

UGC Guidelines for Choice Based Credit System

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Preamble

- The University Grants Commission (UGC) has initiated several **measures** to bring equity, efficiency and excellence in the Higher Education System of country.
 - innovation and improvements in curriculum,
 - teaching-learning process,
 - examination and evaluation systems
- The academic reforms recommended by the UGC in the recent past have led to overall improvement in the higher education system.

Preamble Cont...

- Due to lot of diversity in the system of higher education,
 - there are multiple approaches followed by universities towards examination, evaluation and grading system
- HEIs must have flexibility and freedom in designing the examination and evaluation methods
 - that best fits the curriculum, syllabi and teaching-learning methods
- There is a need to devise a sensible system for awarding the grades based on the performance of students
 - Presently the performance of the students is reported using the conventional system of marks secured in the examinations or grades or both.
 - The conversion from marks to letter grades and the letter grades used vary widely across the HEIs in the country
 - This creates difficulty for the academia and the employers to understand and infer the performance of the students graduating from different universities and colleges based on grades.

the Grading System

- The grading system is
 - considered to be better than the conventional marks system and hence it has been followed in the top institutions in India and abroad.
- So it is desirable to introduce – uniform grading system.
- This will facilitate student mobility
 - across institutions within and across countries and
 - also enable potential employers to assess the performance of students.

Applicability of the Grading System

- all undergraduate and
- postgraduate level
- degree, diploma and certificate programmes

Definitions of Key Words

• Academic Year:

- Two consecutive (one odd + one even) semesters
- Choice Based Credit System (CBCS):
 - The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses)

• Course:

- Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
- Credit Based Semester System (CBSS):
 - Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.

Definitions of Key Words

• Credit Point:

- the product of grade point and number of credits for a course
- Credit:
 - A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.

• Cumulative Grade Point Average (CGPA):

- It is a measure of overall cumulative performance of a student over all semesters.
- Grade Point:
 - It is a numerical weight allotted to each letter grade on a 10-point scale.
- Letter Grade:
 - It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.
- Programme:
 - An educational programme leading to award of a Degree, diploma or certificate.

• Semester Grade Point Average (SGPA):

It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in
various courses registered in a semester and the total course credits taken during that semester. It shall be
expressed up to two decimal places.

• Semester:

 Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.

• Transcript or Grade Card or Certificate:

 Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Semester System and Choice Based Credit System

- The Indian Higher Education Institutions have been moving
 - from the conventional annual system to semester system.
 - Currently many of the institutions have already introduced the choice based credit system.
- The semester system accelerates
 - the teaching-learning process and enables vertical and horizontal mobility in learning.
- The credit based semester system provides
 - flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.
- The choice based credit system provides
 - a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning,
- It is desirable that the HEIs move to CBCS and implement the grading system.

Types of Courses

- Courses in a programme may be of three kinds: Core, Elective and Foundation
- Core Course:
 - Compulsorily
 - a core requirement to complete the requirement of a programme

• Elective Course:

- Elective course is a course which can be chosen from a pool of papers. It may be:
 - Supportive to the discipline of study
 - Providing an expanded scope
 - Enabling an exposure to some other discipline/domain
 - Nurturing student's proficiency/skill.

• Foundation Course:

- Compulsory Foundation
 - based upon the content
- Elective foundation
 - value-based

Examination and Assessment

- There is a marked variation across
 - the colleges and universities in the number of grades,
 - grade points,
 - letter grades used,
 - which creates difficulties in comparing students across the institutions.

• Letter Grades and Grade Points:

- Two methods -relative grading or absolute grading-
- The relative grading
 - based on the distribution (usually normal distribution) of marks
- The absolute grading
 - based on pre-determined class intervals.
- The UGC recommends a 10-point grading system with the following letter grades as given below:

10-point grading system

Letter Grade	Grade Point
O (Outstanding)	10
A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6
C(Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

Examination and Assessment Contd..

