SUPPORTING DOCUMENT FOR 1.1.2

The institution adheres to the academic calendar including for the conduct of CIE

INDEX

Academic Calendars

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Accredited by NAAC Grade "A"

Academic Calendar

Academic Year 2023-2024

S.No.	Event	Period	Duration
1	*Commencement of Even Semester*	*8Jan 2024*	
2	I Spell of Instructions	8 Jan 2024 to 20Feb 2024	6 weeks, 2 day
3	I Mid Semester Test	21Feb 2024 to 23Feb 2024	3 days
4	II Spell of Instructions	26Feb 2024to 9Apr 2024	6 weeks, 2 days
5	II Mid Semester Test	10Apr 2024 to 12Apr 2024	3 days
6	Preparation/Internal Practical Exam	15Apr 2024 to 19Apr 2024	5 days
7	End Semester Examinations	23 Apr 2024 to 31May 2024	6 weeks

Activities at the College level for Session (Jan- May 2024)

S. No	Activity Title	Dates
1	CATC Camp by NCC Cell	15 Jan - 25 Jan 2024
2	National Startup Day	23rd January 2024
3	Celebration of Republic Day by NCC/NSS Cell	24 Jan 2024
4	7th Khalsa College International Folk Festival	2 February 2024
5	Seminar on Banking Exam Preparation by T&P Cell	6 Feb 2024
6	Organizing Innovation & Entrepreneurship Outreach Program in Schools/Community by IIC Cell	12-Feb-2024
7	Seminar on GATE Exam Preparation by T&P Cell	27 Feb 2024
8	National Science Day by ISTE/IIC Cell	28 February 2024
9	Organize an Inter/Intra Institutional Innovation competition / Challenge/ Hackathon and Reward Best Innovations by IIC Cell	5 March 2024
10	Sports Meets by Sports Cell	7 March 2024
11	International Women Day by woman Cell	08-Mar-24
12	Alumni Meet by Alumni Cell	21 March 2024
13	Tech Urja	20-21March 2024
14	International conference	28-29 March 2024
15	Session on "How to plan for Start-up and legal & Ethical Steps" by IIC Cell	30 March 2024
16	Kargil Vijay Diwas by NCC Cell	26 July 2024
17	Cricket Tournament by Sports Cell	5-6 April 2024
18	Volleyball Tournament by Sports Cell	5-6 April 2024
19	Workshop on Intellectual Property Rights (IPRs) and IP management for start-upby IIC Cell	2 April 2024

Dean Academics

Director

Academic Calendar
Academic Year 2023-2024

S.No.	Event	Period	Duration
1	***Commencement of odd Semester***	***1 Aug 2023***	
2	I Spell of Instructions	1 Aug 2023 to 12 Sept 2023	6 weeks, 1 day
3	I Mid Semester Test	13 Sept 2023 to 15 Aug 2023	3 days
4	II Spell of Instructions	18 Sept 2023 to 31 Oct 2023	6 weeks, 2 days
5	II Mid Semester Test	1 Nov 2023 to 3 Nov 2023	3 days
6	Preparation/Internal Practical Exam	6 Nov 2023 to 10 Nov 2023	5 days
7	End Semester Examinations	13 Nov 2023 to 22 Dec 2023	6 weeks
8	***Commencement of Even semester***	***2 Jan 2024***	

Activities at the College level for Session (July- Dec 2023)

S. No	Activity Title	Dates
1	Tree Plantation Drive by NSS Cell	13 July 2023
2	National Online Quiz (Insolvency and Bankruptcy) by HV cell	25 July 2023
3	Tree Plantation Drive by NSS Cell	4 Aug 2023
4	Teez Celebration by Cultural Cell	4 Aug 2023
5	International Youth Day by NCC Cell	11 August 2023
6	Independence Day by NCC Cell	15 Aug 2023
7	Anti Ragging Day by HV Cell	18 Aug 2023
8	Ganesh Chaturthi by Cultural Cell	12 Sept 2023
9	Tree Plantation Drive by NSS Cell	29 Sept 2023
10	International Day of Non-Violence by HV Cell	29 Sept 2023
11	Cleanliness Drive by NSS Cell	1 Oct 2023
12	Guest Lecture by Dr. Kailash Srivastava by ISTE	3 Oct 2023
13	Ardass Diwas by Cultural Cell	6 Oct 2023
14	Indian Air force Day by NCC Cell	9 Oct 2023
15	Blood Donation Camp by NSS Cell	11 Oct 2023
16	Amrit Kalash Yatra by HV Cell	11 Oct 2023
17	Institute Innovation Day by IIC Cell	15 Oct 2023
18	Fresher Party by Cultural Cell	17 Oct 2023
19	IKGPTU Youth Fest	25-27 Oct 2023
20	Khalsa Youth Fest	31 Oct & 1 Nov 2023
21	National Unity Day by NCC Cell & ISTE	31 Oct 2023
	[illegible]tional Entrepreneurship Day by IIC Cell	9 Nov 2023
	National Education Day by IIC Cell	11 Nov 2023
	[illegible] Pollution Control Day by IIC Cell	2 Dec 2023
25	[illegible]ergy Conservation Day by IIC Cell	14 Dec 2023

Dean Academics

Director

Start of Session Notices

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Ref No. KCET/235/6/23 Date 19-06-2023

Office Order

All the students of 3rd, 5th & 7th semester of Khalsa College of Engineering & Technology are hereby informed that the odd semester will start from 24th July, 2023, Monday.

The registration will be on 20th and 21st July, 2023. It is mandatory for all the students to deposit Fee Slip and to register themselves to attend the classes.

(Dr. Manju Bala)
Director

CC:- (i) Dean/Deputy Dean Academics
(ii) All H.O.Ds for information and n.a.
(iii) IQAC Cell
(iv) CNB

Ranjit Avenue, C Block, Amritsar, Punjab (India)-143001

3-5030765,5030760 Fax:-0183-2506969

Khalsa College of Engineering & Technology
ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ
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Ref. No. KCET/284/07/23 Date 21-07-2023

OFFICE ORDER

All the students of 1st semester of Khalsa College of Engineering & Technology are hereby informed that classes will start from 16th August 2023, Monday. It is mandatory for all the students to bring the below documents with them.

1. Original Documents
2. Agreement Letter .

(Dr. Manju Bala)
Director

Copy to:

1. **All HOD's**
2. **Concerned Members**

Ranjit Avenue, C-Block, Amritsar, Punjab (India) - 143 001
Ph. : 0183-5030765, 5030760 Fax : 0183-2506969 Website : www.kcet.co.in E-mail : kcetamritsar@gmail.c

E-mail : kcetamritsar@gmail.c

Mid-Semester Test record

Khalsa College of Engineering & Technology

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Ref No: KCET/DA/185/10/2023

Date: 10/09/2023

Circular

As per the Order of the Director madam, the dates of Mid Semester Test- 1 of all First Semester Students of degree and diploma programs are now changed. The Exam will be held now on *19.10.2023(Thursday), 20.10.2023 (Friday), and 21.10.2023 (Saturday)* as per the Date sheet displayed on the notice board by all the concerned Departments.

Test Duration (1.30 Hr.)

(9.30am - 11.00am) Morning

(2.00 pm - 3.30 pm) Evening

All the faculty members handling various Courses of First Semesters have to set the question papers as per the shared format of NBA & Bloom Taxonomy. The question papers for all courses must be prepared before 13 OCT. 2023.

Important Note:

1. **The question paper must be in portrait format. If the question paper is lengthy, then the two-sided print must be used.**
2. **The concerned faculty members and staff for the conduct of examination will come on Saturday (21.10.2023).**

Jugraj Singh 10/09/2023

Dr. Jugraj Singh
Dean Academics (AICTE Programs)

CC.
To PA of Director Madam for Information.
To Dean Academics (UGC programs)
To COE office
To Heads of Concerned departments.

Khalsa College of Engineering & Technology
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Ref No: KCET/DA/174/2023

Date: 27/09/2023

Circular

As per the Order of the Director madam, Mid Semester Test- 1 of all First Semester Students of degree and diploma programs will be held now on **16.10.2023(Monday), 17.10.2023 (Tuesday), and 18.10.2023 (Wednesday)** as per the Date sheet displayed on the notice board by all the concerned Departments.

Test Duration (1.30 Hr.)

(9.30am - 11.00am) Morning

(2.00 pm - 3.30 pm) Evening

All the faculty members handling various Courses of First Semesters have to set the question papers as per the shared format of NBA & Bloom Taxonomy. The question papers for all courses must be prepared before 13 OCT. 2023.

Important Note:

1. **The question paper must be in portrait format. If the question paper is lengthy, then the two-sided print must be used.**

27/09/2023

Dr. Jugraj Singh
Dean Academics (AICTE Programs)
CC.
To PA of Director Madam for Information.
To Dean Academics (UGC programs)
To COE office
To Heads of Concerned departments.

Khalsa College of Engineering & Technology

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1st SESSIONAL EXAMINATION- Sept, 2023

1. The 1st Sessional Exams for all 3rd, 5th & 7th semesters' students will be conducted from **13.09.2023 to 15.09.2023** as per IKGPTU instructions. The Students must be informed by all the HODs that both the MSTs are compulsory as per directions received from IKGPTU, Kapurthala.
2. All faculty members are required to submit their Question Papers for the Ist Sessional Test to their HOD's, latest by 12.09.2023. Question Papers must include total Course covered till 1st MST. Teachers must cover at least 50% of the syllabus prescribed by the University. Question paper should be of **1.30 hrs** duration and should be strictly according to the University pattern. It must be neatly typed and Xeroxed copies in the required number (No. of Students + 05 extra) be submitted with following information on the sealed cover of the question papers
   - Ist Sessional Test/ 2nd Semester/4th Semester/ 6th Semester
   - Subject Code followed by the Subject Name of Question Paper
   - No. of Copies of the Question Paper (Please make 8-10 extra Copies than actual no. of students)
   - Question Paper prepared by _____
   - Date of examination _____
3. As advised and directed by Director, Question Paper must be of very good standard.
4. All faculty members deputed for Invigilation duties are to report to superintendent Examinations positively ½ hrs before the commencement of examinations. Faculty members on invigilation duty are to deposit Answer-Sheets immediately after exams. The concerned subject teacher is to collect the Answer-Sheets for checking **with in 2 hrs** from the finishing the exams on the **same day** and **detailed result sheet** is to be submitted **within 48 hrs** from the time of collection .
5. Faculty members/ Staff deputed for the examination duty are directed to not to request for leave/ Absence on the day of duty.
6. Answer Sheets after showing to the students and collected back with their signatures must be submitted to the HODs for onwards submission to the secrecy cell.

Controller of Examinations

Cc:-
PA to Director Madam for information
IQAC Cell
All Hods

Khalsa College of Engineering & Technology

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Date:-31.10.2023

NOTICE

This is the information for all the faculty members of Civil Engineering Department and faculties from other department that MST-2 of 5th ,7th sem civil B.tech are starting from 02-11- 2023 . So please submit question paper as per University pattern before 4:30pm dated 01 -11- 2023.

Superintendent of Deptt.Exams

Hod (Civil Engineering Dept)

	Name of Faculty	Sign of faculty
1	Er. Sahil Sharma	
2	Er. Akarshan Uppal	
3	Er. Aman Arora	
4	Er. Ravinder Kaur	
5	Er. Harmeet Singh Chawla	
6	Er. Mansi Mahajan	
7	Ms. Kirandeep Kaur (BBA)	

Khalsa College of Engineering & Technology

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Accredited by NAAC Grade "A"

Ref. No. KCET/CE/10/2023/648 Date 27/10/23

Department Of Civil Engineering
Date Sheet of MST-II (November 2023)
Season July -Nov 2023

(7-SEMESTER)			
DATE	**SUBJECT CODE**	**SUBJECT NAME**	**TIMING**
02/11/2023	PECE-702 D-18	Solid and Hazardous Waste Management	09:30-11:00 A.M
02/11/2023	PECE-703 B-18	Design of Hydraulic structures	02:00-03:30 P.M
03/11/2023	HSMC-255	Professional Practice, Law & Ethics	09:30-11:00 A.M
03/11/2023	OECE-701-18	Metro system and Engineering	02:00-03:30 P.M
06/11/2023	PECE-701 F-18	Traffic Engineering And Management	09:30-11:00 A.M
06/11/2023	BTMC-701-18	Management- I (Organizational Behavior)	02:00-03:30 P.M
(5-SEMESTER)			
DATE	**SUBJECT CODE**	**SUBJECT NAME**	**TIMING**
02/11/2023	BTCE-501-18	Engineering Geology	09:30-11:00 A.M
02/11/2023	BTCE-502-18	Elements of Earthquake Engineering	02:00-03:30 P.M
03/11/2023	BTCE-503-18	Construction Engineering & Management	09:30-11:00 A.M
03/11/2023	BTCE-504-18	Environmental Engineering	02:00-03:30 P.M
06/11/2023	BTCE-505-18	Structural Engineering	09:30-11:00 A.M
06/11/2023	BTCE-506-18	Geotechnical Engineering	02:00-03:30 P.M

Instructions:-
It is mandatory for all the students to reach 15 minutes before examination timings.
Mobile phones and any kind of helping means are strictly prohibited in examination halls.
No student will be allowed to leave exam hall before half time.

Supt. Exams (CE) Controller of Examination HOD (CE) 27/10/2023

CC: The Director for Information Please
Dean Academics

Ranjit Avenue, C-Block, Amritsar, Punjab (India) - 143 001
Ph. : 0183-5030765, 5030760 Fax : 0183-2506969 Website : www.kcet.co.in E-mail : kcetamritsar@gmail.com

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Ref. No. KCET/CE/10/2023/647

Date 19/10/23

Department Of Civil Engineering

Date Sheet of MST-II (October 2023)

Season July -Nov 2023

Diploma (3rd-SEMESTER) MST-1 Regular Students & LEET Students			
DATE	**SUBJECT CODE**	**SUBJECT NAME**	**TIMING**
23/10/2023	9851	Surveying - I	09:30-11:00 A.M
23/10/2023	5112	Building Construction	02:00-03:30 P.M
25/10/2023	0093	Applied Mechanics	09:30-11:00 A.M
25/10/2023	9451	Construction Material	02:00-03:30 P.M
26/10/2023	7651	Fluid Mechanics	09:30-11:00 A.M
26/10/2023	5199	Building Drawing	02:00-03:30 P.M

Instructions:-

It is mandatory for all the students to reach 15 minutes before examination timings.
Mobile phones and any kind of helping means are strictly prohibited in examination halls.
No student will be allowed to leave exam hall before half time.

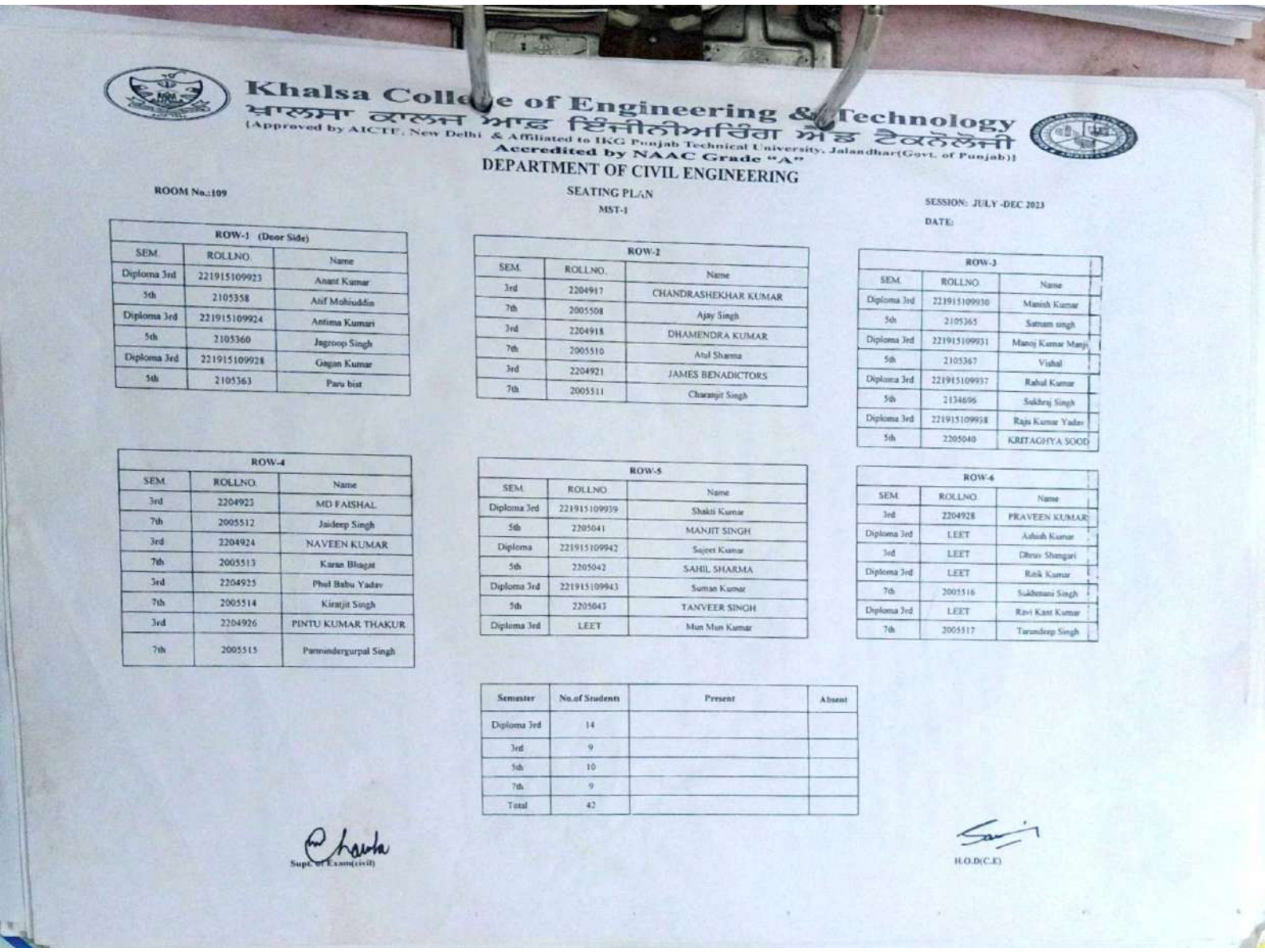
Supt. Exams (CE)

HOD (CE)

CC: The Director for Information Please
Dean Academics

Ranjit Avenue, C-Block, Amritsar, Punjab (India) - 143 001

Ph. : 0183-5030765, 5030760 Fax : 0183-2506969 Website : www.kcet.co.in E-mail : kcetamritsar@gmail.com



Khalsa College of Engineering & Technology

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DEPARTMENT OF CIVIL ENGINEERING

ROOM No.:109

SEATING PLAN

MST-1

SESSION: JULY -DEC 2023

DATE:

ROW-1 (Door Side)		
SEM.	ROLLNO.	Name
Diploma 3rd	221915109923	Anant Kumar
5th	2105358	Atif Mohiuddin
Diploma 3rd	221915109924	Antima Kumari
5th	2105360	Jagroop Singh
Diploma 3rd	221915109928	Gagan Kumar
5th	2105363	Paru bist

ROW-2		
SEM.	ROLLNO.	Name
3rd	2204917	CHANDRASHEKHAR KUMAR
7th	2005508	Ajay Singh
3rd	2204918	DHAMENDRA KUMAR
7th	2005510	Atul Sharma
3rd	2204921	JAMES BENADICTORS
7th	2005511	Charanjit Singh

ROW-3		
SEM.	ROLLNO.	Name
Diploma 3rd	221915109930	Manish Kumar
5th	2105365	Satnam singh
Diploma 3rd	221915109931	Manoj Kumar Manji
5th	2105367	Vishal
Diploma 3rd	221915109937	Rahul Kumar
5th	2134696	Sukhraj Singh
Diploma 3rd	221915109938	Raju Kumar Yadav
5th	2205040	KRITAGHYA SOOD

ROW-4		
SEM.	ROLLNO.	Name
3rd	2204923	MD FAISHAL
7th	2005512	Jaideep Singh
3rd	2204924	NAVEEN KUMAR
7th	2005513	Karan Bhagat
3rd	2204925	Phul Babu Yadav
7th	2005514	Kiratjit Singh
3rd	2204926	PINTU KUMAR THAKUR
7th	2005515	Parmindergurpal Singh

ROW-5		
SEM.	ROLLNO.	Name
Diploma 3rd	221915109939	Shakti Kumar
5th	2205041	MANJIT SINGH
Diploma	221915109942	Sujeet Kumar
5th	2205042	SAHIL SHARMA
Diploma 3rd	221915109943	Suman Kumar
5th	2205043	TANVEER SINGH
Diploma 3rd	LEET	Mun Mun Kumar

ROW-6		
SEM.	ROLLNO.	Name
3rd	2204928	PRAVEEN KUMAR
Diploma 3rd	LEET	Ashish Kumar
3rd	LEET	Dhruv Shangari
Diploma 3rd	LEET	Ritik Kumar
7th	2005516	Sukhmani Singh
Diploma 3rd	LEET	Ravi Kant Kumar
7th	2005517	Tarundeep Singh

Semester	No.of Students	Present	Absent
Diploma 3rd	14		
3rd	9		
5th	10		
7th	9		
Total	42		

Supt. of Exams(civil)

H.O.D(C.E)

Khalsa College of Engineering & Technology

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Department of Civil Engineering

Attendance Lists of MST-1 (September 2023)

Class : B.Tech 5th Sem.

