

### WINTER - 2016 EXAMINATION

Model Answer

Subject Code:

17630

## **Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q.N	Sub	Answer	Marking
о.	Q.N.		Scheme
1.		Attempt any <u>FIVE</u> of the following:	20
	<b>a</b> )	Give three models of OO methodology.	<i>4M</i>
	Ans.	Three models of OO methodology:	
		1. Class Model	List of
		2. State Model	correct
		3. Interaction Model	three
			models
		1. Class Model:	<i>1M</i>
		The class model describes the structure of objects in a system, their	
		identity, their relationships to other objects, their attributes and their	
		operations. The class model provides context for the state and	Relevant
		interaction models.	descripti
		2. State Model:	on of
		The state model describes those aspects of objects concerned with	each
		time and the sequencing of operations also events that mark changes,	model
		states that define the context for the events, and the organization of	<i>1M</i>
		events and states. The state model captures control, the aspect of a	
		system that describes the sequences of operations that occur, without	
		regard for what the operations do, what they operate on, or how they	
		are implemented.	



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	3. Interaction Model:	
	The interaction model describes interaction between objects i.e. how	
	individual objects collaborate to achieve the behavior of the system	
	as a whole. The state and interaction models describe different	
	aspects of behavior. Use cases sequence diagrams and activity	
	aspects of behavior. Use cases, sequence diagrams and activity	
	diagrams document the interaction model. Use cases document	
	major themes for interaction between the system and outside actors.	
<b>b</b> )	Give the use of generalization in class modeling.	<i>4M</i>
Ans.	Use of generalization in class modeling:	
	Generalization supports for polymorphism. In this, a call for an	
	operation at the superclass level is resolved by the object oriented	Relevant
	compiler to the method that metabos the colling object's class	avnlanat
	complet to the method that matches the carring object's class.	explanal
	Polymorphism increases the flexibility of software.	ion 4M
	Generalization structures the description of objects. When	
	generalization is used objects are organizes on the basis of their	
	similarities and differences.	
	Generalization is used to reuse the existing code Reuse is more	
	benefatization is used to redse the existing code. Redse is more	
\ \	productive than repeatedry writing a code from scratch.	() (
<b>c</b> )	Explain the notations used in use case diagrams.	<i>4M</i>
Ans.	Notations used in use case diagram are:	
	1. Use case:	
	Use case is the description of set of sequences of actions. It is	
	graphically represented as an ellipse and labeled with the name of the	Any
	use case. Use case represents an action performed by a system.	four
	Notation:	correct
		notation
	(Use case)	
		S IM
		each
	2. Actor:	
	An actor represents a coherent set of roles that users of use case can	
	play while interacting with use cases. An actor represents a role that a	
	play while interacting with use cases. An actor represents a role that a human, hardware device or another system plays when it	
	play while interacting with use cases. An actor represents a role that a human, hardware device or another system plays when it communicates with the system.	
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b) Ans.	Window         length         width         {0.8 < length/width < 1.5}         • The priority of job may not increase         Job         priority         {priority never increases}    Draw the use case diagram for railway reaction of the construction of the construle of the construction of the construction of the co	eservations system. idered)	8M Use case diagram for railway reservati on system with correct logic and notation s 8M



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		In the above example there are two forks and two joins. Joins and forks should balance, meaning that the number of flows that leave a fork should match the number of flows that enter its corresponding join. The activity Stream audio needed to tell the activity Synch mouth when important pauses and intonations occurred. Similarly, for Synch mouth, we would see transitions triggered by these same signals, to which the Synch mouth state machine would respond.	Any relevant example of join and fork 4M
3.	a)	Attempt any <u>FOUR</u> of the following: Explain the principles of modelling.	16 4M
	Ans.	Modelling principles are as follows:	Four
		how a problem is attacked and how a solution is shaped". This means	correct
		choose your correct model as per the requirement of problem statement. Wrong model will mislead you, causing to focus on	s
		irrelevant issues. 2 "Every model may be expressed at different levels of precision:"	Each principle
		This means all the user and developers both may visualize a system at different levels of details at different time.	1M