- A student obtaining Grade F
 - shall be considered failed and will be required to reappear in the examination.
- For non credit courses
 - 'Satisfactory' or 'Unsatisfactory' shall be indicated
 - instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.
- The Universities can decide on the grade or percentage of marks required to pass in a course
- The statutory requirement for eligibility to enter as assistant professor in colleges and universities in the disciplines of arts, science, commerce etc., is a minimum average mark of 50% and 55% in relevant postgraduate degree respectively for reserved and general category. Hence, it is recommended that the cut-off marks for grade B shall not be less than 50% and for grade B+, it should not be less than 55%

Fairness in Assessment

- at least 50% of core courses
 - question papers will be set as well as assessed by external examiners
- practical component
 - half of the examiners in the team should be invited from outside the university conducting examination
- project reports / thesis / dissertation etc
 by internal as well as external examiners

Computation of SGPA and CGPA

- Semester Grade Point Average (SGPA)
 - is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student

SGPA (Si) = Σ (Ci x Gi) / Σ ci

 where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course

Cumulative Grade Point Average (CGPA)

• The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$CGPA = \Sigma(Ci \times Si) / \Sigma Ci$

- where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

i. Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade	Grade	Credit Point
		letter	point	(Credit x Grade
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	В	6	3 X 6 = 18
Course 4	3	0	10	3 X 10 = 30
Course 5	3	С	5	3 X 5 = 15
Course 6	4	В	6	4 X 6 = 24
	20	2		139

Thus, SGPA =139/20 =6.95

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4
Credit : 20 SGPA:6.9	Credit : 22 SGPA:7.8	Credit : 25 SGPA: 5.6	Credit : 26 SGPA:6.0
Semester 5	Semester 6		
Credit : 26 SGPA:6.3	Credit : 25 SGPA: 8.0		

Thus, **CGPA** = $20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0$

= 6.73

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ii. Transcript (Format): Based on the above recommendations on Letter grades, grade points and SGPA and CCPA, the HEIs may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

Challenges

- Curriculum Design
- Transfer of mobility students
- Time Frame
- Repetition of Grades
- Conversion of Grades
- Distance Learning
- On-Demand Course Curriculum

In view of getting a complete picture of the student's learning, assessment should focus on the learner ability to:

- Learn and acquire desired skills related to different subject areas, Acquire a level of achievement in different subject areas in therequisite measure
- Develop student's individual skills, interests, attitudes and motivation Understand and lead a healthy and productive life
- Monitor the changes taking place in student's learning, behavior and progress over a period of time
- Respond to different situations and opportunities both in and out of school
- Apply what is learnt in a variety of environment, circumstances and situations
- Work independently, collaboratively and harmoniously,
- Analyze and evaluate
- Be aware of social and environmental issues
- Participate in social and environmental projects
- Retain what is learned over a period of time

Steps to Be Followed For Implementation of Choice Based Credit System for All Non Agricultural State Universities of Maharashtra

(Academic Year 2015-16)

- Initiation of Process by
 - Awareness of CBCS to the principal stakeholders (University / College / Institute and Students), Involvement and Suggestion for implementation.
 - Awareness Program : Training Programs at Regional and State Level for coordinator representing organization/institute
 - Design of Uniform CBCS based scheme for all universities
 - Uniform Course Structure and Evaluation Pattern at UG and PG Level in light of UGC and State Govt. Norms
 - Mechanism of Credit Transfer within University, Inter-University offering Uniform CBCS pattern.
 - Interdisciplinary learning opportunity for student via Bridge Course, Service Course.

- Approval for Uniform CBCS based curriculum for all universities
 - Uniform CBCS Pattern has to be approved through all concern statutory authorities (Board of Studies, Faculties, Academic Council etc.) of respective universities.
 - All University has to prepare the detailed proposal containing *Structure, Pattern, Evaluation scheme* in light of Uniform CBCS pattern for Consent of Hon'ble Chancellor
- Implementation of Uniform CBCS at all Universities of Maharashtra



Choice Based Credit System (CBCS)

Initiative

By Dr. Babasaheb Ambedkar Marathwada Univer Aurangabad

www.bamu.net





- Provides Flexibility to make system more responsive to the changing needs of students.
- Provides greater freedom to student to determine their own pace of study.
- Offers Continuous Comprehensive Evaluation of student.
- System Facilitates the transfer of credit

Admission and Promotion



- Admission to the course by CET (<u>Common Entrance Test</u>)
- Eligibility For the Course : As per university norms and qualifying examination
- Rule for Promotion : The candidate who has obtained at <u>least D Grades in</u> all courses [Inclusive of Core and Elective] of First Semester and obtained at least D Grades in 50% Courses of Second Semester Examinations shall be allowed to take admission in Third Semester

University Ordinance O.885 [Admission / Promotion]

Admission and Promotion



- Dropout : Dropout student will be allowed to register for respective semester as and when the concerned courses are offered by the department, subject to the condition that his/her tenure should not exceed more than twice the duration of course from the date of first registration at parent department
- Duration :
 - Minimum : As per structure of the course
 - Maximum: twice the minimum duration of course

