Course Code : CST 401 **EIQU/RW – 16 / 1098**

Seventh Semester B. E. (Computer Science and Engineering) Examination

DISTRIBUTED SYSTEMS

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All Questions carry marks as indicated against them.
(2) Number your answers properly.
(3) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (a) Local event sequences are shown for each of four processes (sites) below. Let each message among process pairs be defined in terms of sending and receiving events as follows :

m [1, 2]: e12 → e22

m [2, 3]: e23 → e34

m [3, 1]: e33 → e14

m [4, 2]: e43 → e24

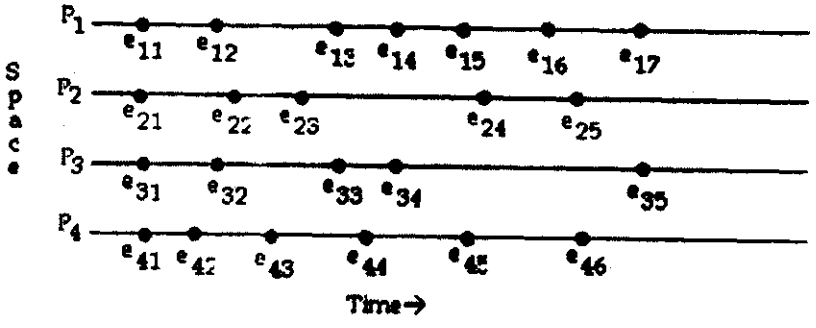
(i) Draw the messages so as to complete the space-time diagram.

(ii) Use the vector clock algorithm to determine the vector clock values for each and every event shown.

(iii) Identify all causally related events in the system.

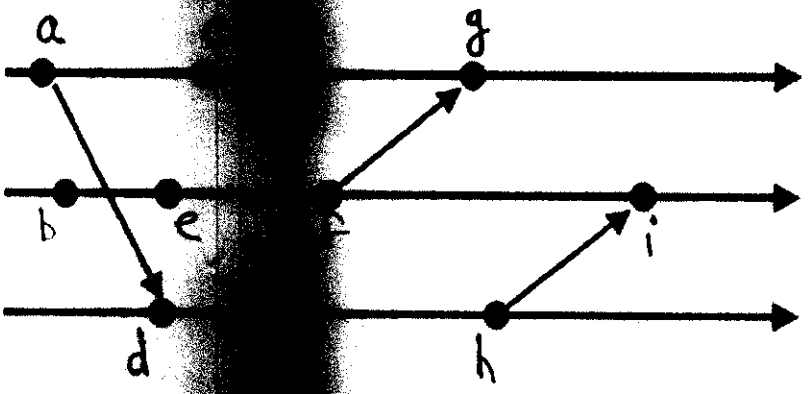
(iv) List all concurrent events.

(v) Does {e15, e24, e35, e43} and {e12, e23, e35, e44} define a consistent cut ? Justify.



6

(b) Refer to the following ram. Fill out the empty cells in the table to give the relations bet ch event. "Æ " denotes "the row event happend before the column " denotes "the row event happened after the column event", an otes "the two events"



	e	d	e	f	g	h	i
	Æ						
	—						
		—					
			—				
				—			
					—		
						—	
							—

OR

Show that using of logical clock C, it is not possible to ensure that if C(n a→b where → denoted happended before relation among ev ibuted systems. 4

2. (a) (i) Write **Suzuki** broadcast Algorithm.

(ii) Implement th thm for following scenario.

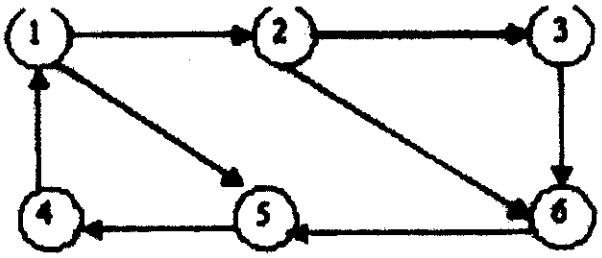
Scenario :

There are distributed system S0, S1, S2, S3 and

S4. Initially token is with S0. Meantime S3 and S4 want to enter in critical section. When S4 enters into Critical section, again S0 requests for critical section.
What are the contents of Request array, token array and Request Queue when S0 is requesting for critical section ? 7