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	<ul> <li>3. "The best models are connected to reality".</li> <li>4. "No single model is sufficient. Every nontrivial system is best approached through a small set of nearly independent models:" This</li> </ul>	
	means you need to have use case view, design view, process view,	
	implementation view and development view. Each of these	
	views may have structural as well as behavioral aspects. Together	
	these views represent a system.	(3.6
b)	Explain how to create objects and classes.	4M
<b>A</b>	(Any Kelevani explanation shall be considered)	
An	s. The following steps are performed to create Objects and classes.	
	1. Identify Objects and Classes	
	From the detail statement of the problem, identify objects and	Dalamand
	classes as below:	Relevant
	a. Physical entities such as nouses, machines etc.	explanal
	b. Nouns such as lickets, systems etc.	lon 4111
	c. Materials such as teacher, student, sustemer etc.	
	u. Koles such as teacher, student, customer etc.	
	2 Propero e data dictionary	
	2. Flepare a data dictionally	
	<ol> <li>Identify attributes of objects and links</li> </ol>	
	<ol> <li>A. Identify attributes of objects and mixs.</li> <li>Dragnize and simplify object classes using inheritance.</li> </ol>	
	6 Identify operations to be included in a class	
	7. Verify that access paths exist for likely queries	
	7. Verify that access paths exist for fixery queries.	
	<ul> <li>Group classes into models</li> </ul>	
	How to create and destroy messages in sequence diagram?	AM.
	Croate message:	<b>4</b> 1 <b>V1</b>
All	<ol> <li>Create message:         <ol> <li>Objects can be created according to the requirement of the system in between the processing of the system because they are not required for the entire duration of the sequence diagrams interaction.</li> <li>If an object does not exist at the beginning of a sequence diagram then it must be created in the system.</li> <li>The UML shows creation by placing the object notation at the head of the arrow for the message call that creates an object.</li> </ol> </li> </ol>	Descripti on of create message 2M,
	<ul> <li>Destroy message:</li> <li>1. An object can destroy itself or it can be destroyed by other objects of the sequence diagram because those objects may not further require during the system.</li> <li>2. If the object is destroyed by itself then "X" is placed at the head</li> </ul>	Descripti on of destroy message 2M



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e) Ans.	Exp Stat	lain the n e chart di	otations used iagram notati	in state diagram. ons:	41
	Sr · N	Name	Symbol	Description	
	1	State		A state is a condition or a situation in the life of an object during which it satisfies some conditions, performs some activity or waits for some events. It is represented with a rounded rectangle. Name of the state is written inside the rectangle.	An for corr nota s: 1 eau
	2	Initial State	۲	It indicates the default starting place of the state chart diagram. An initial state is represented as filled circle.	
	3	Final State	٢	Final state indicates end of the execution of the system. It is represented as a filled black circle surrounded by an unfilled circle.	
	4	Transit ion		A transition is a relationship between two states. It indicates that an object in the first state performs some action and enters in the second state when a specific event occurs. Transition is represented with a directed line.	
	5	Event	Event	An event is the specification of a significant occurrence that has location in time and space. An event can be a signal or a call to a function. An event is indicated with text written above or below transition line.	
	6	Action	Event/action	An action is an executable computation. Action may include operation calls, the creation and destruction of another object or sending of a signal to an object. It is indicated with text written below or above the transition line associated with an event separated by slash	
f)	Dra	w the co	mponent dia	gram for customer login for railway	4

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consists of characters. The copy operation propagates

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<b>c</b> )	<b>Explain how multiple tasks are performe</b> (Any Relevant explanation shall be consid	ed in swim lane diagram. lered)	. 8M
c) Ans.	<ul> <li>Explain how multiple tasks are performe (<i>Any Relevant explanation shall be consid</i>)</li> <li>Activity diagrams provide an ability to clariwhich activity. A swim lane diagram (also a functional diagram) documents the steps or flow or workflow. More specifically, a switthese activities into swim lanes which are h columns that contain all of the activities which performs the activities (i.e., rol of the process in which the activity takes pereator of the document feels should communicated by the swim lane diagram. adopted due to the visual similarity betwee the diagram to that of the swim lanes found</li> <li>Swim lane diagrams are used for inform different separate entities that are not linear sequence.</li> <li>It is used for administrative processes processing, part development, marketing</li> <li>Each lane represents a different ent associated with a certain function.</li> <li>Hence, it could be a department, a sub office, individual people, or it could department as, for example, a plant, a suppliers.</li> </ul>	d in swim lane diagram. <i>'ered</i> ) ify which actor performs sometime called a cross- activities of a process im lane diagram groups orizontal or vertical nich fit into the category es of information such a e or department), the stag place, or whatever else th ld be emphasized an The term swim lane wa een the horizontal rows of l within a swimming pool. <b>cmation flows</b> that involv <b>necessarily working in</b> es as, for example, orde g, etc. ity. An entity is usuall ogroup of a department, a d even be larger than a site, the customer, or th	See e d is of e a e e e e e e e e e e e e e e e e e