University Ordinance O.885 [Admission / Promotion]





- Consideration of Teaching Work Load : One Credit shall mean one teaching period of one hour per week for one semester (of 15 weeks) for theory courses and two practical / laboratory / field / demonstration hours / week for one semester.
- Total number of Minimum Credits to Be completed by the students completing course having Practical's etc: Every student will have to <u>complete at least 100 credits</u> to obtain the masters degree (Post graduate degree) in the subjects having practical's / laboratory / field /demonstration work out of which 96 credits should be from their respective subject and four credits from service courses
 - Autonomous departments can design the curriculum of more credits and it will be compulsory for the students from that department to complete the credits accordingly

University Ordinance O.886 [Credits & Degrees]



- Total number of Minimum Credits to Be completed by the students completing course without Practical's etc: Every student will have to complete at least 68 credits to obtain the masters degree (Post graduate degree) in the subjects without practical's /laboratory /field /demonstration work out of which 64 credits should be from their respective subject and four credits from service courses.
 - Autonomous departments can design the curriculum of more credits and it will be compulsory for the students from that department to complete the credits accordingly.
- Conferring Degree : A candidate who has successfully completed all the Core Courses, Elective/Specialized Courses, Seminars and Project prescribed and or Optional Service Courses approved by the University for the programme with prescribed CGPA shall be eligible to receive the degree.

University Ordinance O.886 [Credits & Degrees]



- **A. Core Course** : A core course is a course that a student admitted to a particular P.G. programme must successfully complete to receive the degree. Normally no theory course shall have more than 4 credits.
- **B. Elective Course** : Means an optional course from the basic subject or specialization.
- **C.** Service course (SC) : The service courses will be offered in third and fourth semesters in different departments of the University. Student should complete at least one service course in any semester

University Resolution R.1927 [Courses]





- Each Course shall include lectures / tutorials / laboratory or field work / Seminar / Practical training / Assignments / midterm and term end examinations / paper / Report writing or review of literature and any other innovative practice etc., to meet effective teaching and learning needs.
- Attendance : Students must have 75% of attendance in each Core and Elective course for appearing the examination. However student having 65% attendance with medical certificate may apply to the H.O.D. for condonation of attendance

- Enrollment : The student will register the service course of his interest after the start of semester in the concerned department on official registration form.
- Record Handling for Service Course: The teacher in-charge of the respective course will keep the record of the students registered. Maximum fifteen days period will be given from the date of admission for completion of registration procedure. The Departmental Committee shall follow a selection procedure after counseling to the students etc. to avoid overcrowding to particular course(s) at the expense of some other courses

- **Minimum Courses Options:** No student shall be permitted to register for more than one service course in a semester and Normally no service course shall be offered unless a minimum of 10 students are registered.
- Maximum Student Intake For Service Course: The University shall decide the maximum number of students in each service course taking into account the teachers and Physical facilities available in the Department.
- Fees: The student shall have to pay the prescribed fee per course per semester / year for the registration as decided by the University

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• Notification of Service course: The University may make available to all students a listing of all the courses offered in every semester specifying the credits, the prerequisites, a brief description or list of topics the course intends to cover, the instructor who is giving the courses, the time and place of the classes for the course. This information shall be made available on the University website

Departmental Committee



- Every P.G. programme of the University / College shall be monitored by a committee constituted for this purpose by the Department.
- The Committee shall consist of H.O.D. as a Chairman and some / all the teachers of the Department as its members

University Resolution R.1929 [Departmental Committee]

Case Study



The Case Study Recipe Problem Solution Results

Department of Computer Science and IT

CBCS Pattern



- M.Sc.(Computer Science)
- M.Sc.(Information Technology)
- M. Phil. (Computer Science)
- M.Tech(Computer Science and Engineering)

Classified various courses in term of their credits

Example :-

Course title : Adv. Java Course code : CSC 401, CSI 401 CSC 451, CSI 451

> C – Computer Science I- Information Technology

4 – Number of Credits 0 – T 5-P

The Course



- In each semester credit limit should not be exceeded 24, Four semesters = 104 Credits
- In every semester the courses offered by the Department will be known to students.
- Students can opt for the listed courses
- One or more than one teacher will be assigned to each course

The Course : Syllabus



• Teachers must provide details

- Describe the objective
- Describe detail time table with calendar
- Text books, Reference books will be mentioned
- Method of evaluation