Dates			13/09/2023		13/09/2023		14/09/2023		14/09/2023		15/09/2023		15/09/2023	
Subject			Engg. Geology BTCE-501-18		E.E.E. BTCE-502-18		C.E.M. BTCE-503-18		E.E. BTCE-504-18		S.E. BTCE-505-18		Geo-Technical Engineering BTCE-506-18	
SESSION			MORNING		EVENING		MORNING		EVENING		MORNING		EVENING	
S.no.	Roll No	Name	Sheet No.	Sign.	Sheet No.	Sign.	Sheet No.	Sign.	Sheet No.	Sign.	Sheet No.	Sign.	Sheet No.	Sign.
1	2105358	Atif Mohiuddin	1643		1671		1710		1729		1764		1810	
2	2105360	Jagroop Singh	1617		1679		—	AB	—	AB	—	AB	—	AB
3	2105363	Paru Bist	1620		1676		1715		1736		1786		1813	
4	2105365	Satnam Singh	1642		1667		1706		1745		1785		1808	
5	2105367	Vishal	1624		1665		1704		1741		1783		1807	
6	2134696	Sukhraj Singh	1622		1663		1716		1739		1788		1805	
7	2205040	Kritaghya Sood	1640		1677		1701		1737		1768		1803	
8	2205041	Manjit Singh	1630		1655		1693		1751		1784		1799	
9	2205042	Sahil Sharma	1634		1678		1717		1755		1776		1801	
10	2205043	Tanveer Singh	1637		1609		1698		1757		1778		1802	
			Present-	10	Present-	10	Present-	09	Present-	09	Present-	09	Present-	09
			Absent-	—	Absent-	—	Absent-	01	Absent-	01	Absent-	01	Absent-	01

Suptd.

HOD CE

Khalsa College of Engineering & Technology

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Department of Civil Engg.

Receiving of Answer Sheets for Evaluation of MST-1(September 2023)

S. No.	Subject Code	Subject Name	Semester	Name of Teacher	No. of Answer Sheets	Date of Issue	Signature
1	BTAM-301-18	Mathematics III	3rd	Ms. Simranjot Kaur (App.Sc.)	07	13/09/23	
2	BTCE-302-18	Solid Mechanics	3rd	Er. Vinod mahajan(ME)	07	13/09/23	
3	BTCE-303-18	Fluid Mechanics	3rd	Er. Sandeep Devgan(ME)	07	14-09-23	
4	BTCE-301-18	Surveying & Geomatics	3rd	Er. Bikramjit Singh	07	14-09-23	
5	HSMC-132-18	Introduction, Societal & Global Impact	3rd	Er. Sameeksha Joshi	07		
6	BTEC-305-18	Basic Electronics & applications in Civil Engineering	3rd	Er. Harneet Kaur (EC)	07	18/09/23	
7	BTCE-501-18	Engineering Geology	5th	Er. Sahil Sharma	10	13/09/23	
8	BTCE-502-18	Elements of Earthquake Engineering	5th	Er. Sameeksha Joshi	10		
9	BTCE-503-18	Construction Engineering & Management	5th	Er. Harmeet Singh Chawla	09	14/09/23	
10	BTCE-504-18	Environmental Engineering	5th	Er.Ravinder Kaur	09	14/09/23	
11	BTCE-505-18	Structural Engineering	5th	Er. Akarshan Uppal	09	15/09/23	
12	BTCE-506-18	Geotechnical Engineering	5th	Er. Mansi Mahajan	09	15/09/23	
13	PECE-702 D-18	Solid and Hazardous Waste Management	7th	Er.Ravinder Kaur	09	13/09/23	
14	PECE-703 B-18	Design of Hydraulic structures	7th	Er. Mansi Mahajan	09	13/09/23	
15	HSMC-255	Professional Practice, Law & Ethics	7th	Er. Sahil Sharma	09	14/09/23	
16	OECE-701-18	Metro system and Engineering	7th	Er. Harmeet Singh Chawla	09	14/09/23	
17	PECE-701 F-18	Traffic Engineering And Management	7th	Er.Ravinder Kaur	09	15/09/23	
18	BTMC-701-18	Management- I (Organizational Behavior)	7th	Ms.Kirandeep Kaur	09	15/09/23	

Suptd. (CE)

H.O.D. (CE)

Khalsa College of Engineering & Technology

ਖਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

{Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)}

Accredited by NAAC Grade "A"

Ref. No.:- KCET/CE/09/2023/637 Date:- 25-09-23

DEPARTMENT OF CIVIL ENGINEERING

Submission of Records in Secrecy Cell

(Tick mark the appropriate block)

MST I ☑ MST II ☐ MST III ☐ Assignments ☐ Tutorials ☐ Practical Files ☐

Course work files ☐

S. No.	Name of Subject	Subject Code	No. of Answer sheets	No. of Assignments/ Tutorials sheets	No. of Practical Files	Course work	Signature of Faculty
1.	S & HW	PECE-702 D-18	09				For Chawla
2.	DHS	PECE-703 B-18	09				
3.	PPL&E	HSMC-255	09				
4.	MS&E	OECE-701-18	09				Chawla
5.	T E & M	PECE-701 F-18	09				For Chawla
6.	M-I (OB)	BTMC-701-18	09				
7.	Engg. Geology	BTCE-501-18	10				
8.	EEE	BTCE-502-18	10				For Chawla
9.	CEM	BTCE-503-18	09				Chawla
10.	EE	BTCE-504-18	09				For Chawla
11.	SE	BTCE-505-18	09				For Chawla
12.	Geo-Technical Engineering.	BTCE-506-18	09				
13.	Mathematics III	BTAM-301-18	07				For Chawla
14.	Solid Mechanics	BTCE-302-18	07				
15.	Fluid Mechanics	BTCE-303-18	07				
16.	Surveying & Geomatics	BTCE-301-18	07				
17.	Introduction, Societal & Global Impact	HSMC-132-18	07				For Chawla
18.	Basic Electronics & applications in Civil	BTEC-305-18	07				

25/9/23

H.O.D.

Enclosures: Compiled MST results and Attendance record of MST.

Khalsa College of Engineering & Technology

ਖਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Ref. No.:- KCET/CE/09/2023/637 Date:- 25-09-23

DEPARTMENT OF CIVIL ENGINEERING

Submission of Records in Secrecy Cell

(Tick mark the appropriate block)

MST I [✓] MST II [ ] MST III [ ] Assignments [ ] Tutorials [ ] Practical Files [ ]

Course work files [ ]

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2.	DHS	PECE-703 B-18	09				
3.	PPL&E	HSMC-255	09				
4.	MS&E	OECE-701-18	09				Chawla
5.	T E & M	PECE-701 F-18	09				For Chawla
6.	M-I (OB)	BTMC-701-18	09				
7.	Engg. Geology	BTCE-501-18	10				
8.	EEE	BTCE-502-18	10				For Chawla
9.	CEM	BTCE-503-18	09				Chawla
10.	EE	BTCE-504-18	09				For Chawla
11.	SE	BTCE-505-18	09				For Chawla
12.	Geo-Technical Engineering.	BTCE-506-18	09				
13.	Mathematics III	BTAM-301-18	07				For Chawla
14.	Solid Mechanics	BTCE-302-18	07				
15.	Fluid Mechanics	BTCE-303-18	07				
16.	Surveying & Geomatics	BTCE-301-18	07				
17.	Introduction, Societal & Global Impact	HSMC-132-18	07				For Chawla
18.	Basic Electronics & applications in Civil	BTEC-305-18	07				

25/9/23

H.O.D.

Received at Secrecy Cell 25/9/23

Enclosures: Compiled MST results and Attendance record of MST.

Khalsa College of Engineering & Technology

ਖਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Accredited by NAAC Grade "A"

Ref. No.:- KCET/CE/09/2023/637 Date:- 25-09-23

DEPARTMENT OF CIVIL ENGINEERING

Submission of Records in Secrecy Cell

(Tick mark the appropriate block)

MST I [✓] MST II [ ] MST III [ ] Assignments [ ] Tutorials [ ] Practical Files [ ]

Course work files [ ]

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3.	PPL&E	HSMC-255	09				
4.	MS&E	OECE-701-18	09				Chawla
5.	T E & M	PECE-701 F-18	09				For Chawla
6.	M-I (OB)	BTMC-701-18	09				
7.	Engg. Geology	BTCE-501-18	10				
8.	EEE	BTCE-502-18	10				For Chawla
9.	CEM	BTCE-503-18	09				Chawla
10.	EE	BTCE-504-18	09				For Chawla
11.	SE	BTCE-505-18	09				For Chawla
12.	Geo-Technical Engineering.	BTCE-506-18	09				
13.	Mathematics III	BTAM-301-18	07				For Chawla
14.	Solid Mechanics	BTCE-302-18	07				
15.	Fluid Mechanics	BTCE-303-18	07				
16.	Surveying & Geomatics	BTCE-301-18	07				For Chawla
17.	Introduction, Societal & Global Impact	HSMC-132-18	07				
18.	Basic Electronics & applications in Civil	BTEC-305-18	07				

25/9/23

H.O.D.

Record at Secrecy Cell 25/9/23

Enclosures: Compiled MST results and Attendance record of MST.

Attendence Register

KHALSA COLLEGE OF ENGINEERING & TECHNOLOGY

Ranjit Avenue, C-Block, Amritsar

Attendance Cum Academic Performance Record

Name of Faculty Dr. Jasleen Kour

Class B.Tech CSE 5th & 7th Sem Subject FLAT, DM & W

Session August - Nov 2023 Batch 2021-2025, 2020-2024

Semester : ODD/EVEN

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

{Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)}

Accredited by NAAC Grade "A"

Department of Computer Science and Engineering

Odd Sem Time Table(July'23–Nov'23)

Name of the Faculty member :Dr. Jasleen Kaur **Designation : Associate Professor** **Department : CSE** **Total Load:12+3**

DAY/Period	09:00-9:55	9:55-10:50	10:50-11:00	11:00-11:55	11:55-12:50	12:50-1:45	1:45-2:40	2:40-3:30	3:30-4:20
	1	2		3	4		5	6	7
MON		FLAT(L) CSE-5th (R-341)	BREAK		DM&W(L) CSE-7th (R-342)	LUNCH BREAK	Project Lab-CSE-7th		
TUE		FLAT(L) CSE-5th (R-341)			DM&W(L) CSE-7th (R-342)				
WED		FLAT(L) CSE-5th (R-341)			DM&W(T) BCA-5th (R-)			DM&W(Lab) BCA-5th (LAB-IV)	
THU		FLAT(L) CSE-5th (R-341)						DM&W(Lab) BCA-5th (LAB-IV)	
FRI		DM&W(L) CSE-7th (R-342)						Project Lab-CSE-7th	

TT Incharge H.O.D Overall TT Incharge Dean Academics Director

KHALSA COLLEGE OF ENGINEERING & TECHNOLOGY
C-BLOCK, RANJIT AVENUE, AMRITSAR.

As per regulations prescribed by **I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY** vide Letter No. **IKG.PTU/DA/2224 Dated 19.07.17. Attendance Register must be maintained properly :-**

A. Attendance

1. The attendance shall be marked progressively (i.e 1 2 3 x 4 .....) A cross is to be marked whenever a student is absent. No P or A or Dot (.) is to be marked anywhere. Put the date and period of taking attendance at the top of the column and sign at the bottom end of the column.
2. No column of the register is to be left blank.
3. Holidays like Sundays, Baisakhi etc are not to be recorded in the register.
4. If a student is falling short of attendance of the required 75% at the end of a calendar month, then the signatures of the student must be taken and the report be sent to the Director/Principal/Dean Academics of the college. It would be preferable to call the parents and apprise them about the poor attendance of the student.
4. The list of students who are likely to fall short of required 75% attendance must be prepared and those students be informed before the submission of the admission forms to the university.t must specify the assignmentt date of submission.

B. Home Assignments

1. There should be some minimum number of home assignments (3)
2. Each assignment must specify the assignment number, topic covered, date of giving the assignment and date os submission.date of submission.
3. The assignment must be evaluated in a reasonable time and the marks given must be recorded in the attendance register at the specified place. The date of returning the assignment must be recorded in the register. Giving letter grades should be acoided and only marks should be given, preferably out of 10 for each assignment.
4. The internal marks allotted to the home assignment must be worked out at the end of the semester proportionally. There is no provision for selecting two.
5. A photocopy of all assignment given must be maintained.

C. Mid-Semester Tests :-

1. There would be a minimum of two MST's.
2. Photocopies of question papers of all the MSTs must be maintained.
3. The date of return of marked answer books to the students must be recorded in the attendance register along with the marks obtained by each student.
4. A student may be awarded @ 2 lectures for each Sessional Test in which he/she has appeared (i.e., 02 lectures if a student appeared in one Sessional Test only).

D. Laboratort Work

1. There has to be a laboratory mannual for every laboratory including the computer lab. and work shops.
2. The experiment peroformed by the student/program developed/job prepared must be evaluated on the same date and not later than the next turn. The marks awarede must be recorded in the attendance register for day to day work.
3. The proportionate marks of all the esperiments performed etc. must be calculated from the allotted marks for day to day work.
4. The parameters for evaluation of the drawing sheets, workshops jobs, lab work, seminars, presentations etc. must be enumerated while evaluating to maintain uniformity.

E. Distriction of Marks

Enginnering & Technology

Presentation/Msts = 60%, Home Assignment - 25%, Attendance - 15%

KHALSA COLLEGE OF ENGINEERING & TECHNOLOGY

Ranjit Avenue, C-Block, Amritsar

Attendance Cum Academic Performance Record

Name of Faculty Dr. Jasleen Kaur

Class B.Tech CSE 5th & 7th Sem **Subject** FLAT, DWDM

Session August - Nov, 2023 **Batch** 2021-2025, 2020-2024

Semester : ODD/EVEN

Students Attendance Record

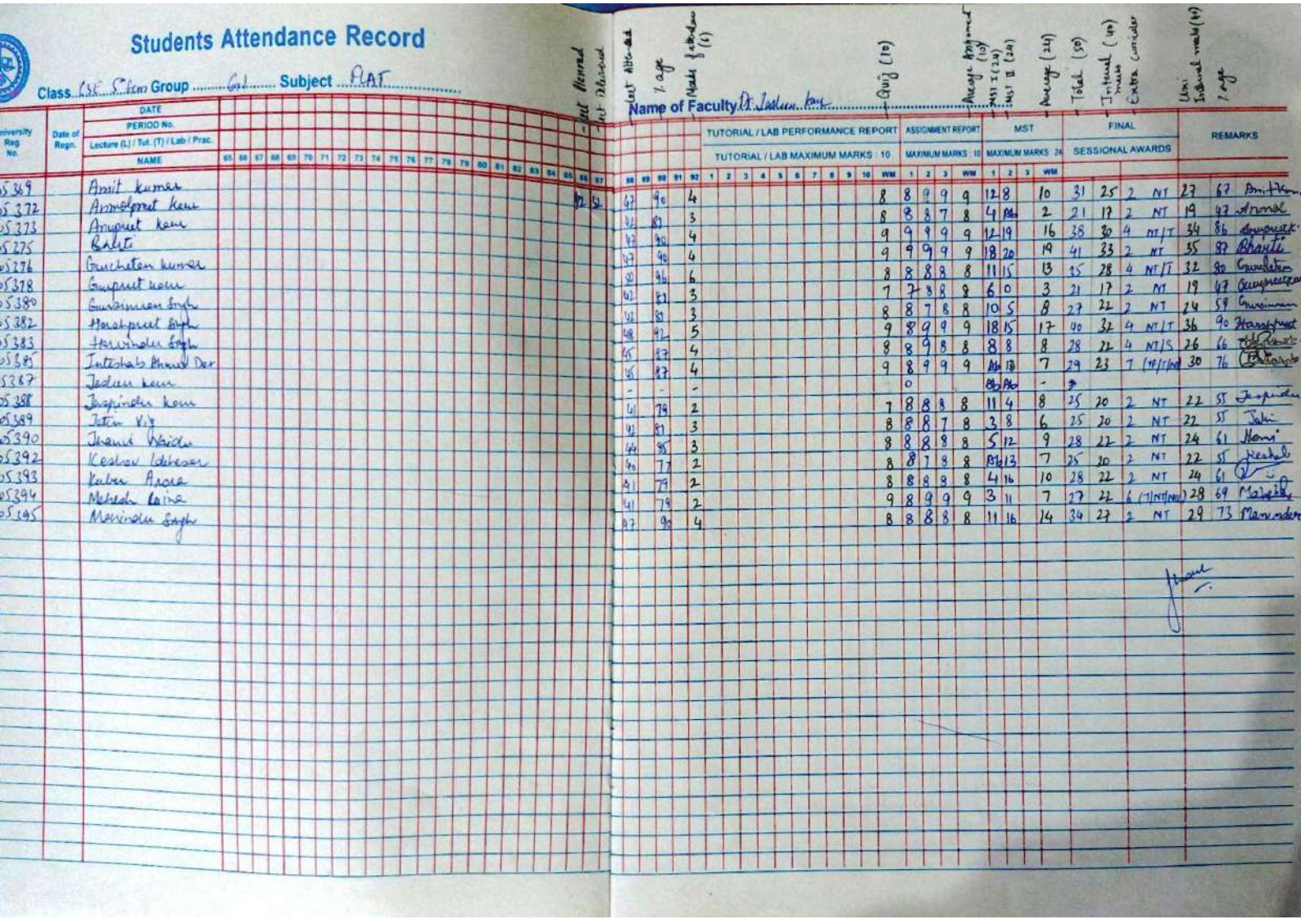
Class CSE. 5th Group G6 Subject FLAT

Name of Faculty Dr. Jasleen Kaur

University Reg. No.	Date of Regn.	NAME
2105369		Amit Kumar
2105372		Anmolpreet kaur
2105373		Anupreet kaur
2105375		Bhakti
2105376		Gurcheten Kumar
2105378		Gurpreet kaur
2105380		Gursimran Singh
2105382		Harshpreet Singh
2105383		Harvinder Singh
2105385		Intehab Ahmed Dar
2105387		Jasleen kaur
2105388		Jeepinder Kaur
2105389		Jatin Vig
2105390		Jhansi Naidu
2105392		Keshav Lakhesar
2105393		Kuber Arora
2105394		Mahesh Raina
2105395		Maninder Singh

DATE / PERIOD No. / Lecture (L) / Tut. (T) / Lab / Prac.

Mid-I Mid-II



Students Attendance Record

Class ... Sem Group ... Subject ...

Name of Faculty ...