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		Customer Customer Submits PO Customer Submits PO Customer Submits PO Customer Rep Logs PO, Enters Order No Standard Terms? Ves Agent Approves Order Agent Requests Approval Agent Cancels Order Contracts Agent Reviews Order Agent Requests Approval Contracts Agent Contracts Agent Reviews Order Contracts Agent Agent Approves Order Agent Requests Approval Corter is Nd Shipped	Legal Attorney Marks It OK, Returns to Agent Yes Changes Acceptable? No Attorney Marks It No, Returns to Agent	Fulfillment Pick Order, Log Shipment	Example 2M
5.	a) Ans.	<ul> <li>Attempt any <u>FOUR</u> of the following: Explain the UML architecture.</li> <li>System architecture contains five views: <ol> <li>Use case view: - it describes the use case of the system as seen by its end users static aspect of this view is shown in use.</li> </ol> </li> <li>Design view: - it consists of classes, in required for the system. It supports the the system. It specifies services that the user. The static aspect is shown in diagram.</li> <li>Process view:-it focuses on threads a system's concurrency and synchronaddresses the performance, scalability system. Static aspect is shown in class a</li> <li>Implementation view:-it focuses on the system of the system of the system.</li> </ul>	ase that shows s, analysts and e case diagram nterfaces and e functional re e system prov- class diagram and processes onization m ty and throu and object diagram hysical system stem's release ent diagram	s the behavior d testers. The n. collaborations quirements of ides to its end n and object that form the echanism. It ghput of the gram. and files that n. It addresses es. The static	16 4M Explana tion 3M



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	5. Deployment view: - it specifies the nodes that form the system's hardware topology on which the system executes. It addresses the distribution, delivery and installation of the parts that make up the physical system. The static aspect of this view is shown in deployment diagram. Vocabulary functionality          Vocabulary functionality       system assembly configuration management         Design view       Use case         View       Deployment view         performance       system topology         scalability throughput       system topology	Diagram 1M
b) Ans.	<ul> <li>Explain the concept of values and attributes.</li> <li>Value: - A value is a piece of data.</li> <li>Attributes: - An attributes is a named property of a class that describes a value held by each object of the class.</li> <li>A class may have any number of attributes or no attributes at all.</li> <li>An attribute represents some property of the thing that is shared by all the objects of that class.</li> <li>Each attribute name is Unique within a class. Each attribute has a value for each object. For example, attribute Name can have value as 'abc' for one object and 'xyz' for other object.</li> <li>Attributes are listed in the second part of Class Box. Each attribute name may be followed by data type of the value and optional default value.</li> <li>For Example: Class Person has attributes Name, Birthdate and weight. Name is string, Birthdate is Date and Weight is integer.</li> </ul>	4M Relevant explanat ion 4M



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	Person JoeSmith:Person MarySharp:Person	
	name: string name="Joe Smith" name="Mary Sharp" hithdate=16 March 1950	
	Class with Attributes Objects with Values	
<b>c</b> )	Explain system boundries for use case diagram.	<i>4M</i>
Ans.	System boundary specifies the scope of an application in order to	
	specify functionality. It indicates what the system includes and what it omits.	
	System boundary groups together logically related things. It separates	
	use cases and actors involved in the system.	
	System boundary is shown with a box in a use case diagram.	Relevant
		ion 4M
	Example:	
	ATM Manager	
d) Ans.	Explain actions and activity node concept in activity diagram.	<i>4M</i>
	Action node/state: The executable, atomic computations such as sending a signal to an object, creating or destroying object are called as action states. Action states cannot be decomposed. For example: an expression for calculating gross salary, entering amount for withdrawal cannot be decomposed. <i>Example:- Action state</i>	Explana tion of action node/sta te 2M
	Index=Index+1	
	Activity node/state: an activity is an ongoing non-atomic execution within an activity diagram. Activity results in action. Activity states can be further decomposed in multiple activities. Activity states are	