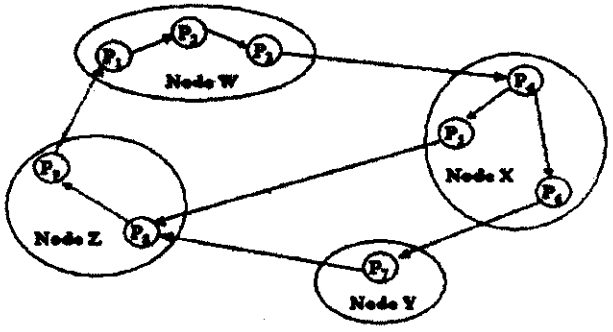
(b) Bring out the use of FAILED, INQUIRE and YIELD message for handling deadlocks in Maekawa's algorithm. 3

3. (a) In the following wait for graph, detect a distributed deadlock if any, viewing the model as an OR model wait for graph. Show all the messages that will flow over the edges to detect the deadlock if any.



OR

Write the deadlock detection algorithm proposed by Chandy, Misra and Haas for AND model. Trace the steps for the following WFG if node P1 initiates.



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(b) Define Byzantine agreement problem.
Is agreement possible if $n = 4$ and $m = 1$? Show the result for :

(i) Source is non-faulty.

(ii) Source is faulty 5

4. (a) What is strict consi… why is not possible to achieve it in a distributed system ?
Is the following d… quentially consistent ? Explain your answer.

A	W(x)a	W(x)b
B		R(x)b
C		R(x)b R(x)a

OR

Discuss cache cohe… PLUS system with neat sketch. 5

(b) Define name server… space. Explain name resolution in the context of distributed file s… 3

(c) What is the major … between stateless server and stateful server? 2

5. (a) Compare transfer … policy between sender and receiver initiated algorithm. 4

(b) Narrate sender-initi… aring algorithm. Mention drawbacks of sender initiated algorithm.

OR

What is task migrat… te task migration process in V-System, Sprite, Accent. 6

6. (a) Illustrate the follow… ample :—

(i) Orphan Ma… Domino effect.

(ii) Livelocks.

OR

Discuss Two-Phase … otocol. Illustrate the behaviour of the protocol in case of site fai… 5

(b) Discuss following m… rotection :—

(i) The Take–Gr… l.

(ii) Bell–LaPadul… 5

Course Code : CST 402 EIQU/RW – 16/1099

Seventh Semester B. E. (Computer Science and Engineering) Examination

LANGUAGE PROCESSORS

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry equal marks.
(2) Assume suitable data wherever necessary.
(3) Due credit will be given to neatness and adequate answers.

1. (a) (1) Write RE for checking palindrome string of even length.

(2) Quadruple is used in ———— Phase.

(3) A grammar can be LR(1) but not LALR (True/Fasle) Justify.

(4) Which type of attribute is used for interpretation of production rule D⟶TL, why ?

(5) The process of copy propagation reduces ———— in code optimization.

(6) Data structures used in compiler design process and their usage. 6

(b) Write Regular expression in python to find out numerical values from the string.

input = 'India scored 320 and Virat scored 120'. 2

(c) If object code generation is carried out on small storage devices, justify, the use of compiler or interpreter. 1

(d) Removal of left recursion is essential for which type of parsers and why ? 1

2. (a) Determine whether given grammar is LL(1) or not :

$A \rightarrow BCc \mid gDB$

$B \rightarrow bCDE \mid \epsilon$

$C \rightarrow D\ a\ B \mid c\ a$

$D \rightarrow \epsilon \mid dD$

$E \rightarrow E\ a\ f \mid c$

Parse the string : bc 6

(b) Design LR(0) parser for following grammar :

$S \rightarrow AaBb \mid BbAa$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$ 4

3. Determine whether given grammar is LL(1)or not.

$S \rightarrow aIJh$

$I \rightarrow I\ b\ Sc \mid c$

$J \rightarrow KLKr \mid \epsilon$

$K \rightarrow d \mid \epsilon$

$L \rightarrow p \mid \epsilon$ 10

4. (a) Generate short circuit code for following expression. Write the various functions/constructs used in process. Draw the address map tree for execution.