University Reg No.	Date of Regn.	NAME	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
05369		Amit kumar																							
05372		Amolpreet kaur																							
05373		Anupreet kaur																							
05375		Babli																							
05376		Gurchetan kumar																							
05378		Gurpreet kaur																							
05380		Gursimran Singh																							
05382		Harpreet Singh																							
05383		Harvinder Singh																							
05385		Intishab Ahmad Dar																							
05387		Jashan kaur																							
05388		Jaspinder kaur																							
05389		Jatin Vij																							
05390		Jhanvi Vaidya																							
05392		Keshav Ishwar																							
05393		Kulvir Arora																							
05394		Mehak Saini																							
05395		Maninder Singh																							

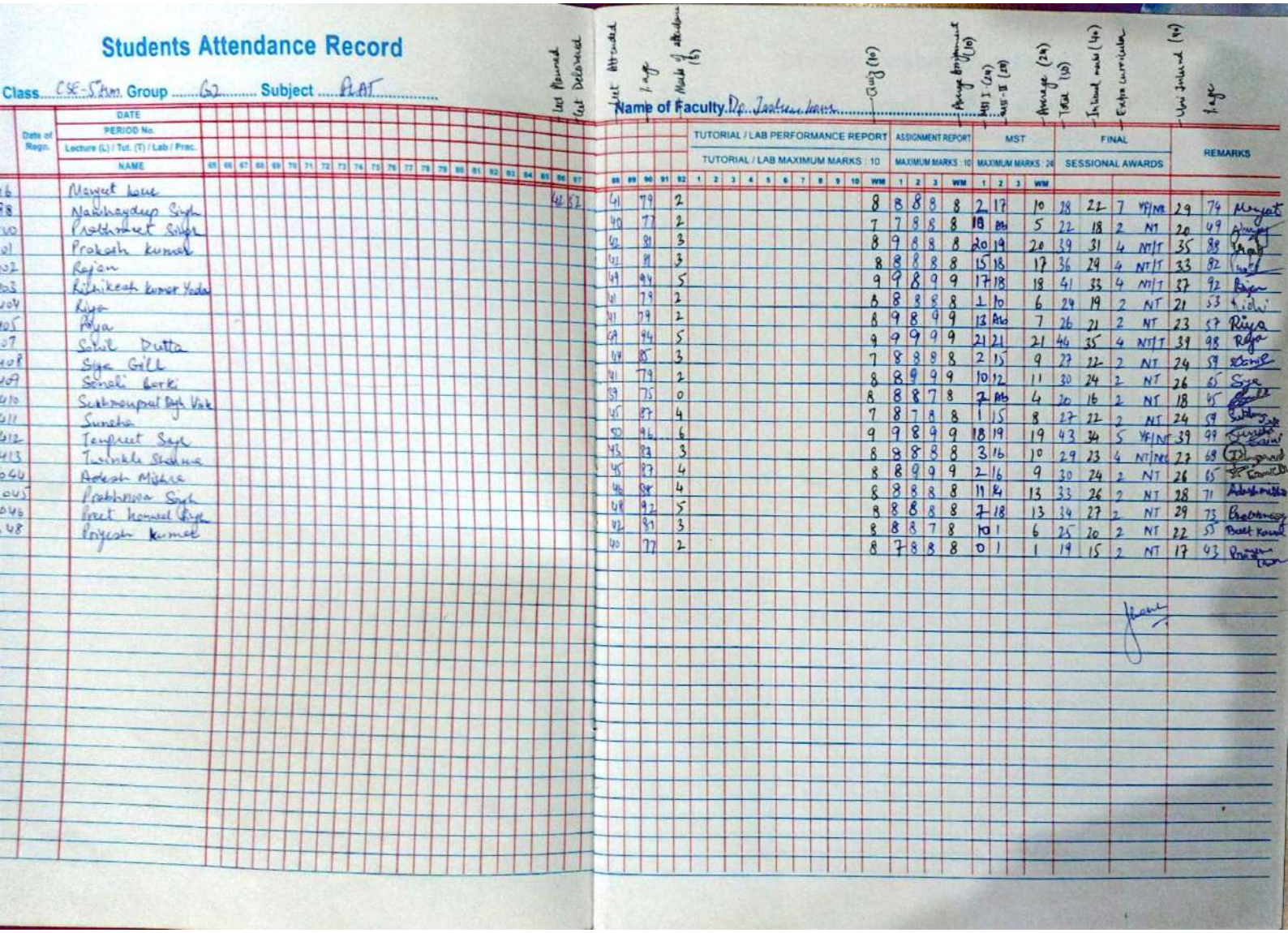
Last Attendance	% age	Marks of attendance (5)	Quiz (10)	Average Assignment (10)	MST I (24)	MST II (24)	Average (24)	Total (50)	Internal (40) mins	Extra curricular	Univ. External marks (60)	% age	REMARKS
TUTORIAL / LAB PERFORMANCE REPORT				ASSIGNMENT REPORT		MST		FINAL					
TUTORIAL / LAB MAXIMUM MARKS : 10				MAXIMUM MARKS : 10		MAXIMUM MARKS : 24		SESSIONAL AWARDS					
88	89	90	91	92	1 2 3 4 5 6 7 8 9 10	WM	1 2 3	WM	1 2	3 WM								
47	90	4			8	8	9 9	9	12	8	10	31	25	2	NT	27	67	Amit kumar
42	83	3			8	8	8 7	8	4	Ab	2	21	17	2	NT	19	47	Amol
47	90	4			9	9	9 9	9	12	19	16	38	30	4	NT/T	34	86	Anupreet
47	90	4			9	9	9 9	9	18	20	19	41	33	2	NT	35	88	Babli
46	96	6			8	8	8 8	8	11	15	13	25	28	4	NT/T	32	80	Gurchetan
43	83	3			7	7	8 8	8	6	0	3	21	17	2	NT	19	47	Gurpreet
41	81	3			8	8	7 8	8	10	5	8	27	22	2	NT	24	59	Gursimran
48	92	5			9	8	9 9	9	18	15	17	40	32	4	NT/T	36	90	Harpreet
45	87	4			8	8	9 8	8	8	8	8	28	22	4	NT/S	26	66	Harvinder
45	87	4			9	8	9 9	9	Ab	13	7	29	23	7	(T/T/Pro)	30	76	Intishab
-	-	-				0			Ab	Ab	-	*						
41	79	2			7	8	8 8	8	11	4	8	25	20	2	NT	22	55	Jaspinder
42	81	3			8	8	8 7	8	3	8	6	25	20	2	NT	22	55	Jatin
44	85	3			8	8	8 8	8	5	12	9	28	22	2	NT	24	61	Manvi
40	77	2			8	8	7 8	8	Ab	13	7	25	20	2	NT	22	55	Keshab
41	79	2			8	8	8 8	8	4	16	10	28	22	2	NT	24	61	
41	79	2			9	8	9 9	9	3	11	7	27	22	6	(T/MT/Proj)	28	69	Mehak
47	90	4			8	8	8 8	8	11	16	14	34	27	2	NT	29	73	Maninder

Students Attendance Record

Class CSE 5th Group G2 Subject FLAT

Name of Faculty Jashan Kaur

S. No.	University Reg. No.	Date of Regn.	NAME	Lecture (L) / Tut. (T) / Lab / Prac.	PERIOD No.	DATE	MS-I	MS-II	
19	2105396		Manjeet kaur						
20	2105398		Nadhneydeep Singh						
21	2105400		Prabhmeet Singh						
22	2105401		Prakash kumar						
23	2105402		Rajan						
24	2105403		Rishikesh kumar Yadav						
25	2105404		Riya						
26	2105405		Riya						
27	2105407		Sahil Dutta						
28	2105408		Siya Gill						
29	2105409		Sonali Barki						
30	2105410		Sukhmanpreet Singh Virk						
31	2105411		Sunehe						
32	2105412		Tanpreet Singh						
33	2105413		Twinkle Sharma						
34	2205044		Adesh Mishra						
35	2205045		Prabhnoor Singh						
36	2205046		Punit kumar Singh						
37	2205048		Priyesh kumar						



Students Attendance Record

Class CSE-5th Sem Group G2 Subject PLAT

Name of Faculty Dr. Jasleen kaur

Date of Regn.	DATE / PERIOD No. / Lecture (L) / Tut. (T) / Lab / Prac. / NAME	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	Last Planned	Last Delivered
16	Manjeet kaur																								42	42
18	Nanhagadup Singh																									
100	Prabhmeet Singh																									
101	Prakash kumar																									
102	Rajan																									
103	Rishikesh kumar Yadav																									
104	Riya																									
105	Riya																									
107	Sahil Dutta																									
108	Siya Gill																									
109	Sonali Barki																									
110	Subhamgupal Singh Vaka																									
111	Suneha																									
112	Tanpreet Singh																									
113	Twinkle Sharma																									
046	Adesh Mishra																									
045	Prabhmeet Singh																									
048	Preet kanwal Riya																									
148	Priyesh kumar																									

				TUTORIAL / LAB PERFORMANCE REPORT											ASSIGNMENT REPORT				MST				FINAL			REMARKS
				TUTORIAL / LAB MAXIMUM MARKS : 10											MAXIMUM MARKS : 10				MAXIMUM MARKS : 20				SESSIONAL AWARDS			
Last Attended	Total Lectures	Mode of Attendance (L)	Quiz (10)	1	2	3	4	5	6	7	8	9	10	WM	1	2	3	WM	1	2	3	WM	Average (20)	Total (50)	Internal marks (40)	Extra curricular	Upto Internal (90)	Fees	
41	79	2												8	8	8	8	8	2	17		10	38	22	7	Y/NA	29	74	Manjeet
45	77	2												7	7	8	8	8	18	AB		5	22	18	2	NT	20	49	Anuj
82	81	3												8	9	8	8	8	20	19		20	39	31	4	NT/T	35	88	Rajan
62	81	3												8	8	8	8	8	15	18		17	36	29	4	NT/T	33	82	Rishi
69	94	5												9	9	8	9	9	17	18		18	41	33	4	NT/T	37	92	Riya
41	79	2												8	8	8	8	8	1	10		6	24	19	2	NT	21	53	Sahil
41	79	2												8	9	8	9	9	13	AB		7	26	21	2	NT	23	57	Riya
94	94	5												9	9	9	9	9	21	21		21	46	35	4	NT/T	39	98	Riya
88	85	3												7	8	8	8	8	2	15		9	27	22	2	NT	24	59	Sonali
41	79	2												8	8	9	9	9	10	12		11	30	24	2	NT	26	65	Siya
39	75	0												8	8	8	7	8	7	AB		4	20	16	2	NT	18	45	
45	87	4												7	8	7	8	8	1	15		8	27	22	2	NT	24	59	
92	96	6												9	9	8	9	9	18	19		19	43	34	5	Y/NT	39	99	
83	83	3												8	8	8	8	8	3	16		10	29	23	4	NT/Ret	27	69	
87	87	4												8	8	9	9	9	2	16		9	30	24	2	NT	26	65	
88	88	4												8	8	8	8	8	11	14		13	33	26	2	NT	28	71	
92	92	5												8	8	8	8	8	7	18		13	34	27	2	NT	29	73	
81	81	3												8	8	8	7	8	10	1		6	25	20	2	NT	22	55	
77	77	2												8	7	8	8	8	0	1		1	19	15	2	NT	17	43	

Internal Breakups

I K G Punjab Technical University, Jalandhar

Internal Awards Evaluation

Khalsa College of Engineering & Technology, Amritsar

Department: Computer Science & Engineering | **Session: Jan-May 2024**

Program: B.Tech (CSE) | **Semester: 4th Semester**

Course Name: Computer Organization & Architechture | **Subject Code: BTES-401- 18**

Sr. no.	University Regd. no.	Name	Lectures Planned as per study	Lectures Del.	Lectures Attn.	%age of Lecture attended	Wt. Marks for Attendance (6)	Marks obtained in MST-1	Marks obtained in MST-2	Wt. Marks for MST's (24)	Wt. Marks (Assignments) (10)	Wt. Marks (Quiz) (10)	Total Marks (50)	Internal Marks (40)	Extracurricular/Co curricular Activities	Remarks	Uni Internal Marks(40)	%age
1	2204934	AALOK KUMAR SAH	42	43	34	79	2	9	10	10	8	7	27	22	2	T	24	60
2	2204936	ABHAY KUMAR	42	43	33	77	2	11	4	8	8	7	25	20	7	S/TFC/T	27	67
3	2204937	ABHINAV ANAND	42	43	34	79	2	8	12	10	8	8	28	22	7	S/TFC/T	29	73
4	2204938	ABHISHEK KUMAR	42	43	35	81	3	14	12	13	8	7	31	25	7	S/TC/NSS	32	79
5	2204939	ADARSH KUMAR	42	43	33	77	2	10	5	8	8	7	25	20	6	S/TC/NSS	26	65
6	2204943	ADITYA KUMAR	42	43	38	88	4	17	20	19	10	9	42	34	5	T/C/NSS	39	97
7	2204944	ALOK KUMAR	42	43	39	91	5	17	17	17	9	9	40	32	7	NSS	39	97
8	2204945	AMAN BISHT	42	43	38	88	4	5	AB	3	7	7	21	17	2	T	19	46
9	2204946	ANMOL RAJ	42	43	34	79	2	16	9	13	8	7	30	24	4	S/T	28	69
10	2204947	ARUSHI SANDHU	42	43	37	86	4	14	17	16	8	8	36	29	6	TC/T	35	88
11	2204948	AYUSH RAJ	42	43	34	79	2	13	12	13	8	7	30	24	2	T	26	64
12	2204949	BACHITER SINGH	42	43	0	0	0	AB	AB	0	0	0	Detained					
13	2204950	BIKASH KUMAR DAS	42	43	36	84	3	16	14	15	8	7	33	26	2	T	28	71
14	2204951	DANISH BABORIA	42	43	34	79	2	10	10	10	7	7	26	21	2	T	23	56
15	2204952	DHIRAJ KUMAR	42	43	34	79	2	17	11	14	8	7	31	25	2	T	27	67
16	2204953	DIVYANSH MAHAJAN	42	43	37	86	4	16	16	16	9	9	38	30	7	S/T/C/NSS	37	94
17	2204954	GAURAV GUPTA	42	43	37	86	4	15	15	15	8	8	35	28	4	S/T	32	80
18	2204955	GOLU KUMAR PANDIT	42	43	33	77	2	4	5	5	8	6	21	17	2	T	19	46
19	2204956	GURDEEPAK SINGH	42	43	33	77	2	16	14	15	7	7	31	25	4	T/NCC	29	72
20	2204957	GURSAHIBA KAUR	42	43	37	86	4	19	19	19	8	8	39	31	7	T/C/NSS	38	96
21	2204958	ISHITA KUMARI	42	43	36	84	3	16	18	17	7	8	35	28	7	T/C/NSS	35	88
22	2204959	JAHANVI RANA	42	43	36	84	3	19	19	19	9	9	40	32	7	TFC/T/C	39	98
23	2204960	JASLEEN KAUR	42	43	34	79	2	12	9	11	7	7	27	21	4	T/C	25	63
24	2204961	JAYANT KUMAR GUPTA	42	43	33	77	2	10	14	12	7	7	28	23	2	T	25	62
25	2204962	KARTIK MAHAJAN	42	43	35	81	3	19	20	20	9	9	41	33	6	T/TC	39	97
26	2204963	KHUSHI KUMARI	42	43	35	81	3	19	20	20	8	8	39	31	6	TC/T	37	93
27	2204964	KRISHNA KUMAR MAHATO	42	43	34	79	2	5	11	8	7	7	24	19	2	T	21	54
28	2204965	KUMARI HEMPUSHPA	42	43	34	79	2	20	20	20	8	9	39	31	6	TC/T	37	93
29	2204966	LADLI KUMARI	42	43	40	93	5	23	22	23	10	9	47	38	1	TFC/TC/T/C/NSS	39	97
30	2204967	LOVELEEN KAUR	42	43	33	77	2	19	12	16	8	7	33	26	4	T/C	30	76
31	2204968	MANPREET SINGH	42	43	36	84	3	15	17	16	8	7	34	27	7	TFC/TC/T	34	85
32	2204969	MAUSAM KUMARI	42	43	36	84	3	20	21	21	9	9	42	34	5	S/TFC/TC/T/C	39	97
33	2204970	MEHAK LAKSHMI	42	43	33	77	2	3	AB	2	6	7	17	14	4	C/NCC	18	44
34	2204971	MEHAKDEEP KAUR	42	43	38	88	4	17	17	17	8	8	37	30	7	TFC/TC/T	37	92
35	2204973	MOKARRAM SHAHBAN	42	43	39	91	5	13	12	13	9	9	36	29	7	TFC/TC/T/Y	36	89

36	2204974	NISHA	42	43	37	86	4	19	20	20	9	8	41	33	6	TC/T	39	96
37	2204975	NITISH CHOUDHARY	42	43	35	81	3	14	13	14	7	7	31	25	2	T	27	67
38	2204976	PAVITRA	42	43	34	79	2	12	AB	6	7	7	22	18	7	S/TFC/T/Y/NSS	25	62
39	2204977	POOJA SHARMA	42	43	37	86	4	15	20	18	8	8	38	31	7	TC/T/C/NSS	38	94
40	2204978	PRERNA SINHA	42	43	39	91	5	12	17	15	8	7	35	28	7	TC/T/NSS	35	88
41	2204979	PRINCE KUMAR	42	43	35	81	3	11	11	11	7	7	28	22	4	T/NSS	26	66
42	2204980	PRINCE KUMAR	42	43	38	88	4	18	15	17	9	8	38	30	4	S/T	34	85
43	2204981	PRIYA KUMARI	42	43	39	91	5	16	16	16	9	9	39	31	7	TFC/TC/T/Y	38	96
44	2204982	RAJANDEEP SINGH	42	43	33	77	2	5	5	5	7	7	21	17	2	T	19	47
45	2204984	RAMAN KUMAR	42	43	42	98	6	21	23	22	10	9	47	38	1	S/TC/T/NSS	39	97
46	2204985	SANGEETA KUMARI	42	43	39	91	5	19	22	21	9	9	44	35	4	TFC/TC/T	39	98
47	2204986	SAURABH KUMAR	42	43	37	86	4	12	16	14	8	7	33	26	4	T/NSS	30	75
48	2204987	SAURAV KUMAR	42	43	38	88	4	18	20	19	9	9	41	33	6	S/TFC/T	39	97
49	2204988	SHAH ZAIB MUNEER	42	43	36	84	3	10	11	11	8	8	30	24	4	S/T	28	70
50	2204990	SHIVANKAR SINHA	42	43	39	91	5	19	22	21	10	10	46	37	2	TFC/T/Y/NSS	39	97
51	2204991	SIMRATPAL KAUR	42	43	12	28	0	4	9	7	6	6	19	15	2	T	DETAINED	
52	2204992	Sunil Kumar Ray	42	43	35	81	3	13	12	13	8	7	31	25	2	T	27	66
53	2204993	SWASTIK MEHRA	42	43	33	77	2	AB	AB	0	7	8	17	14	2	T	16	39
54	2204994	VAIBHAV	42	43	33	77	2	10	12	11	7	7	27	22	2	NSS	24	59
55	2204995	VIDHI	42	43	39	91	5	15	19	17	9	9	40	32	7	TFC/TC/T/C	39	98
56	2204996	VISHAL GOSWAMI	42	43	35	81	3	5	1	3	7	8	21	17	2	T	19	48
57	Leet	Arshdeep Singh	42	43	35	81	3	12	10	11	7	7	28	23	6	TC/T	29	72
58	Leet	Anmolpreet Kaur	42	43	36	84	3	10	9	10	9	9	31	25	4	T/C	29	71
59	Leet	Shail	42	43	33	77	2	8	AB	4	7	7	20	16	2	T	18	45

Note:-

Sports(S), TechFest Coordinator(TFC),Technical coordinator(TC), NonTechnical Coordinator(NTC),Technical(T),NonTechnical(NT), Cultural (C) , Yoga(Y),NCC,NSS,PROCESSION(PROC)

Name & Signature of Faculty **H.O.D** **Dean Academics** **Director**

Recommendations of the Rationalization Committee: _____

_____

_____

Signature 1 **Signature 2** **Signature3**

Note:

1. Guide lines for awarding sessional / internal marks circulated vide IKGPTU/DA/2224 DT. 19.07.2017 should be followed for awarding marks.

2. Similar proforma showing detailed breakup should be developed for awarding marks in practical's, projects, seminars etc.

End Session Notices

Khalsa College of Engineering & Technology

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{Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)}

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Ref No. KCET/447/12/23 **Date** 07/12/2023

Office Circular

There will be a **meeting** in the office of the undersigned today i.e. **07.12.2023** at **12:15 p.m** in the office of undersigned.

Agenda

1. Time-table and workload.
2. Internal Awards – (12)
3. Group Photo
4. Hostel Night
5. External Examiner –
6. Lunch Arrangement for External Examiner –
7. Farewell Party
8. Blazer Payment – (12) –
9. ID cards
10. Winter Break

17 | 18

(Dr. Manju Bala)
Director

Copy to:- (i) Dean Academics and H.O.D for information & n.a. please.
(ii) P.S. to Director
(iii) M/F Office order/MOM
(iv) IQAC Cell

Ranjit Avenue, C Block, Amritsar, Punjab (India)-143001

Ph. 0183-5030765,5030760 Fax:-0183-2506969 Website: www.kcet.co.in Email:-kcetamritsar@gmail.com

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{Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)}

Accredited by NAAC Grade "A"

Ref No. KCET/448/12/23 **Date** 07-12-2023

Minutes of Meeting

Proceeding of the **meeting** held on **07.12.2023** at **12:15 p.m.** in the office of undersigned. Dr. Manju Bala, Director presided over the meeting. The following members were **present.**

S.No.	Name	Signature
1.	Dr. Mohinder Sangita, Dean Acad. UGC	
2.	Dr. Jugraj Singh, Dean Acad. AICTE	
3.	Dr. G. S. Grewal, Dean T & P	
4.	Er. Sukhmeet Kaur, COE and H.O.D BCA/BBA	
5.	Dr. Pardeep Singh, H.O.D App. Sc.	
6.	Dr. Jasleen Kaur, H.O.D CSE	
7.	Er. Sahil Sharma, H.O.D Civil Engg.	
8.	Dr. Maalti Puri, H.O.D ECE	
9.	Dr. Sandeep Devgan, H.O.D ME	
10.	Mr. Muteeb Showket, H.O.D Paramedical Sc.	
11.	Mr. Dilkiranpreet Singh, Officiating H.O.D Agri	
12.	Mr. Rohit Gill, H.O.D HMCT	
13.	Dr. Ripin Kohli, Assoc. Prof. App.Sc.	