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	not atomic that means they may be interrupted and they may take some time duration to complete. Activity state is a composite of flow control made up of other activity states and action states. <i>Example:-Activity state</i> Process Bill	Explana tion of activity node/sta te 2M
e) Ans.	Explain composite state diagram. Composite state is defined as state that has sub states. A Sub state can be sequential or concurrent. Sequential sub states include states of things that change with the help of transition in a particular sequence. Concurrent sub states are the states that executes in parallel. They are independent of each other. In nested state diagram, each of nested state receives the outgoing transition of its composite states. <i>Example:-</i> CarTransmission <u>Neutral</u> push R <u>push N</u> push F <u>push N</u> push F <u>push N</u> push F The above state diagram shows automatic transition with composite state. Automatic transition can be done in reverse, neutral or forward direction. If it is in forward then it can be in first, second or third gear. The first, second and third are nested states for a composite state forward to neutral. Select F in neutral state causes a transition to forward state. The nested state first is the default initial state.	4M Relevant explanat ion 4M
f) Ans.	<ul> <li>Explain node instances of deployment diagram with example.</li> <li>A node is a physical element that exists at run time and represents a computational resource with some memory and processing capability. Instance of node can be hardware device or execution environment.</li> <li>Hardware device can be server, printer etc.</li> </ul>	4M Relevant explanat ion-2M



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### WINTER - 2016 EXAMINATION 17630 Subject Code: **Model Answer** *Example:* Example 2M«device» Application Server • Execution environment can be a node that offers an execution environment for specific types of components that are deployed on it in the form of executable. Example: «executionEnvironment» J2EE Container Attempt any TWO of the following: 16 6. Give the importance of modelling in Rambaugh model. 8M a) Modeling is a central part of all activities that lead up to the Ans. deployment of good software. It is required to build quality software. **Importance of Modeling:** Modeling gives graphical representation of system to be built. Modeling contributes to a successful software organization. Relevant Modeling is a proven and well accepted engineering technique. explanat Modeling is not just a part of the building industry. It would be ion 8M inconceivable to deploy a new aircraft or an automobile without first building models-from computer models to physical wind tunnels models to full scale prototypes. A model is a simplification of reality. A model provides the blueprint of a system. A model may be structural, emphasizing the organization of the system, or it may be behavioral, emphasizing the dynamics of the system. Models are build for better understanding of the system that we are developing: a. Models help us to visualize a system as it is or as we want it to be. b. Models permit us to specify the structure or behavior of a system.



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	<ul><li>c. Models give us a template that guides us in constructing system.</li><li>d. Models support the decisions we have made.</li></ul>	a	
	<b>Modelling principles are as follows:</b> 1. "The choice of what models to create has a profound influence of how a problem is attacked and how a solution is shaped". This mean choose your correct model as per the requirement of problem statement. Wrong model will mislead you, causing to focus of irrelevant issues.	on ns m on	
	2. "Every model may be expressed at different levels of precision This means all the user and developers both may visualize a system a different levels of details at different time.	:" at	
	3. "The best models are connected to reality".		
	4. "No single model is sufficient. Every nontrivial system is be approached through a small set of nearly independent models:" Th means you need to have use case view, design view, process view implementation view and development view. Each of these views may have structural as well as behavioral aspects. Togethe these views represent a system.	st is <i>v</i> , er	
b) Ans	Differentiate between aggregation and association.	8M	[



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	Aggregation	Association	
	Aggregation is the "Part-whole" or 'a- part-of" relationship in which objects representing the components.	Association describe q group of links with common structure & common semantics.	Comment
	Aggregation is drawn like association, except a small diamord indicates the assembly end of the relationship.	A link is an instance of an association.	Compar ative descripti on of
	Notation: Whole Part	Class A Class B	aggregat ion- 4M,asso ciation-
	An Aggregation is a specialized association.	An Association defines a relationship between two or more classes.	4M
	Aggregation is tightly looped from of association with same extra semantics.	Association represents static relationship between classes.	
	Two types of Aggregation : aggregation & composition	Two types of association Binary & n-ary.	
	Example: Document  Paragraph  Sentence	Example: Teacher Student	
	Example shows that a document consists of many sentences.	Example shows the object model for Teacher & student associations.	
c)	Explain loop control in sequence	e diagram.	8M
Ans. Loop is used to show repetitive execution of interactions. Loop fragment operator is used inside fragment box to indicate recursive application. Loop can be controlled either with iterations or with a guard condition. Loop operator can have values for lower bound and upper bound. When loop operator does not contain bounds it indicates that the interaction execute with zero as lower bound and infinite upper bound.			Explana tion of loop control 2M
	<ul><li><i>Example:-</i></li><li>1. In the sequence diagram below, the loop has no bound specified with operator. So lower bound of the loop is 0 and upper bound is infinite.</li></ul>		Explana tion of Loop with no bound 2M