(a < b) AND (c > d) assume start address = 100 5

(b) Consider an array C [ ]x10x4. Construct Three Address Code (TAC) for X:=C[ ]
Compute l–value of C[ ] considering base address of array C as 100 and bpw=4.
Also validate your result using memory representation of array. 5

OR

Write SDTS for following code and also generate TAC I=0; J=0, K=0;
While (I < 10) and (J < 10)
{
C[K] = A[I] + B[J]
I++; J++; K++
}

5

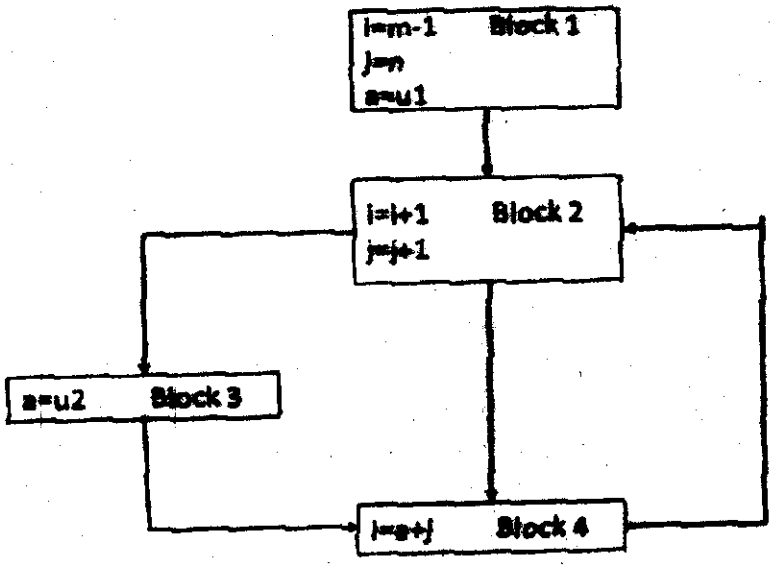
5. (a) Consider the grammar and First, Follow information. Draw parsing table. Suggest suitable error detection and recovery schemes in the parsing table. For the string use modified parsing table and illustrate parsing using stack (LL[1]). String: id+)$

FIRST(E) = FIRST(T) = FIRST(F) = {(,id}
FIRST(E') = {+, ε}
FIRST(T') = {*, ε}
FOLLOW(E) = FOLLOW(E') = {$,)}
FOLLOW(T) = FOLLOW(T') = {+, $.)}
FOLLOW(F) = {*, +, $)}
FOLLOW(F) = {*, +, $)}

6

(b) Discuss various data structures required for implementing Symbol Table. 4

6. (a) Perform live variable analysis on following PFG.



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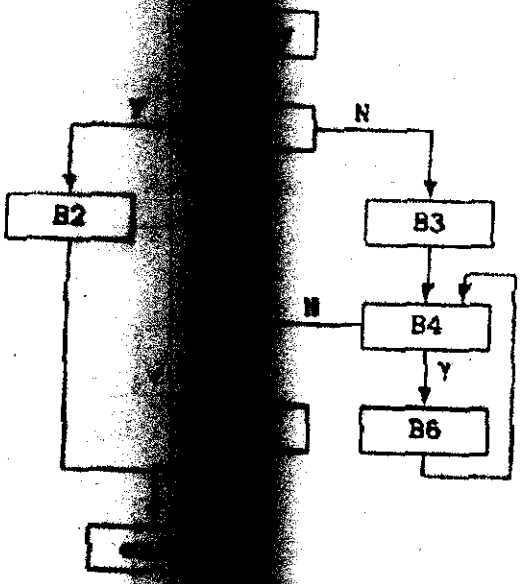
(b) Convert the following ... to PFG and perform loop detection:

```
int func(int a, int b)
{
inti, j, k;
i = 45;
  j = a +b ;
While (j < 25)
{
  if(a + i > 100)
    k = a+j;
else
    k = b+j;
j = j+4
}
  return (k)
}
```

5

Compute Dominators and ... ct dominator tree for the given graph.



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7. (a) Use Sethi–Ullman algor... erte code for the following instruction. Draw various syntax tr...