All were **given directions** by the **Director Madam** as per the **follows:**

1. It was directed that External Examiner list should be approved by undersigned and proper file should be maintained regarding the External examiner, which will be checked by Dean Acad. Regarding the lunch of External Examiner It was directed that Ms. Balbir Kaur, Admin Officer and Ms. Raspinder Suptd. Girls' Hostel will coordinate for the same.

Prepared by:
(Ms. Balbir Kaur)
Admin Officer

Edit by:-
(Dr. Jugraj Singh)
Dean Acad. AICTE

(Dr. Manju Bala)
Director

Ranjit Avenue, C Block, Amritsar, Punjab (India)-143001
Ph. 0183-5030765,5030760 Fax:-0183-2506969 Website: www.kcet.co.in Email:-kcetamritsar@gmail.com

Ref No. KCET/448/12/23 **Date** 07-12-2023

2. It was directed that faculty members will submit the internal assessment of their respective subject(s) to the Dean Academics till 12.12.2023, Tuesday.

3. It was directed that H.O.Ds (except HMCT and Paramedical Sc.) will collect & submit the blazer payment till 12.12.2023, Tuesday.

4. It was directed to the Dr. Ruchi Handa, OIC Library that print the ID cards at the earliest as it is compulsory for the students.

5. It was directed to the H.O.Ds that they will calculate the workload for next semester and prepare tentative time-table. It was informed that workload should not be less than 12-14. It was also informed that a meeting regarding time-table will be held on 12.12.2023 (Tuesday) at 12:15 p.m. in the office of undersigned.

6. It was decided that new session will be start from 8th January, 2024.

7. It was directed to the H.O.Ds that **No Dues Certificate** will be issued by the office of Training & Placement Cell. H.O.Ds will ensure regarding the full payment of fee of the concerned student before sign the certificate.

8. It was decided that Hostel Night will be held as per below:-

   Girls' Hostel:- 18th January, 2023
   Boys' Hostel:- 19th January, 2023

9. It was also decided that Group Photograph and Project Display will also be held on 18-19 January, 2023. It was directed to H.O.Ds to inform their respective students that student dressed up in uniform with blazer, I-Card and attendance is compulsory.

10. It was directed to the H.O.Ds that they will prepare their respective department in all aspects for next semester e.g. appointment of ATPOs, Time-table incharge, Room/Lab requirement, classrooms, Notice board updation, Time-table display.

11. It was directed to the H.O.Ds that they will inform to the students of their respective department that Skill Enhancement Course will be start from next semester.Fee for the course is Rs. 500/- per student and it is compulsory for all students. It is also directed that H.O.Ds will collect the fee and inform to the undersigned.

Prepared by:
(Ms. Balbir Kaur)
Admin Officer

Edit by:
(Dr. Jugraj Singh)
Dean Acad. AICTE

(Dr.Manju Bala)
Director

Ph Ranjit Avenue, C Block, Amritsar, Punjab (India)-143001
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Ref No. KCET/449/12/23 Date 07-12-2023

12. It was also directed that faculty members will complete the Attendnace register/Coursework file before the start of new session and submit to the H.O.Ds. The H.O.Ds will check and submit the report regarding the same, in the approved format to the Dean Academics.

13. Mr. Dilkiranpreet Singh, H.O.D Agriculture was directed to set up the Labs of their respective department as per the norms and submit the requirement if any for the approval of Agriculture course.

14. It was informed that Winter Break will be started from 26th Dec, 2023 to 8th Jan, 2024 in two slots. Separate notice will also be issued from the office of undersigned for the same.

Prepared by:
(Ms. Balbir Kaur)
Admin Officer

Edit by:-
(Dr. Jugraj Singh)
Dean Acad. AICTE

(Dr.Manju Bala)
Director

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Ref No. KCET/Exam/153

Date 16/04/24

Regarding the closing of session(Jan-April-2024)

This is for the information to all the Hods and faculty members that session of Jan-april,2024 is going to close on 17.04.2024. You are directed to note down the followings timelines regarding the conduct and submission of record on time as per the requirement of your respective departments:-

1.	Improvement Test	20.04.2024-21.04.2024
2.	Extra Classes(if required)	18.04.2024-21.04.2024
3.	Final Detainee List	22.04.2024
4.	End Semester Examination	24.04.2024 - 12.06.2024
5.	End Semester Practical Examination	20.05.2024 - 31.05.2024
6.	Institutional Summer Training (First and Second Year)	01.06.2024 - 13.07.2024

Controller of Examinations

CC:

1. Ps to Director, for information
2. All Concerned

Undertakings by faculty (Syllabus coverage report)

Khalsa College of Engineering & Technology

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Date: 11/OCT/2023

ME Department

Syllabus Coverage Report (Session AUG-DEC 2023)

Semester- 7th

Name of Course & Code		Mechanical Vibration BTME 701-18	Automation in Manufacturing BTME 702-18	FME BTME 703-18	Traffic Engg. & Manag. OECE 702-18	M & R BTME 617-18	N-CER BTME 615-18		
Name of Teacher		Dr. Amit Mahajan	Dr. Atul Agnihotri	Dr. Jugraj Singh	Er. Hameet Singh	Dr. Sandeep Singh Sunny	Er. Jaspreet Singh		
% of Syllabus Coverage	Aug 23	30%	25%	23%	22%	25%	25%		
	Teacher Sign	Amit	Atul	Jugraj	Chanda		Jaspreet		
	Sep. 23	60%	55%	54%	50%	55%	55%		
	Teacher Sign	Amit	Atul	Jugraj	Chanda		Jaspreet		
	Oct. 23	90%	90%	87%	90%	92%	85%		
	Teacher Sign	Amit	Atul	Jugraj	Chanda		Jaspreet		
	Nov. 23	100%	100%	100%	100%	100%	100%		
	Teacher Sign	Amit	Atul	Jugraj	Chanda		Jaspreet		

Head
Mechanical Engg. Deptt.
Khalsa College of Engg.& Technology
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Date: 11/OCT/2023

ME Department

Syllabus Coverage Report (Session AUG-DEC 2023)

Semester- 3rd

Name of Course & Code		Fluid Mechanics BTME-301-18	Theory of Machines BTME-302-18	Machine Drawing BTME 303-18	SOM-I BTME 304-18	BEE BTME-305-18	Basic Thermodynamics BTME-306-18		
Name of Teacher		Dr. Sandeep Dogra	Er. Navin Kumar	Er. Jasjeevan Singh	Er. Vinod Mahajan	Harneet Singh	Tejwant Singh		
% of Syllabus Coverage	Aug 23	25%	20%	20%	30%	25%	23%		
	Teacher Sign								
	Sep. 23	55%	50%	50%	85%	55%	55%		
	Teacher Sign								
	Oct. 23	90%	80%	77%	90%	90%	90%		
	Teacher Sign								
	Nov. 23	100%	100%	100%	100%	100%	100%		
	Teacher Sign								

Head
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Date: 11/Oct/2023

ME Department

Syllabus Coverage Report (Session AUG-DEC 2023)

Semester- 5th

Name of Course & Code		Heat Transfer BTME 501-18	DME BTME 502-18	Manufacturing Processes BTME 503-18	M & EE BTME 504-18	EIKT BTMC 102-18			
Name of Teacher		Dr. Atul Agnihotri	Dr. Sandeep Singh Sidhu	Dr. Jugraj Singh	Er. Jasgeevan Singh	Er. Jasgeevan Vinod Singh Mahajan			
% of Syllabus Coverage	Aug 23	25 %	30 %	28 %	30 %	30 %			
	Teacher Sign								
	Sep. 23	60 %	65 %	58 %	65 %	65 %			
	Teacher Sign								
	Oct. 23	90 %	85 %	86 %	88 %	95 %			
	Teacher Sign								
	Nov. 23	100 %	100 %	100 %	100 %	100 %			
	Teacher Sign								

Head
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Khalsa College of Engg. & Technology
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Date:

Computer Science & Engineering Department

Syllabus Coverage Report (SessionJan-May 2024)

Semester-4th

NameofCourse		Discrete Mathematics	Computer Architecture	Operating System	Design Analysis & Algorithm	Human Values	Environment Studies	Add on Course
NameofTeacher		Er. Rohini Pandita	Dr. Anuradha Vashishtha	Er. Paramjeet Kaur	Er. Sarbjot Kaur	Er. Puneet Chhina	Er. Harpreet Singh	Dr. Anuradha Vashishtha
% of Syllabus Coverage	Jan-Feb 24	41%	42%	45%	25%	45-50%	50%	25%
	Teacher Sign	Rohini Pandita	Aadha	Pkaur	Skaur	Puneet	Harp	Aadha
	HOD Sign							
	March 24	70%	30%	65%	75%	70%	75%	75%
	Teacher Sign	Rohini Pandita	Aadha	Pkaur	Skaur	Puneet		Aadha
	HOD Sign							
	April 24	100%	98%	98%	100%	100%	100	100%
	Teacher Sign	Rohini Pandita	Aadha	Pkaur	Skaur	Puneet		Aadha
	HOD Sign							
	May 24							
	Teacher Sign							
	HOD Sign							

Head
Dept. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

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Date:

Computer Science & Engineering Department

Syllabus Coverage Report (SessionJan-May 2024)

Semester-6th

NameofCourse		Compiler Design	ArtificialIntelligence	Cloud Computing	Machine Learning	Wireless Communication	Add on Course
NameofTeacher		Dr. Supreet Kaur	Er. Sukhmeet Kaur	Er. Loveleen Kaur	Dr. Jasleen Kaur	Dr. Jasdeep Singh	Dr. Anuradha Vashishtha
% of Syllabus Coverage	Jan-Feb 24	30 %	46 %	50%	45 %	50%	25%
	Teacher Sign						
	HOD Sign						
	March 24	80%	85 %	80%	75 %	85%	50%
	Teacher Sign						
	HOD Sign						
	April 24	100 %	100 %	100%	100 %	100%	100%
	Teacher Sign						
	HOD Sign						
	May 24						
	Teacher Sign						
	HOD Sign						

Head
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Date:

Diploma in Computer Science & Engineering

Syllabus Coverage Report (Session Jan-May2024)

Semester-4th

NameofCourse&Code		Data Structures (2095)	Object Oriented Programming Using Java (2295)	Computer Networks& Security (2495)	Generic Skills & Entrepreneurship Development (9585)	Database Management System (2395)	Computer Architecture (0495)
NameofTeacher		Er. Sarbjot Kaur	Dr. Anuradha Vasishtha	Er. Loveleen Kaur	Er.Sukhmeet Kaur	Er. Supreet Kaur	Er. Paramjeet Kaur
% of Syllabus Coverage	Jan-Feb 24	25%	45%	45%	46%	45%	45%
	Teacher Sign		Aradha		Suny		Pkaur
	HOD Sign						
	March 24	50%	75%	85%	65%	60%	75%
	Teacher Sign		Aradha		Suny		Pkaur
	HOD Sign						
	April 24	80%	100%	85%	100%	85%	100%
	Teacher Sign		Aradha		Suny		Pkaur
	HOD Sign						
	May 24	100%		100%		100%	
	Teacher Sign						
	HOD Sign						

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

Khalsa College of Engineering & Technology, Amritsar
Department of Computer Science & Engineering

Undertaking

I Er. Subhneet Kaur Associate Prof. /Assistant Prof. in CSE dept. here by certify that I have finished the Syllabus prescribed for my class in the subject Artificial Intelligence & Generic Skills & EDP subject code BT(CS)602-18) and conducted the internal of Laboratory subject AI lab subject code BTCS605-18 the during this semester Jan 2024 to May 2024 (May Exam, 2024) to the full satisfaction of my students of B. TECH (CSE/AIML) 4th /6th Semester. & Diploma (CSE - 4th Semester) & BCA (6th Sem.)

Signature:-.....

Designation:-..Controller of Examinations

Department:-.....CSE.....

Khalsa College of Engineering & Technology, Amritsar
Department of Computer Science & Engineering

Undertaking

I ~~Er~~ Submeet Kaur Associate Prof. /Assistant Prof. in CSE dept. here by certify that I have finished the Syllabus prescribed for my class in the subject Artificial Intelligence & Generic Skills & EDP BT(CS602-18) subject code _____ and conducted the internal of Laboratory subject AI lab subject code BTCS605-18 the during this semester Jan 2024 to May 2024 (May Exam, 2024) to the full satisfaction of my students of B. TECH (CSE/AIML) 4th /6th Semester. + Diploma (CSE - 4th semester) + BCA (6th sem.)

Signature:-.....

Designation:-...Controller of Examination

Department:-.....CSE.....

Undertaking Comp

Khalsa College of Engineering & Technology, Amritsar
Department of Computer Science & Engineering

Undertaking

I Dr. Jasleen kaur Associate Prof. /Assistant Prof. in CSE here by certify that I have finished the Syllabus prescribed for my class in the subject Machine learning subject code BTCS 619 - 18 and conducted the internal of Laboratory subject Machine learning lab subject code BTCS 619 - 18 the during this semester Jan 2024 to May 2024 (May Exam, 2024) to the full satisfaction of my students of B. TECH (CSE/AIML) 4th /6th Semester.

Signature:-.....

Designation:-Associate Professor

Department:-CSE

Khalsa College of Engineering & Technology, Amritsar
Department of Computer Science & Engineering

Undertaking

I Lovleen Kaur Associate Prof. /Assistant Prof. in CSE here by certify that I have finished the Syllabus prescribed for my class in the subject Cloud Computing subject code BTCS612-18 and conducted the internal of Laboratory subject Cloud Computing lab subject code _____ the during this semester Jan 2024 to May 2024 (May Exam, 2024) to the full satisfaction of my students of B. TECH (CSE/AIML) 4th /6th Semester.

Signature:-.....

Designation:-.....Asstt. Prof.....

Department:-.....CSE.....

Khalsa College of Engineering & Technology, Amritsar
Department of Computer Science & Engineering

Undertaking

I Dr. Supreet Kaur Associate Prof. /Assistant Prof. in CSE Dept. here by certify that I have finished the Syllabus prescribed for my class in the subject Compiler Design. subject code BTCS 601-18 and conducted the internal of Laboratory subject Compiler Design lab subject code BTCS 604-18 the during this semester Jan 2024 to May 2024 (May Exam, 2024) to the full satisfaction of my students of B. TECH (CSE/AIML) 4th /6th Semester.

Signature:-.....

Designation:- Associate Professor

Department:- CSE

Result Analysis

Appendix A

Name of the College: Khalsa College of Engg. & Tech, Amritsar

Department of Computer Science and Engineering

Result Analysis (Nov, 2023 CSE-7th Sem)

Sr No	Name of the course	Subject Code 1/Faculty Name	Subject Code 2/Faculty Name	Subject Code 3/Faculty Name	Subject Code 4/Faculty Name	Subject Code 5/Faculty Name
1	B.Tech CSE	Network Security & Crytography (BTCS 701-18) Er. Loveleen Kaur	Data Mining & Data Warehousing (BTCS 702-18) Dr.Jasleen Kaur	Deep Learning (BTCS 704-18Er. Dr. Anuradha Vashishtha	Adhoc& Wireless Communication (BTCS-716-18) Dr. Supreet Kaur	Soft Computing(BTEC908D-18) Er. Avtar Singh
Result Percentage		**100%**	**100%**	**100%**	**100%**	**95.6%**
Overall Pass percentage of (B.Tech- CSE. 7th Sem Students) = 99.12%						

HOD (CSE)

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

Dean Academics

Director

Appendix A

Name of the College: Khalsa College of Engg. & Tech, Amritsar

Department of Computer Science and Engineering

Result Analysis (Nov, 2023 CSE-5th Sem)

Sr No	Name of the course	Subject Code 1/Faculty Name	Subject Code 2/Faculty Name	Subject Code 3/Faculty Name	Subject Code 4/Faculty Name	Subject Code 5/Faculty Name	Subject Code 6/Faculty Name	Subject Code 7/ Faculty Name
1	B.Tech CSE	DBMS (BTCS 501-18) Dr.Supreet Kaur	FLAT (BTCS 502-18) Dr. Jasleen Kaur	Software Engineering (BTCS 503-18) Er. Sukhmeet Kaur	Computer Networks (BTCS 504-18) Er. Loveleen Kaur	Programming in Python (BTCS 510-18) Dr.Anuradha Vashsihtha	ERP (BTES 501-18) Er. Harpreet Singh	COI (MC) Er. Puneet Chhinna
Result Percentage		**100%**	**91.7%**	**97.22%**	**97.22%**	**97.05%**	**100%**	**100%**
Overall Pass percentage of (B.Tech- CSE. 5th Sem Students) = 97.5%								

HOD(CSE)

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

Dean Academics

Director

Appendix A

Name of the College: Khalsa College of Engg. & Tech, Amritsar

Department of Computer Science and Engineering

Result Analysis (Nov, 2023 ,CSE-3rdSem)

Sr No	Name of the course	Subject Code 1/Faculty Name	Subject Code 2/Faculty Name	Subject Code 3/Faculty Name	Subject Code 4/Faculty Name	Subject Code 5/Faculty Name
1	B.Tech CSE	Maths-3 (BTAM304-18) Dr. Ruchi	HSMC101/102-18 Mrs.Gaganpreet Kaur	Data Structure (BTCS301-18) Er. SarbjotKaur	Digital electronics (BTCS301-18 Dr.Jasdeep Singh	OOPS(BTCS 302-18) Er. Parmjeet Kaur
Result Percentage		26.3%	96.5%	96.6%	74.5%	84.7%
Overall Pass percentage of (B.Tech- CSE. 3rdSem Students) = 75.7%						

HOD(CSE) Dean Academics Director

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

Appendix B

Name of the College:Khalsa College of Engg. & Tech, Amritsar

Department of Computer Science and Engineering

Result Analysis Nov 2023

S.No.	Name of Faculty	Subject	Class	No. of Students Appeared	No. of Students Passed	No. of students getting O Grade	No. of students getting A+ Grade	No. of students getting A Grade	No. of students getting B+ Grade	No. of students getting B Grade	No. of students getting C Grade	No. of students getting P Grade	No. of students placed in reappear	No. of students failed	Pass Percentage of the Students	Pass Percentage of University /Board	Difference (+) OR (-) percentage
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Er. Loveleen Kaur	Network Security & Crytography (BTCS 701-18)	7th Sem (CSE)	22	22	0	5	7	5	3	1	1	0	NA	100 %		
		Computer Networks BTCS 504-18	5th Sem (CSE)	36	35	2	3	9	12	9	0	0	1	NA	97.22 %		
2	Dr.Jasleen Kaur	Data Mining & Data Warehousing (BTCS	7th Sem (CSE)	22	22	0	8	10	4	0	0	0	0	NA	100 %		

Head
Dept. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

		702-18)															
		Formal Language &Automata Theory BTCS 502-18	5th Sem (CSE)	36	33	0	4	8	10	9	1	1	3	NA	91.7%		
3	Dr. Supreet Kaur	Adhoc& Wireless Communication (BTCS-716-18)	7th Sem (CSE)	22	22	0	11	8	3	0	0	0	0	NA	100 %		
		Database Management System BTCS 501-18	5th sem CSE	35	35	0	4	12	11	6	2	0	0	NA	100%		
4	Dr. Anuradha Vashishtha	Deep Learning (BTCS 704-18)	7th Sem (CSE)	22	22	5	9	3	4	1	0	0	0	NA	100 %		
		Programming in Python (BTCS 510-18)	5th sem (CSE)	35	34	0	3	8	11	6	4	1	1	NA	97.05 %		
5	Er. Avtar Singh	Soft Computing(BTEC908D-18)	7th Sem (CSE)	23	22	0	9	10	1	2	0	0	1	NA	95.6%		
6	Er. Sukhmeet	Software Engineering	5th sem (CSE)	36	35	0	3	7	11	12	2	0	1	NA	97.22%		