Teachers Responsibility

- Teacher's information
 - Contact number & availability to students
- Course description
 - Objective & topic to be covered
- Text books, Ref. books and other references
 - Describe all materials to be used in the course
- Exams & Grading
 - How students will graded
- Programming Assistance
 - Weightage grading and Assignments
- Scheduled for Topics & lectures
 - Details time schedule for lectures

The Grading



- At the end of each semester, students will be graded and will be handed over to the HOD and will be approved by the departmental committee.
- Department will submit these grades to the University for official results to Students

Ten point grades and grade description



Sr. No.	Equivalent percentage	Grade points	Grade	Grade description
1	90.00-100	9.00-10	0	Outstanding
2	80.00-89.99	8.00-8.99	A++	Excellent
3	70.00-79.99	7.00-7.99	A+	Exceptional
4	60.00-69.99	6.00-6.99	А	Very good
5	55.00-59.99	5.50-5.99	B+	Good
6	50.00-54.99	5.00-5.49	В	Fair
7	45.00-49.99	4.50-4.99	C+	Average
8	40.01-44.99	4.01-4.49	С	Below average
9	40	4.00	D	Pass
10	<40	0.00	F	Fail

How to calculate final CGPA



• First Semester Grade Point Average SGPA is calculated for each semester

 $SGPA = \frac{Sum(Course \ Credit \ x \ Number \ of \ Points \ in \ Concern \ Course \ gained \ by \ the \ student)}{Sum(Course \ Credits)}$

•The Cumulative Grade point Average (CGPA) will be used to describe the overall performance of a student in all semesters of the course and will be computed as under:

 $CGPA = \frac{Sum(All semesters SGPA)}{Sum(Credits of all Semesters)}$

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD M.Sc [Information Technology] Sem-I Month/Year of Examination: NOV/DEC 2011



Sr.No	Seat No	Name of the Candidate	Cou	rse 1	Cou	rse 2	Cou	rse 3	Cou	rse 4	Credit	Grade	Previous	CCCODE	Remarks
			Th	Pr	Th	Pr	Th	Pr	Th	Pr	Total	Point	GPA		
		Highest Grade	0	0	0	0	0	0	0	0		Average	Total		
		Lowest Gade	D	D	D	D	D	D	D	D					
		Number of Credits	4	2	4	2	4	2	4	2	24				
1	CSC1001	Student A	10	10	10	10	4	8.99	6.99	7.99		8.25			
2	CSC1002	Student B	10	10	10	10	10	10	10	10		10.00			
	Grade Obtained by Student Computed									Computed					
30-Sep-15 Professor K. V. Kale, Director, B. C. U. D., Dr. B. A. M. Unive Sheet									Sheet						

M. Sc. Computer Science	Course Structure:
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Sem-I	Sem-II	Sem-III	Sem-IV			
Advanced Java	Data Structure and	Java Network	Pattern Recognition			
3	Analysis of Algorithm	Programming				
Neural Network	Advanced Neural	Advanced Software	Major Project			
	Network and Fuzzy	Engineering and				
	System	Technology				
Digital Signal	Image Processing	Computer Vision	Seminar			
Processing						
Advanced Operating	Advanced Operating Parallel Computing		Elective -II: (Select any one			
System		one from list of elective I)	from list of elective II)			
		1. Advanced	1. Theoretical			
		Embedded	Computer Science			
		System	2. Decision Support			
		2. Data Ware	System & Intelligent			
		Housing	System			
		3. GIT	3. Data Mining			
		4. Biometric	4. Cryptography and			
		Techniques	Network Security			
		5. Mobile	5. Introduction to			
2		Computing	MEMS Pro+			

Semester-I							
Course	Course Title	No. of	No. of Hours	Total Marks:100			
Code		Credits	/ Week	External	Internal		
CSC401	Advanced Java	4	4	80	20		
CSC402	Neural Network	4	4	80	20		
CSC403	Digital Signal Processing	4	4	80	20		
CSC404	Advanced Operating System	4	4	80	20		
CSC451	Practical Based on CSC401	2	4 (Per Batch)	50	-		
CSC452	Practical Based on CSC402	2	4 (Per Batch)	50	72		
CSC453	Practical Based on CSC403	2	4 (Per Batch)	50	2 2		
CSC454	Practical Based on CSC404	2	4 (Per Batch)	50	. =		
	Total No of Credits in Sem-I	24		-	122		