Z = (A + B)*C + D /...

5

(b) Generate assembly lan[illegible] using RR and RX format for following instruction: X = ((a + [illegible] – e

Find total number of [illegible] required for execution. Verify the register requirement using labe[illegible]ithm. 5

Explain in brief :—

(i) Peephole Optim[illegible]

(ii) GETREG(). 5

Course Code : CST 403–1 **EIQU/RW – 16 / 1100**

Seventh Semester B. E. (Computer Science and Engineering) Examination

WEB ARCHITECTURE AND TECHNOLOGY

Elective – I

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry equal marks. Figure to the right indicate marks.
(2) Carefully see the internal choices.
(3) Which Course Objectives (COs) are satisfied by the question is mentioned against each question.
(4) Assume suitable data and illustrate your answer with with the help of neat sketches wherever necessary. Due credit will be given to neatness.

1. (a) What are RFCs ? What is the contribution of RFCs in the evolution of Internet ? 5

   (b) For an IP address 198.17.5.122 and subnet mask 255.255.255.192, What are the subnet addresses ? How many hosts per subnet are possible ? If we want to create subnets of 120, 50, 60 hosts each, is it possible ? How ? 5

OR

2. (a) What are interior and exterior Routing Protocols ? Explain any one popularly used protocol in internet. 5

   (b) With respect to a transport level connection, what are the five components in an association ? What is a socket ? What are minimum and necessary components in a socket interface ? 5

3. (a) Explain DNS. How recursive name resolution works ? 5

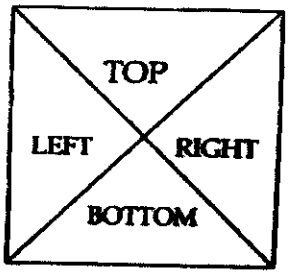
   (b) What is MIME Transfer encoding ? A message of size 3000 bytes is encoded using Base 64 scheme. What will be the size of the encoded message ? 5

OR

4. (a) What is NAT ? G types ? For NAT overloading, what are the typical entries in of the address translation table (ATT) ? 5

(b) Explain the spec Pv6. 5

5. (a) What are server lient side image maps ? Show a client-side image map confi ification where there are four triangular shaped areas joined tog n a square shaped structure. The vertices are (0, 0)
Bottom-Left (0, 1
Top-Right (100, 0)
Bottom-Right (100
Center (50, 50)



5

(b) What is a RegEx ? Write a Perl code segment to replace all occurrences of th d" to "good" in a given file. 5

R

6. (a) How can we find er type and version in JavaScript ? How can it be used fo with users ? 4

(b) Write a Javascript submit a student form with name and phone number. Validate t by accepting only alphabets in Name, and exactly 10 digits in nber (no alphabet or special character). Also prompt user in th you really want to submit ?" 6

7. (a) In public key crypt strate how are the keys used for encryption and authentication espectively ? 5

(b) Enlist the benefits o rce with different perspectives. 5

R

(c) Explain varius types s and their impacts. 5

8. Solve any **Two** :—

(a) What are the main reasons of packet loss in Internet telephony ? Explain SIP in brief. 5

(b) Justify the use of separate multimedia streaming server in multimedia applications. 5

(c) Explain the architecture and components used in virtual reality systems. 5

9. (a) What are web frameworks ? Explain any one framework with characteristics and highlights ? 5

(b) Why client-server architectures have been the main back bone of internet based applications ? 5

OR

(c) Explain MVC architecture with its variants. 5

Course Code : CST 404-1 **EIQU/RW–16/1102**

Seventh Semester B. E. (Computer Science and Engineering) Examination

Elective – II

INTERNETWORKING AND TCP / IP

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) Question **01** , **02** and **05** is compulsory.
(2) All questions carry marks as indicated against them.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. Describe the cell relay protocol with respect to Multiplexing, its architecture, circuit connection and layer detailing. 10

2. (a) List five non proprietary internet applications and the application layer protocols that they use. 3

   (b) What information is used by a process running on one host to identify a process running on another host ? 2

   (c) Bridge doesn't change the Physical (MAC) addresses in frame. Give justification to support the statement. Also State the usage of Source and destination address related to forwarding decision taken by bridges. 5

3. Solve any **two** :—

   (a) State three major differences between a router and a repeater or a bridge. An organization is granted the block 16.0.0.0./8. The administrator wants to create 500 fixed-length subnets.