Dept. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

	Kaur	BTCS 503-18															
7	Er. Harpreet Singh	Enterprise Resource Planning BTES 501-18	5th sem (CSE)	36	36	3	8	12	8	5	0	0	0	NA	100%		
8	Er. Puneet Chhina	COI (MC)	5th sem (CSE)	36	36	6	11	6	8	4	1	0	0	NA	100%		
9	Dr. Ruchi	Maths-3 (BTAM304-18)	3rd Sem (CSE)	57	15	0	1	0	4	8	1	1	42	NA	26.3%		
		Maths-3 (BTAM304-18)	3rd Sem (AIML)	18	9	0	0	0	2	3	2	2	9	NA	50%		
10	Mrs.Gaganpreet Kaur	(HSMC101/102-18)	3rdSem(CSE)	58	56	0	10	19	13	7	4	3	2	NA	96.5%		
		Humanities (HSMC101-18)	3rd Sem (CSE)	18	14	0	0	1	4	7	1	1	4	NA	77%		
11	Mrs. SarbjotKaur	Data Structure (BTCS301-18)	3rd Sem (CSE)	60	58	0	10	17	13	14	3	1	2	NA	96.6%	-	-
		Data Structure (BTCS301-18)	3rd Sem (AIML)	17	9	0	0	3	3	0	0	2	8	NA	52%		

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

12	Dr.Jasdeep Singh	Digital electronics (BTCS301-18	3rd Sem (CSE)	59	44	0	1	11	17	10	3	2	15	NA	74.5%		
		Digital Electronics (BTES301-18)	3rd Sem (AIML)	18	6	0	0	1	1	1	2	1	12	NA	33%		
13	Er. Parmjeet Kaur	OOPS (BTCS 302-18)	3rd Sem (CSE)	59	50	0	1	18	16	10	3	2	9	NA	84.7%		
		OOPS (BTCS302-18)	3rd Sem (AIML)	17	12	0	0	2	3	6	1	0	5	NA	70%		

Head

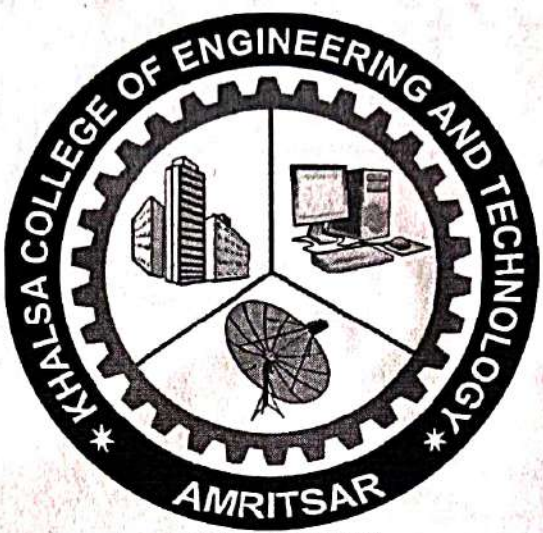
Dean Academics

Director

Head
Deptt. of Computer Science & Engg.
Khalsa College of Engg. & Technology
Amritsar

Course Work File

KHALSA COLLEGE OF ENGINEERING AND TECHNOLOGY, AMRITSAR



ESTD:2009

Course File

Course Name: Formal Languages & Automata Theory
Course Code: BTCS-502-18

Semester –5th (Batch-2021-25)
Degree & Program - B.Tech. (CSE)
Session (August -Dec 2023)
Academic Year 2023-2024

Submitted By

Faculty Incharge: Dr. JASLEEN KAUR

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CONTENTS

***To be added as per in the universityCurriculum**
 # To be added as per related course in the university Curriculum

Faculty Incharge
Name: Dr. Jasleen Kaur(Associate. Prof.)
Deptt. of Computer Science andEngg.

Checked By
Dr. Jasleen Kaur(H.O.D)
Deptt. of Computer Science &Engg.

INSTITUTE VISION AND MISSION

VISION
The vision of Khalsa College of Engineering and Technology Amritsar is to elevate the youth from rural areas on basis of access and equity through multidisciplinary education, transformation and research exploration.

MISSION
Our mission is to produce industry oriented, competent, creative, ethical and skilled professionals with an international outlook and confident to contribute towards sustainable development in rural and urban areas. To be centre of excellence in which research and scholarship flourish and to provide entrepreneurs and strategic leadersfor societal and human good.

DEPARTMENT VISION AND MISSION

VISION
The vision of Department of Computer Science and Engineering is to emerge as a state-of-art technological department through education, innovation and collaborative research.

MISSION
Our mission is to impart high quality education to students and to create and disseminate knowledge for the betterment of society.To establish a center of excellence in collaboration with industries and research laboratoriesto meet the changing needs of mankind. To provide individual attention and enable personality building and to impartand promote entrepreneurship and its skills among students.

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1: To enable graduates to pursue higher education and carry out research, or have a career in Engineering career in industries associated with Computer Science and Engineering or as an entrepreneur.

PEO 2: To ensure that graduates will have the ability and attitude to acquire new skills and adapt to emerging technological changes in the industry.

PEO 3: To ensure that graduates will be professional and ethical in their work, contributing to theadvancement and development of society.

PROGRAM OUTCOMES

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM-SPECIFIC OUTCOMES

PSO 1: To investigate challenging problems across various domains with appropriate computational techniques and evaluate the constructive solutions systematically.

PSO2: To apply principles of computer science engineering and practices for building high quality computing systems.

PSO 3: To adopt emerging information processing technologies for producing innovative solutions to current societal problems.

Ref. No IKGPTU/DA/1121 Dated 11/05/2023

Academic Calendar for Existing Batches upto 2022
(Including LEET Student admitted in 2022)
For the Session 2023-24

Odd Semester		
Sr. No.	Description	Period
1.	Commencement of Session	17/07/2023
2.	First Mid Semester Examination	September, 2023 (11th to 15th)
3.	Second Mid Semester Examination	November, 2023 (6th to 10th)
4.	Preparatory Holidays	November, 2023 (13th to 19th)
5.	End Semester Examination *	November, 2023 (20th) to December 2023 (24th)
6.	Winter Vacations **	December, 2023 (25th) to January 2024 (1st)
* End Semester Practical Examination will be notified separately by the Examination Branch of the University. (To be completed before last date of theory examination) ** This will be applicable for all faculty and students.		

Even Semester		
Sr. No.	Description	Period
1.	Commencement of Session	January 2024 (2nd)
2.	First Mid Semester Examination	February, 2024 (26th) to March 2024 (2nd)
3.	Second Mid Semester Examination	April, 2024 (15th to 20th)
4.	Preparatory Holidays	April, 2024 (25th) to April, 2024 (29th)
5.	End Semester Examination *	April, 2024 (30th) to June, 2024 (8th)
6.	Summer Vacations #	June, 2024 (1st) to July, 2024 (13th)
* End Semester Practical Examination will be conducted will be notified separately by the Examination Branch of the University. (To be completed before 8th June 2024) **Note: - End Semester Summer Training from 1st June, 2024 to 13th July, 2024**		

Contd...2

I. K. Gujral Punjab Technical University
Jalandhar-Kapurthala Highway, Kapurthala -144 603
Ph.: 01822-282562 Email : deanacad@ptu.ac.in Website : www.ptu.ac.in

Ref. No. IKGPTU/DA/1722 Dated 26/6/2023

Revised Academic Calendar for Session 2023-24

In accordance with the letter being issued by AICTE, New Delhi (vide letter No.AICTE/Adv./RB/Academic Calendar/23-24 dated 25.05.2023, copy enclosed), regarding the commencement of the Academic Session for the **2023-24 Batch**, the Revised Academic Calendar for **All Batches** is as under:

Odd Semester		
Sr. No.	**Description**	**Period**
1.	Commencement of Session	1st August 2023
2.	Orientation Program for 2023 Batch#	1st August 2023 to 31st August 2023
3.	First Mid Semester Examination	11th September 2023 to 15th September 2023
4.	Second Mid Semester Examination	30th October 2023 to 3rd November 2023
5.	Preparatory Holidays	6th November 2023 to 12th November 2023
6.	End Semester Examination*	13th November 2023 onwards
7.	Winter Vacations**	25th December 2023 to 1st January 2024
# First 14 Days Full day and there after along with classes.		
* End Semester Practical Examination will be notified separately by the Examination Branch of the University (To be completed before last date of theory examination). ** This will be applicable for faculty and students.		

Even Semester		
Sr. No.	**Description**	**Period**
1.	Commencement of Session	2nd January 2024
2.	First Mid Semester Examination	19th February 2024 to 24th February 2024
3.	Second Mid Semester Examination	8th April 2024 to 12th April 2024
4.	Preparatory Holidays	18th April 2024 to 22nd April 2024
5.	End Semester Examination*	23rd April 2024 onwards
6.	Summer Vacations#	1st June 2024 to 13th July 2024
* End Semester Practical Examination will be conducted will be notified separately by the Examination Branch of the University. (To be completed before 8th June 2024) **Note: - End Semester Summer Training from 1st June 2024 to 13th July 2024**		
# The Principal / Director of concerned Institute / Campus / College shall manage the vacation schedule for the Faculty and Students as per their requirement.		

a) Next Academic Session 2024-2025 shall commence from **15th July 2024.**

b) The number of days falling short of 90 (100 for Pharmacy Courses) should be compensated by making Saturdays or other holidays working by the institutions.

Prof. (Dr.) Vikas Chawla
Dean (Academics)

"Propelling Punjab to a Prosperous Knowledge Society"

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

[Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)]

Accredited by NAAC Grade "A"

Academic Calendar

Academic Year 2023-2024

S.No.	Event	Period	Duration
1	***Commencement of odd Semester***	***1 Aug 2023***	
2	I Spell of Instructions	1 Aug 2023 to 12 Sept 2023	6 weeks, 1 day
3	I Mid Semester Test	13 Sept 2023 to 15 Aug 2023	3 days
4	II Spell of Instructions	18 Sept 2023 to 31 Oct 2023	6 weeks, 2 days
5	II Mid Semester Test	1 Nov 2023 to 3 Nov 2023	3 days
6	Preparation/Internal Practical Exam	6 Nov 2023 to 10 Nov 2023	5 days
7	End Semester Examinations	13 Nov 2023 to 22 Dec 2023	6 weeks
8	***Commencement of Even semester***	***2 Jan 2024***	

Activities at the College level for Session (July- Dec 2023)

S. No	Activity Title	Dates
1	Tree Plantation Drive by NSS Cell	13 July 2023
2	National Online Quiz (Insolvency and Bankruptcy) by HV cell	25 July 2023
3	Tree Plantation Drive by NSS Cell	4 Aug 2023
4	Teez Celebration by Cultural Cell	4 Aug 2023
5	International Youth Day by NCC Cell	11 August 2023
6	Independence Day by NCC Cell	15 Aug 2023
7	Anti Ragging Day by HV Cell	18 Aug 2023
8	Ganesh Chaturthi by Cultural Cell	12 Sept 2023
9	Tree Plantation Drive by NSS Cell	29 Sept 2023
10	International Day of Non-Violence by HV Cell	29 Sept 2023
11	Cleanliness Drive by NSS Cell	1 Oct 2023
12	Guest Lecture by Dr. Kailash Srivastava by ISTE	3 Oct 2023
13	Ardass Diwas by Cultural Cell	6 Oct 2023
14	Indian Air force Day by NCC Cell	9 Oct 2023
15	Blood Donation Camp by NSS Cell	11 Oct 2023
16	Amrit Kalash Yatra by HV Cell	11 Oct 2023
17	Institute Innovation Day by IIC Cell	15 Oct 2023
18	Fresher Party by Cultural Cell	17 Oct 2023
19	IKGPTU Youth Fest	25-27 Oct 2023
20	Khalsa Youth Fest	31 Oct & 1 Nov 2023
21	National Unity Day by NCC Cell & ISTE	31 Oct 2023
22	National Entrepreneurship Day by IIC Cell	9 Nov 2023
23	National Education Day by IIC Cell	11 Nov 2023
24	National Pollution Control Day by IIC Cell	2 Dec 2023
25	National Energy Conservation Day by IIC Cell	14 Dec 2023

Dean Academics

Director

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

[Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)]

Accredited by NAAC Grade "A"

Department of Computer Science & Engineering - Academic Planner for odd Semester (Aug 2023-Nov 2023)

Aug-23	Day	Details	Day Order	Working Days	Sep-23	Day	Details	Day Order	Working Days	Oct-23	Day	Details	Day Order	Working Days	Nov-23	Day	Details	Day Order	Working Days
1	Tue	Commence of Classes	I	1	1	Fri		I	1	1	Sun	Holiday			1	Wed	MST-II	I	1
2	Wed		II	2	2	Sat	Holiday			2	Mon	Gandhi Jayanti			2	Thu	MST-II	II	2
3	Thu		III	3	3	Sun	Holiday			3	Tue		I	1	3	Fri	MST-II	III	3
4	Fri		IV	4	4	Mon		I	2	4	Wed		II	2	4	Sat	Holiday		
5	Sat	Holiday			5	Tue	Teachers Day Celebration	II	3	5	Thu	Technical Seminar	III	3	5	Sun	Holiday		
6	Sun	Holiday			6	Wed		III	4	6	Fri		IV	4	6	Mon	Result Analysis Report after MST-2		
7	Mon		I	5	7	Thu		IV	5	7	Sat	Holiday			7	Tue	Letter to parents /Syllabus revision		
8	Tue	Departmental Meeting	II	6	8	Fri	Departmental Meeting	V	6	8	Sun	Holiday			8	Wed	Preparatory Holidays		
9	Wed		III	7	9	Sat	Holiday			9	Mon		I	5	9	Thu	Preparatory Holidays		
10	Thu		IV	8	10	Sun	Holiday			10	Tue		II	6	10	Fri	Preparatory Holidays		
11	Fri	Guest Lecture	V	9	11	Mon	MST-I	I	7	11	Wed	Industrial Visit	III	7	11	Sat	Holiday		
12	Sat	Holiday			12	Tue	MST-I	II	8	12	Thu		IV	8	12	Sun	Diwali/Holiday		
13	Sun	Holiday			13	Wed	MST-I	III	9	13	Fri	International E Waste Day	V	9	13	Mon	Govardhan Puja		
14	Mon		I	10	14	Thu	MST-I	IV	10	14	Sat	Holiday			14	Tue	End Sem Examination		
15	Tue	Independay Day			15	Fri	Engineers Day	V	11	15	Sun	Holiday			15	Wed			
16	Wed		II	11	16	Sat	Holiday			16	Mon		I	10	16	Thu			
17	Thu		III	12	17	Sun	Holiday			17	Tue	Technical Quiz	II	11	17	Fri			
18	Fri		IV	13	18	Mon		I	12	18	Wed		III	12	18	Sat	Holiday		
19	Sat	Holiday			19	Tue	Technical Seminar	II	13	19	Thu		IV	13	19	Sun	Holiday		
20	Sun	Holiday			20	Wed		III	14	20	Fri	Departmental Meeting	V	14	20	Mon			
21	Mon		I	14	21	Thu	Result Analysis Report after MST-1	IV	15	21	Sat	Holiday			21	Tue			
22	Tue		II	15	22	Fri	Virtual Parent Meeting	V	16	22	Sun	Holiday			22	Wed			
23	Wed	Workshop	III	16	23	Sat	Holiday			23	Mon	Virtual Parent Meeting	I	15	23	Thu			
24	Thu	Workshop	IV	17	24	Sun	Holiday			24	Tue	Dussehra			24	Fri			
25	Fri	Workshop	V	18	25	Mon	Teachers Feedback from students	I	17	25	Wed	Course and Lab Exit Survey	II	16	25	Sat	Holiday		
26	Sat	Holiday			26	Tue	Letter to parents	II	18	26	Thu	Syllabus Completion Undertaking	III	17	26	Sun	Holiday		
27	Sun	Holiday			27	Wed	SDP	III	19	27	Fri	Distribution of Add on Course Certificate	IV	18	27	Mon	Guru Nanak Jyanti		
28	Mon		I	19	28	Thu	SDP	IV	20	28	Sat	Holiday			28	Tue			
29	Tue		II	20	29	Fri	SDP	V	21	29	Sun	Holiday			29	Wed			
30	Wed	Raksha Bandhan			30	Sat	Holiday			30	Mon	Parkash Gurpurab			30	Thu			
31	Thu		III	21						31	Tue	MST-II	I	19					3
Total				21					21					19					

HOD

Dean Academics

Director

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Department of Computer Science & Engineering

Session: (July-Nov 2023) **TIME TABLE – 5th Semester** **(Room No: 341)**

PERIOD/ DAY	9.00-9.55	9.55-10.50	10.50-11.00	11.00-11.55	11.55-12.50	12.50-1.45	1.45-2.40	2.40-3.30	3.30-4.20
	1	2		3	4		5	6	7
MON	DBMS(L)-SPK	FLAT(L)-JK	BREAK	ERP(L)-HS	Programming in Python(L)-AV	LUNCH BREAK	Constitution of India-PC	DBMS-LAB(LAB-VI)-G1-SPK	Programming in Python LAB-(LAB VIII)-G2-AV
TUES	FLAT(L)-JK	SE(L)-SK		CN(L)-LK	DBMS(L)-SPK		Java(AOC)-AV (Lab-III)	SE LAB-(LAB-V)-G1-SK	CN LAB(LAB-IV)-G2-LK
WED	Programming in Python(L)-AV	FLAT(L)-JK		LIBRARY-LK	SE(L)-SK		Constitution of India-PC	Programming in Python LAB-(LAB VIII)-G1-AV	DBMS LAB(LAB-VI)-G2-SPK
THU	DBMS(L)-SPK	FLAT(L)-JK		SE(L)-SK	CN(L)-LK		ERP(L)-HS	DBMS LAB(LAB-VI)-G1-SPK	SE LAB-(LAB-V)-G2-SK
FRI	CN(L)-LK	Programming in Python(L)-AV		Java(AOC)-AV- (Lab-III)	ERP(L)-HS		PD/Soft skills(L)-LK	CN LAB(LAB-IV)-G1-LK	DBMS LAB(LAB-VI)-G2-SPK

COURSE	CODE	FACULTY	COURSE	CODE	FACULTY
ERP	BTES-501-18	HARPREET SINGH(HS)	DBMS LAB	BTCS-505-18	SUPREET KAUR (SPK)
DBMS	BTCS-501-18	SUPREET KAUR (SPK)	SE LAB	BTCS-506-18	SUKHMEET KAUR (SK)
FLAT	BTCS-502-18	JASLEEN KAUR (JK)	CN LAB	BTCS-507-18	LOVELEEN KAUR(LK)
Software Engineering	BTCS-503-18	SUKHMEET KAUR (SK)	Programming in Python LAB	BTCS-513-18	ANURADHA VASHISHTHA(AV)
Computer Networks	BTCS-504-18	LOVELEEN KAUR(LK)	PD/Soft skills		LOVELEEN KAUR (LK)
Programming in Python	BTCS-510-18	ANURADHA VASHISHTHA(AV)	JAVA (AOC)		ANURADHA VASHISHTHA(AV)
COI	MC	PUNEET CHHINA	LIBRARY		LOVELEEN KAUR(LK)

TT Incharge H.O.D Overall TT Incharge Dean Academics Director

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Department of Computer Science and Engineering

Odd Sem Time Table(July'23–Nov'23)

Name of the Faculty member :Dr. Jasleen Kaur Designation : Associate Professor Department: CSE Total Load:12+5

DAY/Period	09:00-9:55	9:55-10:50	10:50-11:00	11:00-11:55	11:55-12:50	12:50-1:45	1:45-2:40	2:40-3:30	3:30-4:20
	1	2		3	4		5	6	7
MON		FLAT(L) CSE-5th (R-341)	BREAK		DM&W(L) CSE-7th (R-342)	LUNCH BREAK	Project Lab-CSE-7th	Project Lab-CSE-7th	
TUE	FLAT(L) CSE-5th (R-341)				DM&W(L) CSE-7th (R-342)				
WED		FLAT(L) CSE-5th (R-341)			DM&W(T) BCA-5th (R-)			DM&W(Lab) BCA-5th (LAB-IV)	
THU		FLAT(L) CSE-5th (R-341)						DM&W(Lab) BCA-5th (LAB-IV)	
FRI		DM&W(L) CSE-7th (R-342)						Project Lab-CSE-7th	

TT Incharge H.O.D Overall TT Incharge Dean Academics Director

Course Information sheet

Degree/Program: -B.Tech/CSE	**Year/Semester: - 3rd/ 5th**
Course Name: - Formal Languages and Automata Theory	**Course Code: - BTCS 502-18**
Course Type: - Professional Core	**Credit: - 3**

UNIT	Course Syllabus as per University Scheme	Hour
1	Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.	3hrs
2	Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.	8hrs
3	Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.	8hrs
4	Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.	5hrs
5	The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.	8hrs
6	Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages. Intractablity: Notion of tractability/feasibility. The classes NP and co-NP, their importance. Polynomial time many-one reduction. Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover	12hrs

Total Marks: 100	**Contact Hour: - 3+0=3 hr. (L+T)/week**
Corresponding Lab Course: - nil	**Corresponding Lab Code: -nil**

Faculty Incharge
Name: Dr. Jasleen Kaur(Associate. Prof.)
Deptt. of Computer Science andEngg.

