit from excess demand is 15 cents for each paper demanded that could not be provided. Newspapers are purchased in bundles of 10. There are three types of news days, "Good", "Fair", "Poor" with probabilities of 0.35, 0.45, 0.20 respectively. The distribution of papers on each of the days is shown in table 1.
- The random digits for types of News day and Demand is shown in table 2. Simulate the demands for five days and record the profit considering the decision to purchase 60 newspapers

**Table 1**

Demand Probability Distribution			
Demand	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	0.00
100	0.07	0.00	0.00

**Table2**

RD for type of Newsday	49,32,77,24,94
RD for Demand	86,65,20,60,80

- iii) Using the data given in table below, obtain the simulation table emphasizing clock times.

Draw figure and table to show the chronological ordering of events :

Customer Number	Interarrival time	Service Time
1	-	2
2	2	1
3	4	3
4	1	2
5	2	1

Determine the (i) time weighted average number of customers in the system. (ii) time weighted average number of customers waiting.

Que. No.	Question	Max. Marks
Q5	Write notes / answers on any four	20
i)	Multi variate and time series models	5
ii)	A component whose time to failure is exponentially distributed with failure rate 1/6. Generate two random failure times from this distribution. Use R1 = 0.38 and R2 = 0.45	5
iii)	Verification in Simulation	5
iv)	Acceptance Rejection method	5
v)	Input modeling	5
vi)	The number of hurricanes hitting the coast of Florida annually has a poisson distribution with a mean of 0.8. What is the probability that more than two hurricanes will hit the florida coast in a year? Give the mean and variance of this distribution.	5

11.05.2024 (E)

Maximum Marks: 100	Semester: January 2024 - April 2024	Duration: 3 Hrs.
Programme code: 04	Examination: ESE Examination	Semester: VI (SVU 2020)
Programme: B Tech Information Technology	Class: TY	Name of the department: Information Technology
Name of the Constituent College: K. J. Somaiya College of Engineering		
Course Code: 116U04E612	Name of the Course: Vulnerability Analysis and Penetration Testing	
<b>Instructions:</b> 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary		

Que. No.	Question	Max. Marks
Q1	Solve any <b>Four</b>	
i)	Discuss phases of pen testing.	20
ii)	Discuss the security, functionality, usability triangle.	5
iii)	Explain examples of application level attacks.	5
iv)	Describe scope and limitations of ethical hacking.	5
v)	Discuss the injection attacks according to OWASP's classification.	5
vi)	Elaborate on Ethical Disclosure.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	
i)	Explain the objectives of footprinting.	10
ii)	Discuss the countermeasures of footprinting.	5
OR		
Q2 A	Apply advanced Google hacking techniques for footprinting. ( Minimum five relevant queries with example)	10
Q2 B	Solve any <b>One</b>	
i)	Elaborate on Email footprinting with process and example.	10
ii)	Elaborate on social engineering footprinting with process and example.	10

Que. No.	Question	Max. Marks
Q3	Solve any <b>Two</b>	20
i)	With respect to ECB, explain generation, vulnerabilities, and mitigations.	10
ii)	Discuss with example the security implications of predictable session tokens generated from concealed sequences, time dependency, and weak random number generation.	10
iii)	Explain types for securing sessions with examples.	10

Que. No.	Question	Max. Marks
Q4	Solve any Two Give two examples of the following design flaws in authentication	20
i)	✓ Vulnerable Transmission of Credentials ✓ Brute-Forceable Login ✓ "Remember Me" Functionality ✓ Incomplete Validation of Credentials ✓ Predictable Usernames	10
ii)	Discuss password-cracking tools (minimum 2).	10
iii)	With example, explain weaknesses in session token handling	10

Que. No.	Question	Max. Marks
Q5	Discuss in brief (any four)	20
i)	DOM-based XSS	5
ii)	Stored XSS	5
iii)	Out-of-band SQL Injection	5
iv)	In-band SQL Injection	5
v)	MITM attack techniques	5
vi)	Link manipulation phishing attack	5

Maximum Marks: 100			Semester: January 2024 – April 2024	Duration: 3 Hrs.		
Programme code: 04		Examination: ESE Examination	Class: TY Semester: VI (SVU 2020)			
Programme: BTech. In IT						
Name of the Constituent College: K. J. Somaiya College of Engineering		Name of the department: IT				
Course Code: 116U04C603		Name of the Course: Cloud Computing				
Instructions: 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary						