      (a) Find the subnet Mask.

      (b) Find the number of addresses in each subnet.

(c) Find the fi… the last address in the first subnet.

(d) Find the fir… he last address in the last subnet (subnet 500). 5

(b) State the classific… pes of error messages given by ICMP also Identify the type o… orting message for the following that is raised by ICMP protocol … f the same ?

→ Used for pe… correction in the routing table.

→ Allowing flo… l mechanism with IP protocol. 5

(c) What are the signifi… ges we observe in the bits while doing super-netting and subnet… pany needed a subnet of 2000, and 15 usable hosts, given the n… ress 178.100.0.0. Find out the following and show your rough … the same :—

(a) What is th… class ?

(b) How many … bits borrowed ?

(c) What is the … Subnet Mask ?

(d) What is C… net Mask ?

(e) What is To… of subnets ?

(f) What is To… of host address ?

(g) What is To… of usable address ? 5

4. Solve any **two** :—

(a) What are the func… RIP message ? How does the hop count limit alleviate RIP's … List RIP Shortcomings and their corresponding fixes ? 5

(b) What is the basis o… tion for the four types of links defined by OSPF ? Discuss G… e message in detail. 5

(c) State the applications … ing. Also Draw taxonomy of common multicast protocols. How doe… mation takes place in Core based Tree Protocol ? 5

5. (a) Explain the need of host configuration. 3

(b) Differentiate functioning of RARP and BOOTP protocol. 3

(c) What roles do relay agent plays while carrying the information to bootstrap server ? Also state the reasons why server and client should choose permanent port in case of BOOTP configuration show with an example. 4

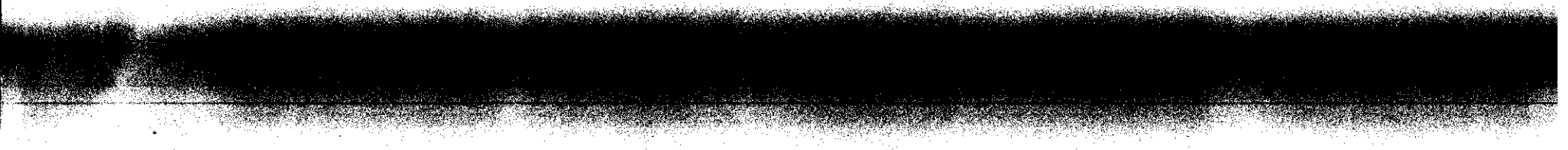
6. Solve any **two** :—

(a) Show the response message of a DNS server in regards to the Query made by DNS client for searching the IP addresses that corresponding to xxx.yyy.com and aaa.bbb.edu. if the addresses are 14.23.45.12 and 131.34.67.89. 5

(b) Why do we need an RRQ or WRQ message in TFTP but not in FTP? 5

(c) Draw architecture of www and browser ; describe the importance of web documents. And show Http request and response message. 5

(d) Write a Java Script program to display login and password screen on the terminal. 5



Course Code : CST 404-2 **EIQU/RW – 16 / 1103**

Seventh Semester B. E. (Computer Science and Engineering) Examination

Elective – II

MACHINE LEARNING

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated against them.
(2) Assume suitable data wherever necessary.
(3) Illustrate your answers wherever necessary with the help of neat sketches.

1. Attempt any **Two** questions :—

(a) Calculate the size of hypothesis space in the Enjoy Sport learning task given in table.

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	Enjoy Sport
1.	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2.	Sunny	Warm	High	Strong	Warm	Same	Yes
3.	Rainy	Cold	High	Strong	Warm	Change	No
4.	Sunny	Warm	High	Strong	Cool	Change	Yes

Table 1 5

(b) Is more_general_than_or_equal_to relation is a partial order relation over set of hypotheses H ? If yes prove this and if not give an example. 5

(c) Apply List–Then–Elimination learning Algorithm on Enjoy Sport Data in Table 1. 5

2. Attempt any **Two** questions :—

(a) Describe Radial Basis Function (RBF) network. Solve X-OR classification problem using RBF network. 5