Checked By
Dr. Jasleen Kaur(H.O.D)
Deptt. of Computer Science &Engg.

Text/Reference Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing
5. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Delivery/Instruction Methodologies (*Tick Appropriate*):

Chalk & Talk	✓	Projectors/Smart Board	✓	Web Resources	✓
Online videos	✓	Others			

Assessment Methodologies -Direct(*Tick Appropriate*):

MSTs/Test	✓	Assignments	✓	Tutorials	
Quizzes	✓	University Exams	✓	Lab Cont. Evaluation	
Viva Voice		Seminar	✓	Others	

Assessment Methodologies-In Direct(*Tick Appropriate*):

Assessment of Course Outcome (By feedback once)	✓	Student Feedback on Faculty	✓
Others			

LECTURE SCHEDULE

Degree/Program: B.Tech/ CSE **Course Code:- BTCS 502-18**
Course Name:Formal Languages and Automata Theory **Duration:Aug 2023-Dec 2023**
Faculty Name: Dr. Jasleen Kaur **Semester: 5th**

Aim:

Objective: To motivate and challenge students to understand properties of formal languages, formal grammars and finite automata and design automatato acceptset of strings of language. Also to understand the concept of decidability, NP completeness and NP-hard problem.

Pre-Requisite: *Design Analysis and Algorithm*

Teaching Aids:-*Chalk & Talk, PPT/Projectors, Online videos.*

Course Outcomes: After the course, the students should be able to

	Course Outcomes	POs	PSOs
CO1	Write a formal notation for strings, languages and machines.	1,2,3,5	1,2
CO2	Design finite automata to accept a set of strings of a language.	1,2,3,5	1,2
CO3	Design context free grammars to generate strings of context free language .	1,2,3,5	1,2
CO4	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.	1,2,3,5	1,2
CO5	Distinguish between computability and non-computability and Decidability and undecidability.	1,2,3,5	1,2

Faculty Incharge
Name: Dr. Jasleen Kaur(Associate. Prof.)
Deptt. of Computer Science andEngg.

Checked By
Dr. Jasleen Kaur(H.O.D)
Deptt. of Computer Science &Engg.

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Subject:Formal Languages and Automata Theory **Branch:** CSE
Sub Code:BTCS-502-18 **Sem:** 5th
Faculty: Dr. Jasleen Kaur **Session:** August-Nov 2023

Lect. No	Topics to be Covered	Planned Date	Period Number	Actual Date	Sign
MODULE-1Introduction (Formal Languages)					
1	Basic definition and examples ofGrammar	1-08-2023	2	7-08-2023	
2	Derivations and language generated by a grammar	2-08-2023	2	8-08-2023	
3	Examples	3-08-2023	2	10-08-2023	
4	Construction of a Grammar	7-08-2023	2	14-08-2023	
5	Examples	8-08-2023	2	14-08-2023	
6	Chomsky Classification of languages	9-08-2023	2	16-08-2023	
7	Languages and their corresponding automata	9-08-2023	2	16-08-2023	
MODULE-2 Regular Languages and Finite Automata					
8.	Definition of Automation	10-08-2023	2	7-08-2023	
9.	Characteristics of Automation	10-08-2023	2	17-08-2023	
10.	Description of Finite Automation	14-08-2023	2	17-08-2023	
11	Transition Systems	16-08-2023	2	18-08-2023	
12	Properties of Transition Functions	16-08-2023	2	18-08-2023	
13	Acceptability of a string by a finite automation	16-08-2022	2	18-08-2023	
14	Examples	17-08-2023	1	21-08-2023	
15	Examples	21-08-2023	1	21-08-2023	
16	Non Deterministic finite state machines	22-08-2023	2	22-08-2023	
17	Examples	22-08-2023	2	22-08-2023	
18	The Equivalence of DFA and NDFA	23-08-2023	2	23-08-2023	
19	Examples	23-08-2023	2	23-08-2023	
20	Finite Automata with Outputs Mealy and Moore models	24-08-2023	2	24-08-2023	
21	Regular Expressions	28-08-2023	2	28-08-2023	

22	Identites for regular expressions	29-08-2023	2	29-08-2023	
23	Arden's Theorem	31-08-2023	2	29-08-2023	
24	Transition systems and regular expressions	4-09-2023	2	4-09-2023	
25	Transition system containing null moves	5-09-2023	2	5-09-2023	
26	Algebric method using Arden's Theorem	6-09-2023	2	6-09-2023	
27	Construction of Finite automata equivalent to a regular expression	7-09-2023	2	7-09-2023	
28	Equivalence of two finite automata	18-09-2023	2	11-09-2023	
29	Equivalence of two regular expressions	18-09-2023	2	11-09-2023	
30	Pumping Lemma A Context-sensitive language is recursive	19-09-2023	2	12-09-2023	
31	Closure properties of regular sets	20-09-2023	2	12-09-2023	
32	Construction of a regular grammar	20-09-2023	2	18-09-2023	
	Assignment No:1	***Date of Announcement:-*** 4-09-2023		***Date of Submission:-*** 11-09-2023	
MODULE-3 Context free languages and Pushdown Automata					
33	Derivation Trees	21-09-2023	2	20-09-2023	
34	Leftmost and Rightmost derivation	21-09-2023	2	20-09-2023	
35	Ambiguity in Context free grammars	25-09-2023	2	21-09-2023	
36	Simplification of context free grammars	26-09-2023	2	25-09-2023	
37	Construction of Reduced Grammar	26-09-2023	1	26-09-2023	
38	Elimination of Null Production	27-09-2023	2	27-09-2023	
39	Elimination of Unit Production	27-9-2023	2	27-09-2023	
40	Normal forms for context free grammars	28-9-2023	2	28-09-2023	
41	Chomsky normal form	28-9-2023	2	28-09-2023	
42	Greibach normal form	3-10-2023	1	3-10-2023	
43	Definition and examples of Pushdown Automata	4-10-2023	2	4-10-2023	
44	Acceptance by Null store	5-10-2023	2	5-10-2023	

45	Construction of pda equivalent to context free grammar	9-10-2023	2	9-10-2023	
46	Construction of context free grammar	10-10-2023	1	10-10-2023	
	MODULE-4 Context Sensitive Languages				
47	Context Sensitive grammars and Languages	11-10-2023	2	12-10-2023	
48	Linear Bounded Automata	12-10-2023	5	13-10-2023	
49	Equivalence with CSG	12-10-2023	5	13-10-2023	
	Assignment No:2	***Date of Announcement:-*** 9-10-2023		***Date of Submission:-*** 13-10-2023	
	MODULE-5 Turing Machines				
50	Turing machine model& Representation of Turing Machines	16-10-2023	2	16-10-2023	
51	Design of Turing Machines	17-10-2023	1	17-10-2023	
52	Halting Problem The Post Correspondence problem	18-10-2023	2	19-10-2023	
53	Variants of Turing machines	18-10-2023	2	19-10-2023	
54	Definition, Properties of LR(k) Grammars	19-10-2023	2	23-10-2023	
55	Decidability and recursively enumerable languages, TMs as enumerators	19-10-2023	2	23-10-2023	
	MODULE-6 Undecidability and Intractability				
56	Church-Turing thesis and Reduction between languages and Rice s theorem	23-10-2023	2	26-10-2023	
57	Undeciable Problems :The classes NP and co-NP & Cook-Levin theorem	25-10-2023	1	31-10-2023	
58	Graphs	26-10-2023	2	1-11-2023	
	Assignment No:3	***Date of Announcement:-***		***Date of Submission:-***	
59	Revision	6-11-2023	1	7/11/2023	
60	Revision	7-11-2023	2	8-9/11/2023	

Number of proposed Lectures: 45
Number of proposed assignments: 3
Number of proposed Tests: 2(MST)

Text References:

1. K.L.P. Mishra and N. Chandrasekaran, "Theory of Computer Science, Third Edition", PHI Learning Private Limited, 2011.
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory", Languages and Computation, Pearson Education.

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Department of Computer Science and Engineering

Semester: 5th (Batch 2021-2025)

Sr. no.	University Regd. no.	Name
1	2105369	Amit kumar
2	2105372	Anmolpreet Kaur
3	2105373	Anupreet kaur
4	2105375	Bharti
5	2105376	Gurchetan Kumar
6	2105378	Gurpreet kaur
7	2105380	Gursimran Singh
8	2105382	Harshpreet singh
9	2105383	Harvinder singh
10	2105385	Intishab Ahmad Dar
11	2105387	Jasleen Kaur
12	2195388	Jaspinder kaur
13	2105389	Jatin vig
14	2105390	Jhanvi Naidu
15	2105392	Keshav Lakhesar
16	2105393	Kuber Arora
17	2105394	Mahesh Raina
18	2105395	Maninder Singh
19	2105396	Manjeet kour
20	2105398	Namhaydeep Singh Kang
21	2105400	Prabhmeet Singh
22	2105401	Prakash Kumar
23	2105402	Rajan
24	2105403	Rishikesh Kumar
25	2105404	Riya
26	2105405	Riya
27	2105407	Sahil Dutta
28	2105408	Siya Gill
29	2105409	Sonali
30	2105410	Sukhmanpreet Singh Virk
31	2105411	Suneha Saini
32	2105412	Tanpreet Singh
33	2105413	Twinkle sharma
34	2205044	Adesh Mishra
35	2205045	Prabhnoor Singh
36	2205046	Preet Kanwal Singh
37	2205048	Priyesh Kumar

Dr. Jasleen kaur

Name & Signature of Faculty

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DEPARTMENTOFCOMPUTER SCIENCE & ENGINEERING

ASSIGNMENT

Assignment No.	**1**	**Semester**	**5th**
CourseCode	**BTCS 502-18**	**CourseTitle**	**Formal Languages and Automata Theory**
Date of Issue	**4-09-2023**	**Date of Submission**	**11-09-2023**
Year	**3rd**	**Marks**	**10**

Bloom Skills Level:

Q. No.	Questions	CO	PO	PSO
1	Find a grammar generating $\{a^n b^n c^n \mid n \geq 1\}$	CO1	PO1	PSO1
2	Explain Pumping Lemma for Regular Sets.	CO2	PO1	PSO1

Marks Allocation		
Description	**Marks Allocated**	**Marks obtained**
Content	**6**	5
Presentation	**2**	2
Submission	**2**	2
Total	**10**	9

Name of student: Bharti

Signature : Bharti

Roll no - 2105375

Faculty Name: Dr. Jasleen Kaur

Signature:

Assignment no: 1

Explain Pumping lemma for Regular Sets.

The language accepted by finite automata is known as Regular language. Pumping lemma is used to prove that a language is not Regular.

The term Pumping lemma is made up of two words – Pumping and lemma.

- **Pumping:** The word pumping refers to the generating many input strings by pushing a symbol in an input string repeatedly.
- **lemma:** The word lemma refers to the intermediate theorem in a proof.

There are two pumping lemma, which are defined for-

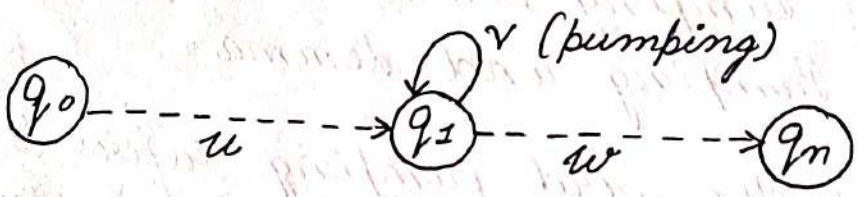
(i) Regular Languages
(ii) Context free Languages

- **Pumping lemma for Regular languages:**

for any regular language L, there exists an integer n, such that for all $x \in L$ with $|x| \geq n$, there exists $u, v, w \in \Sigma^*$, such that $x = uvw$ and (1) $|uv| \leq n$ (2) $|v| \geq 1$ (
for all $i \geq 0$: $uv^i w \in L$

In simple terms, this means that if a string v is 'pumped', i.e. if v is inserted any number of times, the resultant string still remains in L.
Pumping lemma is used as a proof for irregularity

of a language. Thus, if a language is regular, it always satisfies pumping lemma. If there exists at least one string made from pumping which is not in L, then L is surely not regular. The opposite of this may not always be true. That is if Pumping lemma holds, it doesnot mean that the language is regular.



- **Pumping lemma for context-free languages:**

Pumping lemma for Context-free languages states that for any context free language L, it is possible to find two substrings that can be 'pumped' any number of times and still be in same language.

for any language L, we break it string into five parts and pump second and fourth substring. Pumping lemma, here also, is used as a tool to prove that a language is not CFL.

Thus, if any one string does not satisfy its conditions, then the language is not CFL. Thus, if L is a CFL, there exists an integer n, such that for all $x \in L$ with $|x| \geq n$, there exists $u, v, w, x, y \in \Sigma^*$, such that $x = uvwxy$ and (1) $|vwx| \leq n$ (2) $|vx| \geq 1$ (3) for all $i \geq 0$: $uv^i wx^i y \in L$

Applications of Pumping Lemma:

The pumping lemma is extremely useful in proving that certain sets are non-regular. The general methodology followed during its applications is:

- Select a string Z in language L.
- Break string Z into x, y and z in accordance with the above conditions imposed by pumping lemma.
- Now check if there is any contradiction to the pumping lemma for any value of i.

Ques- find a Grammer generating $\{a^n b^n c^n \mid n \geq 1\}$

Solution- The given $L = \{a^n b^n c^n \mid n \geq 1\}$

(i) Construct $a^n \alpha^n$

(ii) we convert α^n into $b^n c^n$

$\alpha = BC$ where B and C are variables.

To bring B's together we introduce $CB \to BC$ Some more productions to convert B's into b's and C's into c's.

$$S \to aS\alpha \mid a\alpha$$

$$G = (\{S, B, C\}, \{a, b, c\}, P, S)$$

where Production consist of;

$S \to aSBC \mid aBC$

$CB \to BC$

$aB \to ab$

$bB \to bb$

$bC \to bc$

$CC \rightarrow cc$

$S \Rightarrow aBC$

$\Rightarrow abC$

$\Rightarrow abc.$

Thus, $abc \in L(G)$

Also,

$S \overset{*}{\Rightarrow} a^{n-1} S (BC)^{n-1}$ $[S \rightarrow aSBC]$

$\Rightarrow a^{n-1} aBC (BC)^{n-1}$ $[S \rightarrow aBC]$

$\overset{*}{\Rightarrow} a^n B^n C^n$ $[CB \rightarrow BC]$ (Since $CB \rightarrow BC$ Interchanging B and C)

$\overset{*}{\Rightarrow} a^{n-1} ab B^{n-1} C^n$ $[aB \rightarrow ab]$

$\overset{*}{\Rightarrow} a^n b^n C^n$ $[bB \rightarrow bb]$

$\Rightarrow a^n b^{n-1} bc C^{n-1}$ $[bC \rightarrow bc]$

$\Rightarrow a^n b^n c^n$ $[cC \rightarrow cc]$

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ASSIGNMENT for Advance Learners

Assignment No.	**2**	**Semester**	**5th**
Course Code	**BTCS 502-18**	**Course Title**	**Formal Languages and Automata Theory**
Date of Issue	**9-10-2023**	**Date of Submission**	**13-10-2023**
Year	**3rd**	**Marks**	**10**

Bloom Skills Level:

Q. No.	Questions	CO	PO	PSO
1	Explain Pumping Lemma for Context Free Languages.	CO3	PO1	PSO1
2	Explain model of Linear Bounded Automation.	CO4	PO1	PSO1

Marks Allocation		
Description	**Marks Allocated**	**Marks obtained**
Content	**6**	5
Presentation	**2**	2
Submission	**2**	2
Total	**10**	9

Name of student: Riya (2105405)
Signature : Riya

Faculty Name: Dr. Jasleen Kaur
Signature:

ASSIGNMENT-II (FLAT)

Ques:- Explain the pumping lemma for context free languages.

Ans:- • The pumping lemma for context-free languages gives a method of generating an infinite no. of strings from a given sufficiently long string in a context-free language L.

• It is used to prove that certain languages are not context-free.

• The pumping lemma for CFG is a well-built theorem that proves a language is not CFL.

FORMAL THEOREM :- The pumping lemma states:

For any context free language L, there exists an integer n, such that for all $x \in L$ with $|x| \geq n$, there exists $v, w, x, y, z \in \Sigma^*$, such that $x = vwxyz$ and

1.) $|wxy| \leq n$

2.) $|wy| \geq 1$

3.) for all $i \geq 0$: $vw^i xy^i z \in L$

The given rules mean that if two substrings form from a string of a CFL are pumped i.e. parts w and y are repeated i number of times, it will still remain part of the CFL.

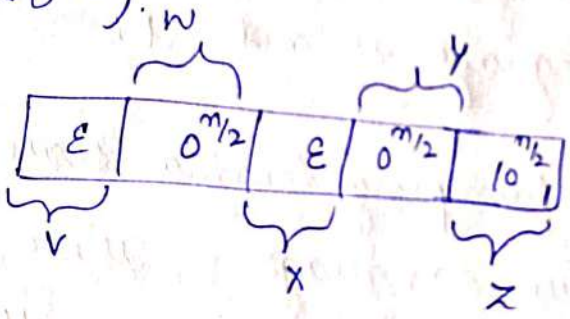
STEPS OF LEMMA:

1. Given a CFL, extract a string (instance) from it
2. Divide the string into substring such that $|wxy| \leq n$ and $|wy| \geq 1$.
3. Find a suitable i where the pumped string does not remain a part of language.

Example:- Let $L = ww/w \in (0,1)^*$ and suppose L is CFL

Take $u = 0^n 10^n 1$ where $|u| = 2n+2 > n$ and $u \in L$.

we divide u in such a way that $v = \epsilon$, $wxy = 0^n$ where $|wxy| \leq n$ $(w = 0^{n/2}, x = y, y = 0^{n/2})$ & $(w = 0^{n/2}, x = y = 0^{n/2})$.



Taking $i = 0$

$vw^i xy^i z = (1)(0^{n/2})^0 (\epsilon) (0^{n/2})^0 (10^n 1)$

$= 10^n 1 \notin L$

Q:- explain the model of Linear Bounded Automation.

A:- A Linear Bounded Automation (LBA) is similar to Turing Machine with some properties stated below:

- Turing Machine with Non-deterministic Logic.
- Turing Machine with multi-track, and
- Turing Machine with a bounded finite length of the tape.

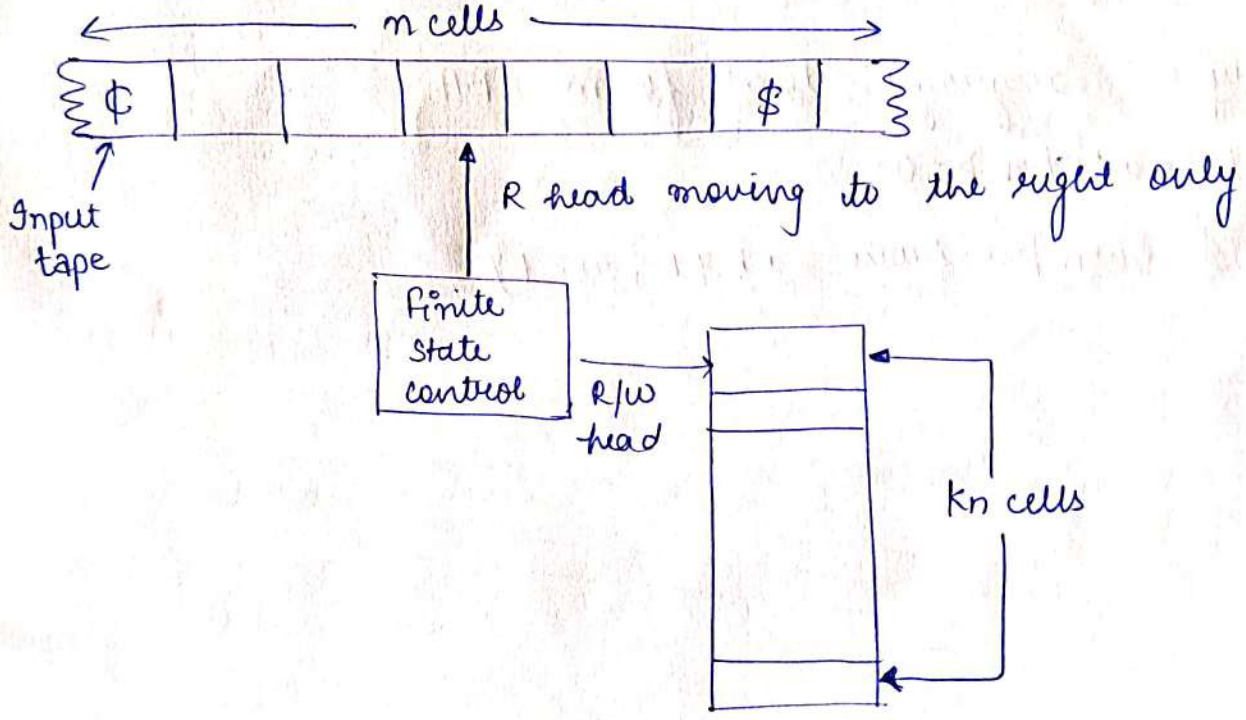


fig: Model of Linear Bounded Automation

Tuples Used in LBA:

LBA can be defined with eight tuples (elements that help to design automata) as:

$M = \{Q, T, E, q_0, M_L, M_R, S, F\}$,

where

Q -> A finite set of transition states.