Semester-II

Course	Course Title	No. of	No. of Hours	Total Marks:100		
Code		Credits	/ Week	External	Internal	
CSC405	Data Structure and Analysis of Algorithm	4	4	80	20	
CSC406	Advanced Neural Network and Fuzzy	4	4	80	20	
(Dadad)	System	,		7		
CSC407	Image Processing	4	4	80	20	
CSC408	Parallel Computing	4	4	80	20	
CSC455	Practical Based on CSC405	2	4 (Per Batch)	50	7	
CSC456	Practical Based on CSC406	2	4 (Per Batch)	50	2	
CSC457	Practical Based on CSC407	2	4 (Per Batch)	50		
CSC458	Practical Based on CSC408	2	4 (Per Batch)	50		
	Total No of Credits in Sem-II	24				

Detail Syllabus of M. Sc. Computer Science Semester-I

Subject Reference No	CSC401	Subject Title	Advanced Java
No of Credits	4 Theory, 2Practical	Assignment/	20%
		Sectionals	
		(Internal)	
Total Contact	4 Theory, 4 Practical	External	80%
Hrs/Week		(Semester	
		Exam)	

Course Objective

This course assumes that students are aware of core java programming and hence it starts from threading and goes up to web programming. It covers some advance topics of reflection, applets, swings, JDBC, Networking, JSP and Servlet.

At Course Completion

After complication of this course students can write good application based on java. Students can appear for java certification examinations. Student can also work on networking and web projects.

Prerequisites

Student should know the programming in core java.

UNIT I:

Threading: Threading Basics: Java Thread Model, Creating and Running Threads, Manipulating Thread State, Thread Synchronization, Volatile Fields vs. Synchronized Methods, wait and notify, join and sleep, The Concurrency API, Atomic Operations Reflection: Uses for Meta-Data, The Reflection API, The Class<T> Class, The java.lang.reflect Package, Reading Type Information, Navigating Inheritance Trees, Dynamic Instantiation, Dynamic Invocation, Reflecting on Generics

UNIT II:

Type 3 type 4) the

Java Database Connectivity: JDBC, JDBC Architecture (type 1, type 2, Type 3, type 4) the java.sql.* package, Connection, ResultSet, Statements

UNIT III:

Servlets: Web Application Basics: How the Web works, Thin Clients, TCP/IP, HTTP overview, Brief HTML review, Overview of Java EE, servlets & Web applications., Servlet Basics, Servlet API:-HTML Forms, HTTP: Request-response, headers, GET, POST, Overview: How Servlets Work, Servlet Lifecycle: init(), service(), destroy(), Requests and responses, Core Servlet API: GenericServlet, ServletRequest, and ServletResponse, HTTP Servlets: HttpServletRequest, HttpServletResponse and HttpServlet, Accessing Parameters, Additional Servlet Capabilities, HTTP headers and MIME types RequestDispatcher: Including and forwarding, Sharing data with the request object attributes, Sharing data with ServletContext attributes, Error Handling

UNIT IV:

Java Server Pages: Basics and Overview, JSP architecture, JSP tags and JSP expressions, Fixed Template Data, Lifecycle of a JSP, Model View Controller (MVC), Model 1/Model 2 Architecture, Data Sharing among servlets & JSP: Object scopes or "buckets", Request, application, session and page scope, Predefined JSP implicit objects (request, session, application, page), <jsp:useBean>, <jsp:getProperty>, <jsp:setProperty>, <jsp:include>, <jsp:forward>, More JSP Capabilities and Session Management, HTTP as a stateless protocol, Hidden form fields, Cookies: Overview, API, Using cookies, Session overview: Cookies and session tracking, HttpSession, Putting data into a session object, Retrieving data from a session object, Using session data in servlets and JSPs Additional JSP Capabilities, Exception handling and error pages, Directives (page, include, others), Import declarations, Multithreading considerations

and data safety, SingleThreadModel interface, Additional JSP Capabilities, JSP Directives, JSP Error Pages, JSP and Java Declarations, Scriptlet overview, Scriptlet syntax **UNIT V**:

JSTL: Using Custom Tags, Custom tags overview, Reducing JSP complexity, Tag Libraries, Tag Library Descriptor (TLD), Loading a tag library in a web app, The JSTL, JSP Expression Language (EL), Using custom tags, The c:url, c:param, c:forEach, c:out tags, Overview of JSTL libraries, The JSTL Expression Language, Expressions, Type Coercion, Operators, String concatenation, Implicit Objects, The Core JSTL Library, General Purpose: c:out, c:set, c:catch, Conditional: c:if, c:choose,, Overview of other capabilities, Additional Topics : Servlet Filter overview, Filtering examples, lifecycle, & filter chains, Filter API, Modifying a request, Modifying a response, Struts Overview Advanced MVC – Struts overview, Command and State patterns, Struts View and Controller elements