(b) Conjunctions of Boolean [illegible] are PAC learnable, Justify your answer with a suitable example. 5

(c) Discuss Case Based Le[illegible]th a suitable example, What are the different applications of case [illegible]ning ? 5

3. Attempt any **Two** questions :—

(a) Find derivatives of ca[illegible]ctivation functions in terms of functions. 5

(b) Derive Gradient Desce[illegible] a single neuron with activation as bipolar sigmoid function. 5

(c) Design a neural netwo[illegible]lving 2-input NOR classification, Is this a linearly separable prob[illegible] 5

4. Attempt any **Two** questions :—

(a) Explain Bayes optimal[illegible] with an example. 5

(b) An example of traini[illegible]re as follows :

X	Y	[illegible]	lass
2	3		A
4	1		B
1	3		A
2	4		A
4	2		B
2	1		B
1	2		A
2	3		B

2

Apply Naïve Bayes cl[illegible]o estimate the class for $(x = 2, y = 3, z = 4)$ 5

(c) What are the merits and demerits of Bayesian learning ? Discuss brute force MAP learning Algorithm. 5

5. Attempt any **Two** questions :—

(a) Describe Bayesian network using suitable example. Discuss the advantages of Bayesian networks. 5

(b) Apply K-means clustering algorithm on following data and identify cluster for each individual.

No:	x	y
1	4	4
2	8	4
3	15	8
4	24	4
5	24	12

Table 3 5

(c) Write Ward's algorithm used in Hierarchical clustering. 5

6. Attempt any **Two** questions :—

(a) Explain the role of Support Vector Machine in data classification. 5

(b) Differentiate between Bagging and Boosting methods used in ensemble learning. 5

(c) Write short note on Hidden Markov Models. 5

Course Code : CST 403–3 EIQU/RW – 16/1101

Seventh Semester B. E. (Computer Science and Engineering) Examination

Elective – I

ADVANCED OBJECT ORIENTED TECHNOLOGIES

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated against them.

(2) Assume suitable data wherever necessary and clearly state the assumption made.

1. (a) Write a stateful session bean with a remote interface to implement operations on a bank account like, display balance, add money to account and deduct money. 7

   (b) What is the difference between a bean with local interface and remote interface ? 3

2. (a) Consider the case of an organisation where employees are of two types (regular and adhoc). Create a table with columns eid, ename, type (Regular / Adhoc), Date of Joining and Salary. Using JDBC, store data for 5 employees. Write a Stored Procedure to return the name and experience of employee who has maximum salary. Call this SP from code. 10

3. (a) Explain in detail Lifecycle of a servlet. 6

   (b) Create a web application using servlets to find the LCM of two numbers and display it on the same page. 4

4. (a) Explain the difference between <jsp:include> and <jsp:forward> actions. 5

   (b) How to use exception object in JSP ? Explain with example. 5

5. Attempt any **two** :—

(a) What are benefits of [illegible]mework ? 5

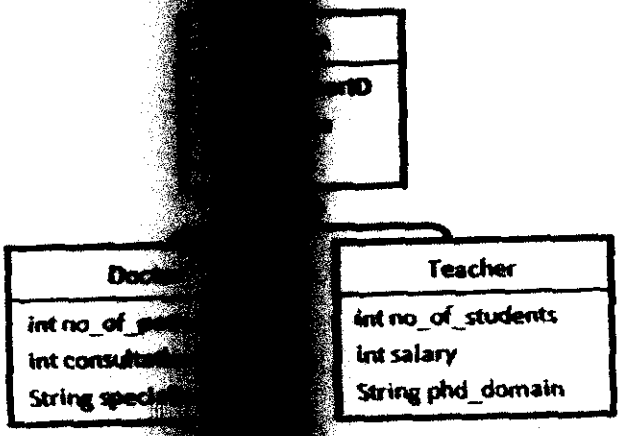
(b) Explain Bean lifecycle [illegible] Framework. 5

(c) Explain the use of g[illegible]nd containsBean( ). 5

6. (a) Relation between objec[illegible] and Answer is given below. Perform One to Many mapping in [illegible] framework.

10

7. (a) Consider the hierarch[illegible]w ; implement Table per subclass using a discriminator in Hibe[illegible]



10