Que. No.	Question	Max. Marks
Q1	Solve any Four	20
i)	Draw Cloud Computing Model (NIST, only diagram).	5
ii)	Explain any one case study where public cloud can't be used. Justify your answer.	5
iii)	Compare type I and type II Hypervisors.	5
iv)	Commodity hardware is suitable for which type of scaling? Justify your answer.	5
v)	Compare Private and Public cloud.	5
vi)	Describe any two methods for data security.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	10
i)	Explain features of Eucalyptus.	5
ii)	Explain benefits of Eucalyptus.	5
OR		
Q2 A	Explain architecture of Google App Engine with help of neat diagram	10
Q2 B	Solve any One	10
i)	Explain IOT and cloud working model with help of neat diagram.	10
ii)	Explain architecture of Open Stack with help of neat diagram.	10

Que. No.	Question	Max. Marks
Q3	Solve any Two	20
i)	Explain any five technologies in Evolution of cloud computing.	10
ii)	Explain the responsibilities of cloud provider and users for SaaS/PaaS/IaaS with help of neat diagram.	10
iii)	Explain benefits and challenges of cloud computing	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Explain Cloud Storage Gateway with help of neat diagram.	10
ii)	Explain Virtual firewall and its mode of operations.	10
iii)	Explain Information Technology Infrastructure Library (ITIL)	10

Que. No.	Question	Max. Marks
Q5	Write notes on any four	20
i)	OS virtualization with diagram	5
ii)	Shadow Page Table	5
iii)	Network Attached Storage	5
iv)	Nimbus features	5
v)	Need of Cloud for IOT	5
vi)	Security issues in cloud	5

Maximum Marks: 100		Semester: January 2024 – April 2024 Examination: ESE Examination	Duration: 3 Hrs.
Programme code: 66 Programme: Honour Programme in Artificial Intelligence		Class: TY (B.Tech.)	Semester: VI (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering		Name of the department: Information Technology	
Course Code: 116h66C601		Name of the Course: Deep Learning	
<b>Instructions:</b> 1) Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary			

Que. No.	Question	Max. Marks
Q1	Solve any Four	20
i)	List different challenges which have motivated Deep Learning.	5
ii)	Explain Probability Conditional Probabilities, Posterior Probability with examples.	5
iii)	Describe various resampling methods.	5
iv)	What is Stochastic Gradient Descent? What are its drawbacks?	5
v)	What is the need for activation function? Describe any one most widely used activation function in deep learning.	5
vi)	Describe any five parameters used to evaluate the performance of deep learning models.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	10
i)	What are hyperparameters? What is the difference between parameter tuning and hyperparameter tuning? What are the advantages of hyperparameter tuning?	5
ii)	Describe any one optimization algorithms with Adaptive Learning Rate.	5
Q2 A	OR What is regularization? What are the benefits of regularization? Elaborate any two regularization techniques.	10
Q2 B	Solve any One	10
i)	Explain any four loss functions with formulas.	10
ii)	What are the four major architectures of deep networks? Describe any two with diagram.	10

Que. No.	Question	Max. Marks
Q3	Solve any Two a. Consider an input of size $28 \times 28 \times 192$ . Apply a $1 \times 1$ convolution using 32 filters. What will be size of the output? What is effect of using $1 \times 1$ convolution. b. Consider the input image data as	20

0	0	0	0	0	0	0
0	0	2	1	2	0	0
0	1	2	2	0	2	0
0	0	2	0	1	1	0
0	0	0	0	1	0	0
0	0	1	2	2	1	0
0	0	0	0	0	0	0

and convolution kernel as

0	1	1
-1	1	-1
0	1	1

Find out output after application of convolution operation with stride of 1 and zero padding.

ii)	Explain the following terms related to CNN: a. Transfer learning b. Padding c. Pooling d. Flattening Layer e. Fully-Connected Layer	10
iii)	How do CNNs deal with overfitting? Describe any four techniques to mitigate overfitting in CNNs.	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	What is a Gated Recurrent Unit (GRU), and how does it differ from an LSTM cell?	10
ii)	What are Recurrent Neural Networks (RNNs), and how do they differ from feedforward neural networks? Describe how the hidden state in an RNN operates?	10
iii)	What are Long Short-Term Memory (LSTM) networks, and how do they address the vanishing gradient problem?	10

Que. No.	Question	Max. Marks
Q5	Write short on any four	20
i)	Unsupervised Pretrained Networks	5
ii)	Deep Belief Networks	5
iii)	ReLU and Leaky ReLU activation function	5
iv)	Variants of basic convolution function	5
v)	Recursive Neural Networks	5
vi)	Sequence-to-Sequence Architectures	5