Books

- 1. Java 2 Complete Reference by Herbert Schieldt (Sixth Edition)
- 2. Core Java Vol 1: Sun Press
- 3. Core Java Vol 2: Sun Press

Additional Web Reference

http://www.javapassion.com/javaintro/ Presentation Slides (Available in .ppt format)

E-book:

1. Java 2 Complete Reference by Herbert Schieldt (Fourth Edition)

Lab Exercise: CSC451 Practical based on CSC401 At least two experiments should be carried out on each unit.

Dr. Babasaheb Ambedkar Marathwada University, Department of Computer Science and Information Technology, End Term Semester Examination: 21-04-2012

M. Sc. II (Computer Science): Neural Networks and Fuzzy Logic (CSC406)

Time: 3 Hour (11:00 am to 2:00 pm)

Max Marks: 80

		NB: Part A is compulsory. Attemp	ts any five from Part B. SECTION-A		
1.	[A] Fill i	in the blanks by an appropriate choice.			(2X5 marks)
	i.	A vector of a state is called a	vector.		
	a)	state		c)	straight
	b)	linear		d)	current state
	ii.	If the trajectories shoot off to infinity	then the system is said to be		
	a)	unstable		c)	Non-stationary
	b)	stable		d)	Orbital
	iii.	OLAM stands for			
	a)	Orthogonal Linear Attractive Memor	у	c)	Orthogonal Linear Associative Memory
	b)	Orthogonal Linear Attractive Models	1	d)	Orthonormal Linear Associative Memory
	iv.	In self organizing process ,the cluster	r unit whose weight vector match	nes th	e input pattern closely selected as
	a)	Runner		c)	Competitive
	b)	Neighborhood		d)	winner
	v.	is the process of grouping	ng together data points based on	some	e measures of distance.
	a)	Clustering		c)	Mapping
	b)	Non-clustering		d)	Learning
	[B] Mate	ch the Following.			(2X5marks)
		NetAlgorithm	Stopping Cri	iteria	1
	i.	LVQ	A) fixed number of iterations or	lear	ning rate reaching a sufficiently small value
	ii.	Maxnet	B) if more than one node has no	nzer	o activation, continue, otherwise stop
	iii.	ART1	C) no weights changes, no units	reset	or max. no. of epochs searched
	iv.	Maxican Hat	E) if t < t-max, continue, otherw	ise, s	top.
	v.	Hamming Net	F) Best match exemplar.		

SECTION-B

2. Consider a BAM network (with bipolar vectors) to map two simple letters (given by 5x3 patterns) to the following bipolar target codes:

*	*	*		*		*		
*				*		*		
*	*	*		*	*	*		
*				*		*		
*	*	*		*		*		
Pattern (E) (-1, 1)					Pattern (H) (1, 1)			
Find the weigh	ht matr	ix with	input pattern E	and H.				

- (a) (b) Obtain the response of the net with E as input.
- 3. A Kohonen self organizing map is shown with weights in the following figure.
 - Using the square of the Euclidean distance find the cluster unit C₁ that is closest to the input vector (0.3, 0.4) (a)
 - Using a learning rate of 0.3, find the new weights for unit CI. (b)

C5 c_1 c_2 C3 C_4 0.3 0.9 0.4 0.20.5 0.8 0.2 0.7 0.6 .0.6 u2 \mathbf{u}_{t}

- 4. Give the architecture of ART1 and ART2 and discuss the similarity and differences between them. (12 marks)
- 5. What are the various classification of competition based nets? How is competition performed for supervised learning and unsupervised learning? (12 marks)
- 6. Illustrate the concept of attractor and stability in dynamic network systems with fixed point attractor example (12 marks)
- 7. (a) Explain training algorithms of Learning Vector Quantization (LVQ) net. (6 marks) (b) Explain the discrete Hopfield network with its architecture. (6 marks) (6X2 marks)
- Write short note on (any two)
 - a. Genetic Algorithm (GA) b. Fuzzy sets and its Membership Functions

- c. Support Vector Machine (SVM) d. Application of Neural Networks
- Professor K. V. Kale, Director, B. C. U. D., Dr. B. A. M. University 30-Sep-15 50

(6 marks) (6 marks)

(12 marks)

Thank You