T -> Tape alphabet

Σ -> Input alphabet

q_0 -> Initial state

m_L -> Left bound of tape

m_R -> Right bound of tape

δ -> Transition function

F -> A finite set of final states

Examples :- Languages that form LBA

- $L = \{a^{n!} / n >= 0\}$
- $L = \{ww^n / w \text{ from } \{a,b\}+, n \geq 1\}$

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DEPARTMENTOFCOMPUTER SCIENCE & ENGINEERING

ASSIGNMENT for Slow Learners

Assignment No.	2	Semester	5th
CourseCode	BTCS 502-18	CourseTitle	Formal Languages and Automata Theory
Date of Issue	9-10-2023	Date of Submission	13-10-2023
Year	3rd	Marks	10

Bloom Skills Level:

Q. No.	Questions	CO	PO	PSO
1	Define Closure Properties of Context free Languages.	CO3	PO1	PSO1
2	Explain Context Sensitive Grammar and their Languages.	CO4	PO1	PSO1

Marks Allocation		
Description	Marks Allocated	Marks obtained
Content	6	5
Presentation	2	2
Submission	2	1
Total	10	8

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(2205048)

Faculty Name: Dr. Jasleen Kaur
Signature:

Define Closure properties of context free language?

Context free language (CFLS) are accepted by pushdown automate. Context free language can be generated by context free grammars, which have Productions (substitution) rules of the form.

A > P (where A ∈ N and P ∈ (T ∪ N) and N is a non terminal and T is a terminal.

Properties of context free languages

Union :→ If L_1 and L_2 are two context free for example $L_1 = \{a^n b^m c^m | m >= 0$ and $n >= 0\}$ and $L_2 = \{a^n b^m c^m | m >= 0$ and $m >= 0\}$ $L_3 = L_1 \cup L_2 = \{a^n b^n c^m \cup a^n b^m c^m | n x = 0, m > 0\}$ is also Context free.

L_1 says number of a's should be equal to number of b's and L_2 says number of b's should be equal number of is. Their unions says either of two condition to be true so it is also Context free language.

Concatenation :→ If L_1 and If L_2 are two Context free language their Concatenation $L_1 L_2$ will also ibe context free for example $L_1 \{a^n b^n | n > 2 0\}$ and $L_2 = \{c^m d^m / M >$ 0

$L_3 = L_1 \; L_2 = \{a^n b^n c^m d^m) \; m >= 0$ and and $n > 0$ is also context free.

L_1 says number of a's should be equal to number of b's and L_2 says number of c's should be equal to number of d's. Their Concatention says first number of a's should be equal to number of b's, then number of c's should be equal to number of d's.

Note :→ So CFL are closed under Concatenator

Kleene closure :→ If L_1 context free is Kleene closure L_1 will also be context free for example,

$L_1 = \{a^n b^n / n >= 0\}$

$L_1 = \{a^n b^n / n >= 0\}$ is also context free

Note :→ So CFL are closed under Kleen closure.

Intersection and Complementation :→ If L_1 and L_2 are two context free language their intersection $L_1 \cap L_2$ need not be context free for example

$L_1 = \{a^n b^m c^n / n >= 0$ and $m >= 0\}$ and $L_2 = (a^m b^n c^n / n >= 0$ and $m >= 0\}$

$L_3 = L_1 \text{ on } nc_2 = \{a^n b^n c^n / n >= 0\}$ need not be context free.

L_1 says number as a's should be equal to number of b's and L_2 say number of bj.

and L_2 say number of b's should be equal to number of c's Their intersection says both conditions need to be true but Push down automata hence not context free.

Similarly Complementation of Context free language L_1 which is $\Sigma - L_1$ need not be Context free.

Deterministic Context free Language:

Deterministic CFL are subset of CFL which can be recognized PDA has only one move from a given state and input symbol ie. It do not have choice for a language to be DCFL it should be clear when to Push or Pop.

for example:- $L_1 = \{a^n b^n c^m / m >= 0 \text{ and } n\}$ is a DCFL because for a's we can Push on stack and for b's we can Pop.

Explain Context sensitive Grammar and their Language.

Context sestitive Grammar:→

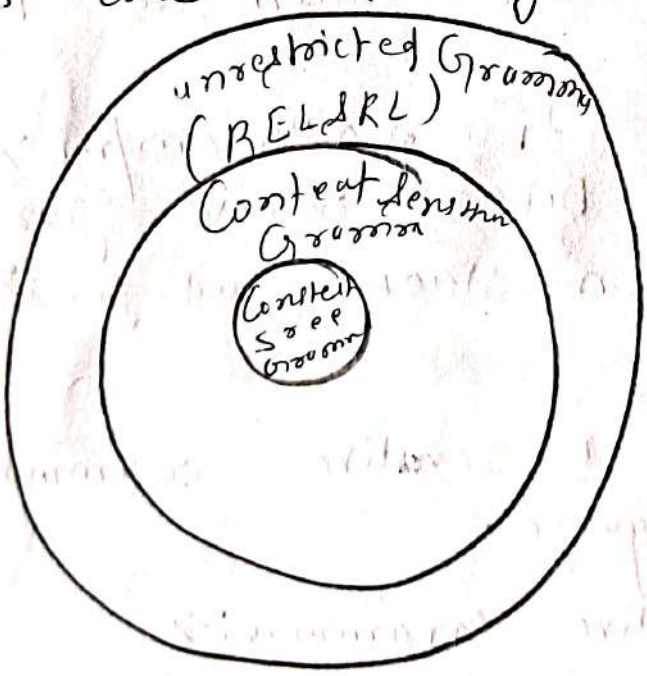
A Context sestitive grammer is an unrestricted grammer in which all the Production are as form

$\alpha \gamma \beta$.

where $\alpha, \beta \in (V \cup T)^+$ and $|\alpha| \leq |\beta|$

where α and β are strings of non-terminals and terminal.

Context :→ sensitive grammars are more Powerful than Context free grammary because there are same language that can be described by CSG but not by Context free grammers and CSL are less Powerful than unrestricted grammer. That's why Context sensitive grammer are Positional b/w Context free and unrestricted grammars in the Chansky hireraris.



Context sensitive grammar has 4-tuples

$G = \{N, \Sigma, P, S\}$ where

N = Set of non terminal symbols.

Σ = Set of terminal symbol

S = Start symbol of the production.

P = finite set of Productions.

All rules in P are of the form $a_1 A a_2 \rightarrow a_1 B a_2$

Context sesitive Language :→ The language that can be defined by context sestive grammers is called CSL Properties.

of CSL are :—

Union intersection and Concatenation of two Context senstive language in Context Senstive.

Complement of context - sestive language. is Context sensitive.

Example :—

Consider the following CSG

$S \rightarrow abc / aAbc$

$Ab \rightarrow bA$

$Ac \rightarrow Bbcce$

$bB \rightarrow Bb$

$aB \rightarrow aa / aaA$

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ASSIGNMENT for Advance Learners

Assignment No.	3	Semester	5th
Course Code	BTCS 502-18	Course Title	Formal Languages and Automata Theory
Date of Issue	23-10-2023	Date of Submission	27-10-2023
Year	3rd	Marks	10

Bloom Skills Level:

Q. No.	Questions	CO	PO	PSO
1	Explain Church – Turing Thesis..	CO5	PO1	PSO1
2	Explain Cook- Levin Theorem.	CO5	PO1	PSO1

Marks Allocation		
Description	Marks Allocated	Marks obtained
Content	6	5
Presentation	2	2
Submission	2	2
Total	10	9

Name of student: Riya (2105405)

Signature : Riya

Faculty Name: Dr. Jasleen Kaur

Signature:

ASSIGNMENT-III (FLAT)

Ques1:- Explain Church-Turing Thesis.

Ans1:- • Turing Machine is defined as an abstract representation of a computing device such as hardware in computers.

• Alan Turing proposed Logical computing machines (LCMs) i.e. Turing's expressions for Turing machines.

• This was done to define algorithms properly. So, church made a mechanical method named as 'm' for manipulation of strings by using logic and mathematics. This method 'm' must pass the following statements:

- No. of Instructions in m must be finite.
- o/p should be produced after performing finite no. of steps.
- It should not be imaginary i.e. can be made in real life.

• It should not require any complex understandi

→ Using these statements church proposed a hypothesis called "church's Turing Thesis" that can be stated as: "The assumption that the intuitive notion of computable functions ca be identified with partial recursive functions"

ASSUMPTIONS:-

1.) Each and every function must be computable.
2.) Let 'F' be the computable function and after performing some elementary operations to CF, it will transform a new $f^n(01)$, then this '01' automatically becomes computable f^n.
3.) If any function that follows above two assumptions must be stated as computable function.

Ques 2 :- Explain Cook- Levin Theorem

Ans 2 :- Cook- Levin Theorem states that the Boolean satisfiability problem is NP-complete. That is, it is in NP and any problem in NP can be reduced in polynomial time by a deterministic Turing machine to the Boolean satisfiability problem.

- Stephen Arthur Cook and L.A. Levin in 1973 proved that satisfiability problem (SAT) is NP-complete.
- He proved Circuit-SAT and 3CNF-SAT problems are as hard as SAT.

→ Hence, SAT is a significant problem and can be stated as follows:

Given a Boolean expression F having n variables $x_1, x_2, \ldots, x_n$ and Boolean operators, is it possible to have an assignment for variables True or False such that Binary expressions F is true?

→ This problem is also known as the formula-SAT.

IMPORTANT TERMINOLOGIES OF BOOLEAN EXPRESSION:-

→ BOOLEAN VARIABLE: A variable, 'x', that can have only two values, true or False is called Boolean variable

→ LITERAL: A logical variable 'x' or the negation of it i.e. 'x' or $\bar{x}$,

$x \longrightarrow$ positive literal

$\bar{x} \longrightarrow$ negative literal

→ CLAUSE: A sequence of variables $(x_1, x_2, ---, x_n)$ that can be separated by a logical OR operator is called a clause.

Example: $(x_1 \vee x_2 \vee x_3)$ is a clause of three literals.

→ Expressions:- One can combine all the preceding clauses using a Boolean operator to form an expression.

→ CNF-Form:- An expression is in CNF form (conjunctive Normal form) if the set of clauses are separated by an AND ($\wedge$)

the literals are connected by an OR (∨) operator.

Example: $f = (x_1 \vee \bar{x}_2 \vee x_3) \wedge (x_1 \vee \bar{x}_3 \vee x_2)$

3-CNF: An expression is said to be in 3-CNF if it is the conjunctive Normal form and every clause has exact three literals

TYPES OF SAT:-

i) Circuit - SAT

ii) CNF - SAT

iii) 3-CNF - SAT (3-SAT)

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ASSIGNMENT forSlow Learners

Assignment No.	**3**	**Semester**	**5th**
CourseCode	**BTCS 502-18**	**CourseTitle**	**Formal Languages and Automata Theory**
Date of Issue	**23-10-2023**	**Date of Submission**	**27-10-2023**
Year	**3rd**	**Marks**	**10**

Bloom Skills Level:

Q. No.	Questions	CO	PO	PSO
1	Explain Universal – Turing Machine..	CO5	PO1	PSO1
2	Explain Classes NP and Co-NP and their importance.	CO5	PO1	PSO1

Marks Allocation		
Description	**Marks Allocated**	**Marks obtained**
Content	**6**	4
Presentation	**2**	2
Submission	**2**	1
Total	**10**	7

Name of student: Jatin

Signature : Jatin

Faculty Name: Dr. Jasleen Kaur

Signature:

Assignment - (1)

Q1 Explain Universal Turing Machine

Ans → A universal Turing Machine is a Turing Machine which when supplied with an appropriate description of a Turing Machine M and an input string w can simulate the computation of w.

M, w Turing Machine → [UTM] → Response as M
Response with w

construction of Universal Turing Machine

- without loss of generality we assume the following for M.
- $Q = \{q_1, q_2, q_n\}$ where q_1 = initial data state and graphical state
- $\Gamma = \{\sigma_1, \sigma_2, \sigma_n\}$ where σ represents blanks
- select an encoding on which q_i is representable by $1q^2$, by 11 and so on
- Similarly σ_1 is encoded as 1, σ_2, as 11 etc -
- Finally let us represent R/w head directions by 1 for L (Left) and 11 for R (Right)
- The symbol 0 will be used as a separator b/w 11.

with these scheme any transition of M can be given as

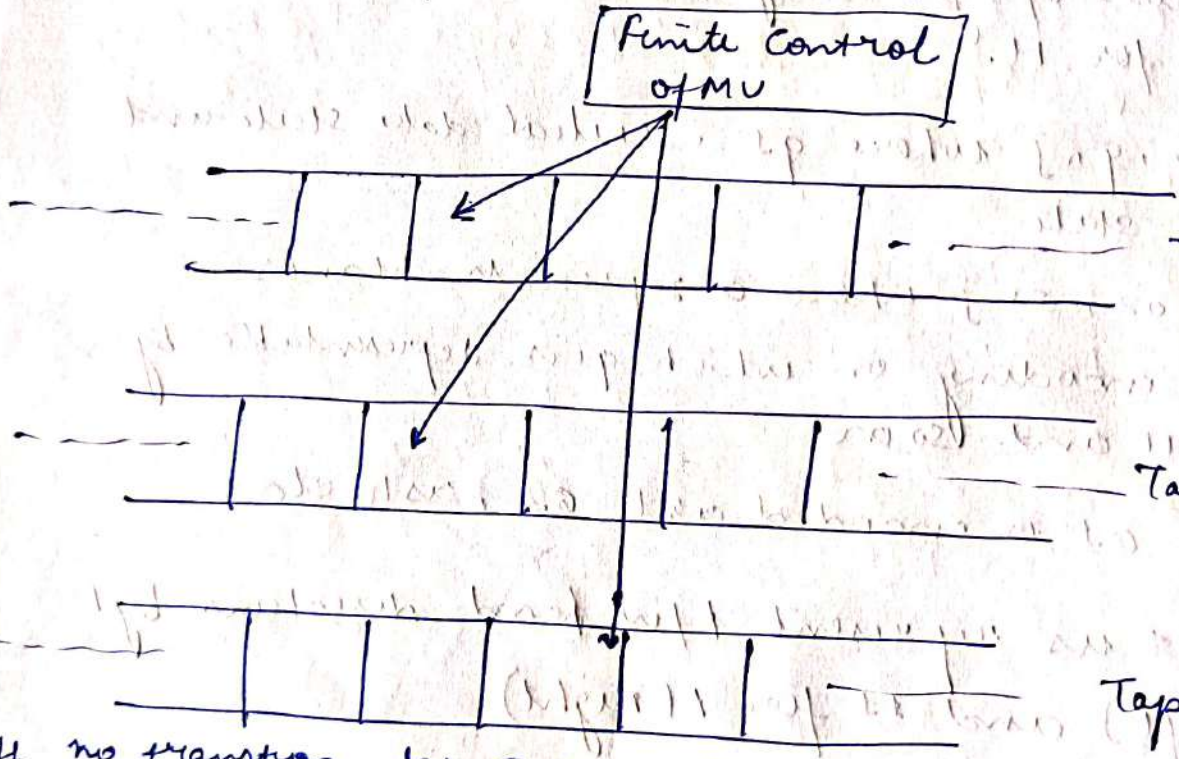
$\sigma(q_3, \sigma_1) = (q_4, \sigma_3, 2)$ will appear as

01110101110111010

- Implementation of Universal Turing Machine

A universal Turing Machine MU when then has an input alphabet, = {0,1} and the structure of a multitape TM

- MU looks first at the contents of Tape 2 and Tape 3 to determine the instantaneous description (ID) of M
- It then consists Tape 1 to see what M would do with this ID
- Finally Tape 2 and Tape 3 will be modified to reflect the result of the move.



If no transition for a given ID is formed MU halts as M must

- In either case, MU behaves as M would
- If M halts when presented with string w then MU will halt when presented with the encoded M and the encoded string or its tape
- Moreover the final string, MU has a tape will be the encoding of the string.

when M halts, Mu can tell if it is in the single accepting state and so moves to an accepting state of its own (or not)

2 Explain classes NP and CO-NP and their importance

→ In computer science, there exist some problems whose solutions are not yet found, the problems are divided into classes known as complexity class It is the branch of theory of computation that deals with the resources required to solve a problem

NP class :→

NP stands for the class of problems that can be solved by a non-deterministic algorithm (that is by a non deterministic Turing Machine) in Polynomial Time. P stands for Polynomial and NP for non deterministic polynomial.

The time cost of the non deterministic Turing Machine M on input x is the maximum number of transitions it follows before it halts, over all computational paths.

The (worst-case) time cost of a non-deterministic Turing Machine is the function $t: N \to N$ where $t(n)$ is the maximum time cost of M on any input (x) of length $|x| = n$.

For every function $t: N \to N$ non deterministic time complexity N Time (t) is the set of all languages that can be decided by non-deterministic Multi

Co-NP class

Co-NP class stands for the complement of NP class. It means if the answer to a problem in co-NP is No then there is proof that can be checked in polynomial time.

If a problem X is in NP, then its complement $\bar{X}$ is also in co-NP.

For an NP and coNP problem there is no need to verify all the answers at once in polynomial Time there is so need to verify only one particular answer yes or no in polynomial time for a problem to be in NP or Co-NP

FLAT QUIZ 1:-

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Student name:- *

Bharti

Roll no:- *

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Subject:- *

Flat

Subject code:- *

BTCS-502 -18

QUIZ

1.Which one of these given regular expressions isn't equivalent to this regular expression: * 1 point

(m + n + o) *

- ○ (m*n* + o*)*
- ○ (m*n*o*)*
- ◉ (m* + n* + o*)*

What is the highest type number which can be applied to the following grammar? * 1 point

S —> Aa, A —> Ba, B —> abc

- ○ type 0
- ○ type 1
- ◉ type 2
- ○ type 3

An automation is made up of * 1 point

- ○ States
- ○ transition
- ◉ both

how many states do finite automata have? * 1 point

- ○ 1
- ◉ 2
- ○ 3
- ○ none

finite Automata is collection of how many tuples? * 1 point

- ◉ 5
- ○ 4
- ○ 3
- ○ 2

The C language is a * 1 point

- ○ Regular language
- ◉ context free language
- ○ context sensitive language

Consider the following languages: * 1 point

L1 = {0^i1^j | i != 2j}

L2 = {0^i1^j | i = 2j+1}

L3 = {0^i1^j | i = j}

L4 = {0^i1^j | i != j}

Which of these is/are context free:

- ○ Only L3
- ○ only L3 & L2
- ○ L4 & L3
- ◉ all of these

Which of the following strings is not generated by the following grammar? S ? SaSbS|e * 1 point

- aabb
- abab
- aababb
- aaabb

If L1 and L2 are context free language and R a regular set, then which one of the languages below is not necessarily a context free language? * 1 point

- L1L2
- L1 ∩ L2
- L1 ∩ R
- L1 ∪ L2

Consider a grammar : * 1 point

G = ({ x , y) , { s , x , y } , p , s)
where elements of parse :
S--> x y
S -->y x
x--> x z
x--> x
y--> y
z--> z

The language L generated by G most accurately is called

- ○ Chomsky type 0
- ○ Chomsky type 1
- ◉ Chomsky type 3
- ○ Chomsky type 2

Flat Quiz 2

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Student name:- *

Sahil Dutta

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Subject:- *

Flat

Subject code:- *

Btcs-502-18

Flat Quiz II

In Moore machine, output is produced over the change of: *

- (●) transition
- ( ) state
- ( ) none of the above
- ( ) all of the above

Which of the following option is correct? *
A = {{abc, aaba}. {ε, a, bb}}

1 point

- ( ) abcbb ¢ A
- (●) ε may not belong to A
- ( ) ε¢A
- ( ) abca ¢ A

Transition function maps. * 1 point

- ○ Σ * Q -> Σ
- ○ Q * Q -> Σ
- ○ Σ * Σ -> Q
- ◉ Q * Σ -> Q

Number of states require to accept string ends with 10. * 1 point

- ◉ 3
- ○ 2
- ○ 1
- ○ 0

It is less complex to prove the closure properties over regular languages using * 1 point

- (●) NFA
- ( ) DFA
- ( ) PDA
- ( ) can't be send

. Which of the following is an application of Finite Automaton? * 1 point

- ( ) a) Compiler Design
- ( ) b) Grammar Parsers
- ( ) c) Text Search
- (●) d) All of the mentioned
- ( ) Other: _____

L1= {w | w does not contain the string tr } * 1 point
L2 = {w | w does contain the string tr}
Given ∑ = {t, r}, The difference of the minimum number of states required to form L1 and L2?

- a) 0
- b) 1
- c) 2
- d) Cannot be said

P, O, R be regular expression over ∑, P is not ε, then * 1 point
R=Q + RP has a unique solution:

- a) Q*P
- b) QP*
- c) Q*P*
- d) (P*O*) *

Which among the following are incorrect regular identities? * 1 point

- ○ a) εR=R
- ○ b) ε*=ε
- ○ c) Φ*=ε
- ◉ d) RΦ=R

Simplify the following regular expression: * 1 point

ε+1*(011) *(1*(011) *) *

- ○ a) (1+011) *
- ◉ b) (1*(011) *)
- ○ c) (1+(011) *) *
- ○ d) (1011) *

QUIZ III

Email *

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Quiz 3

Turing machine is more powerful than * 1 point

- ○ Finite automata
- ○ Push down automata
- ◉ Both(a) and (b)
- ○ None of these
- ○ Option 5

4/1

A pushdown automata behave like a turing machine, when it has number of auxiliary memory * 1 point

- ○ 0
- ○ 2
- ◉ 2 or more
- ○ Both b and c
- ○ Other: _____

Let two machines be P and Q. The state in which P can simulate Q and Q can simulate P is called * 1 point

- ◉ Turing equivalence
- ○ State equivalence
- ○ Universal Turing machine
- ○ None of these

Which among are not the results of computational theory? * 1 point

- ○ In general, it is impossible to predict that what a Turing-complete program will do over an arbitrarily long time.
- ○ It is impossible to determine for every input, whether the program will eventually stop or continue forever.
- ○ It is not possible to determine whether a program will return true or false.
- ◉ None of the mentioned

which of the following is an extension to the basic model of turing machine * 1 point

- ○ Multi tape turing machine
- ○ Multi head turing machine
- ○ Nondeterministic turing machine
- ◉ All of the above

According to chomsky hierarchy which of the following is recognised by recursively enumerable language * 1 point

- ○ Type 3
- ○ Type 2
- ○ Type 1
- ◉ Type 0

Church's Thesis supports * 1 point

- ○ Both TM is an general-purpose computer and TM is an algorithm and vice-versa are correct
- ◉ A Turing machine an algorithm and an algorithm as a Turing machine
- ○ A Turing machine as a general-purpose computer system
- ○ None of them is correct

Which of the following conversion is not possible (algorithmically)? * 1 point

- Regular grammar to context-free grammar
- (●) Non-deterministic pushdown automata to deterministic pushdown automata
- Non-deterministic finite state automata to deterministic finite state automata
- Non deterministic Turing machine to deterministic Turing machine

Any function whose values can be computed by an algorithm can be computed by a turing machine * 1 point

- Smn theorem
- Structured program theorem
- (●) Church turing thesis
- None of these

Which of the following is true for the language: {alpha^p| p is a prime} * 1 point

- (●) It is regular but not context free
- ( ) It is neither regular nor context free but accepted by a turing machine
- ( ) It is not accepted by a turing machine
- ( ) It is context free but not regular

QUIZ IV

Email *

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Which of the following allows stacked values to be sub-stacks rather than just finite symbols? * 1 point

- ○ Pushdown
- ○ turing machine
- ◉ nested stack automation
- ○ none of these

A push down automaton with only * 1 point

symbol allowed on the stack along with fixed symbol.

- ○ Embedded pda
- ○ nested stack automata
- ○ dpda
- ◉ counter automation

A PDA machine configuration (p, W, y) can be correctly represented as: * 1 point

- ◉ (current state, unprocessed input, stack content)
- ○ (unprocessed input, stack content, current state)
- ○ (current state, stack content, unprocessed input)
- ○ None

A DPDA is a PDA in which: * 1 point

- (●) No state p has two outgoing transitions
- ( ) More than one state can have two or more outgoing transition
- ( ) Atleast one state has more than one transitions
- ( ) None of these

Consider the grammer S -> SbS| a * 1 point

Consider thr following statement:

The string abababa has

A two parse tree

B two left most derivative

C two right most derivative

Which of thr following is correct

- (●) All A,B,C
- ( ) only A
- ( ) only B
- ( ) only C

A pushdown automata employs which data structure * 1 point

- ○ Queue
- ○ Linked list
- ○ Hash table
- ◉ stack

A non deterministic two way nested stack automation has n tuples definition. state the value of n * 1 point

- ○ 5
- ○ 8
- ○ 4
- ◉ 10
- ○ Option 5

pushdoem automata accepts ich language * 1 point

- ○ Type 3
- ◉ type 2
- ○ type 1
- ○ type 0

the class of languages not accepted on deterministic , non erasing stack automata is * 1 point

- ○ NSPACE
- ○ NL
- ○ CSL
- ◉ all of these
- ○ Option 5

the following move of a pda is on the basis of * 1 point

- ○ Present state
- ○ input symbol
- ◉ both a and b
- ○ None of these

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Program/Degree	**B. Tech (CSE)**	**Semester**	**5th**
Course Code	**BTCS 502-18**	**Course Title**	**FLAT**
Mid Sessional Test (MST) No.	1	**Faculty Incharge**	Dr. Jasleen Kaur
Max Marks	24	**Time Duration**	1Hour 30 Minutes
Date of MST	14th SEPT. 2023	**Roll Number**	

Q. No.	Questions			Marks
Section A (Attempt all questions)				
Q1.	a) Define NDFA and DFA.	CO2	L2	2
	b) Give regular expressions for the following L1 = set of all strings of a's and b's ending in ab ,L2 = set of all strings of 0 and 1 beginning with 1 and ending with 00.	CO2	L3	2
	c) Explain Mealy and Moore Models.	CO2	L2	2
	d) Give two properties of regular languages.	CO2	L1	2
Section B (Attempt all questions)				
Q2.	Construct a non-deterministic finite automation accepting all strings over {0, 1} ending in 010 or 0010. Use it to construct DFA accepting same set of strings.	CO2	L5	4
Q3.	Find the language generated by $S \rightarrow 0S1 \mid 0A1$, $A \rightarrow 1A \mid 1$.	CO1	L5	4
Section C (Attempt any one question)				
Q5.	Explain in brief Chomsky classification of languages. Also name the automata accepting those languages.	CO1	L3	8
Q6.	Find a grammar generating $\{a^n b^n c^j \mid n \geq 1, j \geq 0\}$	CO1	L5	8

Bloom's Skills: L1= Remember (R), L2= Understand (U), L3= Apply (A), L4= Analyze (AZ), L5= Evaluate (E) and L6 = Create (C).

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Department of Computer Science and Engineering

MST I Performance (September'2023)

Subject:FLAT **Subject Code: BTCS 502-18** **Semester: 5th**

Sr. no.	University Regd. no.	Name	Lectures Del.	Lectures Attn.	%age of Lecture attended	Marks obtained in MST-1	%	Slow/Advanced Learner
1	2105369	Amit kumar	25	18	72	12	50.00%	
2	2105372	Anmolpreet Kaur	25	11	44	4	16.67%	Slow Learners
3	2105373	Anupreet kaur	25	16	64	12	50.00%	
4	2105375	Bharti	25	18	72	18	75.00%	Advaced Learners
5	2105376	Gurchetan Kumar	25	20	80	11	45.83%	
6	2105378	Gurpreet kaur	25	12	48	6	25.00%	Slow Learners
7	2105380	Gursimran Singh	25	10	40	10	41.67%	
8	2105382	Harshpreet singh	25	19	76	18	75.00%	Advaced Learners
9	2105383	Harvinder singh	25	10	40	8	33.33%	Slow Learners
10	2105385	Intishab Ahmad Dar	25	14	56	Ab	0.00%	Slow Learners
11	2105387	Jasleen Kaur	25	0	0	Ab	0.00%	Slow Learners
12	2195388	Jaspinder kaur	25	15	60	11	45.83%	
13	2105389	Jatin vig	25	10	40	3	12.50%	Slow Learners
14	2105390	Jhanvi Naidu	25	13	52	5	20.83%	Slow Learners
15	2105392	Keshav Lakhesar	25	4	16	Ab	0.00%	Slow Learners
16	2105393	Kuber Arora	25	12	48	4	16.67%	Slow Learners
17	2105394	Mahesh Raina	25	8	32	3	12.50%	Slow Learners
18	2105395	Maninder Singh	25	18	72	11	45.83%	
19	2105396	Manjeet kour	25	8	32	2	8.33%	Slow Learners
20	2105398	Namhaydeep Singh Kang	25	13	52	10	41.67%	
21	2105400	Prabhmeet Singh	25	8	32	20	83.33%	Advaced Learners
22	2105401	Prakash Kumar	25	8	32	15	62.50%	
23	2105402	Rajan	25	21	84	17	70.83%	
24	2105403	Rishikesh Kumar	25	8	32	1	4.17%	Slow Learners
25	2105404	Riya	25	15	60	13	54.17%	
26	2105405	Riya	25	17	68	21	87.50%	Advaced Learners
27	2105407	Sahil Dutta	25	19	76	2	8.33%	Slow Learners
28	2105408	Siya Gill	25	15	60	10	41.67%	
29	2105409	Sonali	25	10	40	7	29.17%	Slow Learners

Sr. no.	University Regd. no.	Name	Lectures Del.	Lectures Attn.	%age of Lecture attended	Marks obtained in MST-1	%	Slow/Advanced Learner
30	2105410	Sukhmanpreet Singh Virk	25	16	64	1	4.17%	Slow Learners
31	2105411	Suneha Saini	25	16	64	18	75.00%	Advaced Learners
32	2105412	Tanpreet Singh	25	10	40	3	12.50%	Slow Learners
33	2105413	Twinkle sharma	25	19	76	2	8.33%	Slow Learners
34	2205044	Adesh Mishra	25	18	72	11	45.83%	
35	2205045	Prabhnoor Singh	25	17	68	7	29.17%	Slow Learners
36	2205046	Preet Kanwal Singh	25	11	44	10	41.67%	
37	2205048	Priyesh Kumar	25	8	32	0	0.00%	Slow Learners
Note: Less than 40% Marks: Slow Learners						More than 75% Marks: Advaced Learners		

Dr. Jasleen Kaur

Name & Signature of Faculty

KHALSA COLLEGE OF ENGINEERING AND TECHNOLOGY

MST-1 SOLUTIONS

FORMAL LANGUAGES & AUTOMATA THEORY

SUBJECT CODE :- BTCS 502-18

SUBMITTED TO :- DR. JASLEEN KAUR

SUBMITTED BY :- ANMOLPREET KAUR

B.TECH CSE

5th SEMESTER

ROLL NO. 2105372

Require NDFA and DFA.

s:- DFA: It stands for deterministic finite automata. Deterministic refers to the uniqueness of the computation. In DFA there is only one path for specific input from the current state to the next state. A DFA is a collection of 5 tuples.

$\{Q, \Sigma, q_0, f, \delta\}$ where

$Q \rightarrow$ finite set states.

$\Sigma \rightarrow$ finite set called alphabets.

$\delta \rightarrow Q \times \Sigma \rightarrow \delta$ is the transition function.

$f \rightarrow f$ is the final state.

$q_0 \rightarrow$ initial state.

DFA requires more space and it is a subset of NDFA.

NDFA:- It stands for Non-Deterministic finite automata. It has finite numbe of states. It is easy to construct an NDF than DFA for a given regular language. I NDFA for each input symbol the transitio can be to multiple next states. NDFA also has 5 tuples as DFA but different transi tion functions.

$\{Q, \Sigma, \delta, q_0, f\}$ where

$Q \rightarrow$ finite set of states.

$\Sigma \rightarrow$ finite set of symbols called alphabets.

$\delta \rightarrow$ transition function where

$\delta : Q \times \Sigma \rightarrow 2^Q$

q_0 → Initial state from ... function processed. ($q_0 \in Q$)

F → set of final state / states of Q ($F \subseteq Q$) un...

(b) Give regular expression for the following ... L = set of all strings a and b's ending in ab
L_2 = set of all strings of 0 and 1 beginning with 1 and ending with 00.

Ans: α_1 = set of all strings of a's and b's ending in ab.

Any string in α_1 is obtained by concatenating any string over {a, b} and the string ab. {a, b} is represented by $(a+b)^*$.

Hence, α_1 is represented by 1.

$(a+b)^*$ ab

α_2 = set of all strings of 0 and 1 beginning with 1 and ending with 00

$1\{0,1\}^*00$

α_2 is represented by:

$1(0+1)^*00$

Explain Mealy and Moore Models.

MOORE MACHINES → are finite state machines with output ... and its output depends only on present state. The value of the output

function $z(t)$ in the most general case is a function of the present state of t and the present input and is dependent of current input.

$$z(t) = \lambda\, q(t)$$

where λ is called output function.

A moore machine has 6 tuples i.e.

$$Q, \Sigma, \Delta, \delta, \lambda, q_0$$

where...

$Q \rightarrow$ finite set of states.

$\Sigma \rightarrow$ input alphabet.

$\Delta \rightarrow$ output alphabet

$\delta \rightarrow$ transition from $\Sigma \times Q$ into Q

$\lambda \rightarrow$ output function mapping Q into Δ and

$q_0 \rightarrow$ initial state.

MEALY MACHINES:→ are also finite state machines with output value and their output depends on the present state and current input state symbol. The value of the output function $z(t)$ is most general case is a function of present state q_t and present input $x(t)$ i.e.

$$z(t) = \lambda(q_t)\, x(t)$$

where λ is the called the output function. It can be defined as

$$(Q, q_0, \Sigma, O, \delta, \lambda)$$

where

Q → finite set of states
q_0 → initial state
Σ → input alphabet
O → output alphabet
δ → transition function which maps Q × Σ → δ
λ → output function that maps Q × Σ → O

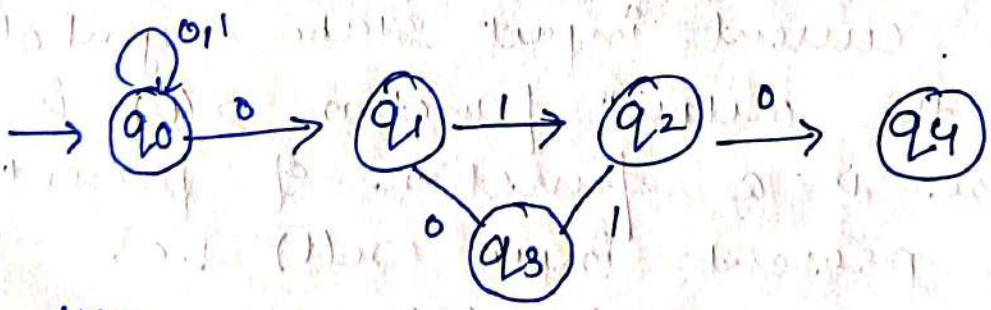
(d) Give two properties of regular Languages.

Ans:-

1. If a Language L is regular its complement L is regular.
2. If L_1 and L_2 are regular, then $L_1 \cup L_2$ is regular
3. If L is regular. then L^* is regular.

2. Construct a non-deterministic finite automation accepting all strings over {0,1} ending in 010 or 0010. use it to construct DFA accepting same set of strings.

Ans:-



Transition state table

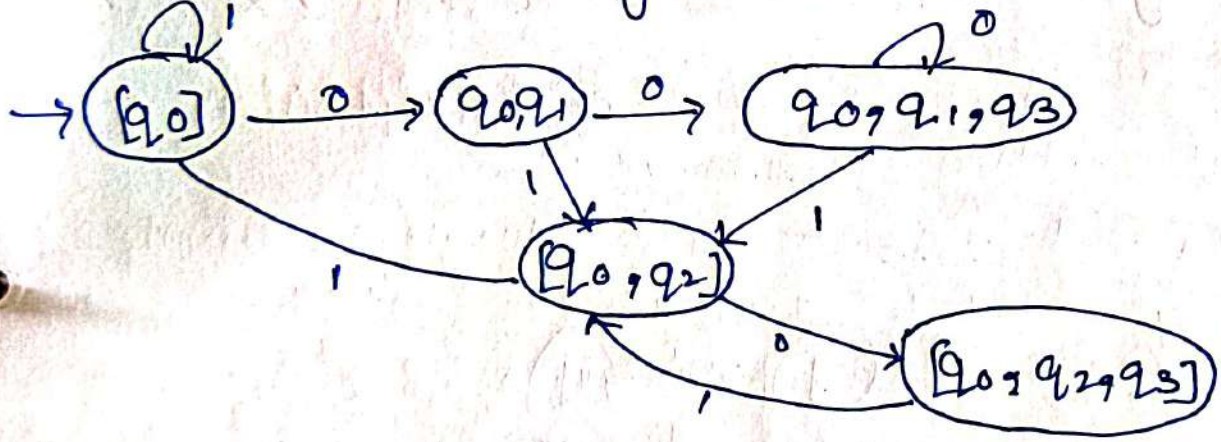
State	0	1
q_0	$q_0 q_1$	q_0
q_1	q_3	q_2
q_2	q_f	ϕ
q_3	ϕ	q_2
q_4	ϕ	ϕ

ansition table for Deterministic automata.

State	0	1
[q0]	[q0,q1]	q0
[q0,q1]	[q0,q1,q3]	[q0,q1]
[q0,q2,q3]	[q0,q1,q3]	[q0,q2]
[q0,q2]	[q0,q1,qf]	[q0]
[q0,q1,qf]	[q0,q1,q3]	[q0,q2]

The States are subset of {q0,q1,q2,q3,qf} i.e
[q0], [q0,q1], [q0,q2], [q1 q2,q3] [q0,q3,qf]
[q0] is initial state.
[q0,q1,qf] is final state.

Transition State Diagram:→



3. Find the language generated by
$S \to 0S1 \mid 0A1$, $A \to 1A \mid 1$.

Ans:. The given $G = \{S, A\}, \{0,1\}, \{P, S\}$

where P → S → 0S1 | 0A1
A → 1A | 1

here A → 11 [minimum string]

$S \to 0A1$

$= 00A11$ [$A = 0S1$]

$= 000A111$ [$S \to 0A1$]

$= 0001A111$ [$A \to 1A$]

$= 000111111$ [$A \to 1$]

$= 0^3 1^5$

$= 0^m 1^m \in L(G)$

where $m < m \geq 1$

4. Find a grammar generating $\{a^n b^n c^j / n \geq 1, j \geq 0\}$.

Sol:- Given $L = \{a^n b^n c^j / n \geq 1, j \geq 0\}$

$S \to AC$

$A \to aAb / ab$

$C \to Cc / a$

$\therefore G \to (\{S, A, C\}, \{a, b, c\}, P, S)$

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Program/Degree	**B. Tech (CSE)**	**Semester**	**5th**
Course Code	**BTCS 502-18**	**Course Title**	**Formal Language & Automata Theory**
Mid Sessional Test (MST) No.	2	**Faculty Incharge**	Dr. Jasleen Kaur
Max Marks	24	**Time Duration**	1Hour 30 Minutes
Date of MST	6th Nov. 2023	**Roll Number**	

Q. No.	Questions			Marks
	Section A (Attempt all questions)			
Q1.	a) If G is the grammar $S \rightarrow SbS \mid a$, show that G is ambiguous.	CO3	L2	2
	b) Define Context sensitive grammar.	CO4	L2	2
	c) Explain Linear Bounded Automata.	CO4	L3	2
	d) State Cook- Levin Theorem.	CO5	L2	2
	Section B (Attempt all questions)			
Q2.	Convert the following grammar G into Greibach normal form. $S \rightarrow ABb \mid a$, $A \rightarrow aaA \mid B$, $B \rightarrow bAb$.	CO3	L5	4
Q3.	Design a PDA for $\{wcw^T \mid w=\{a,b\}^*\}$.	CO3	L5	4
	Section C (Attempt question)			
Q4.	Explain the various representations of Turing Machine.	CO5	L4	8

Bloom's Skills: L1= Remember (R), L2= Understand (U), L3= Apply (A), L4= Analyze (AZ), L5= Evaluate (E) and L6 = Create (C).

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Department of Computer Science and Engineering

MST II Performance (November'2023)

Subject:FLAT **Subject Code: BTCS 502-18** **Semester: 5th**

Sr. no.	University Regd. no.	Name	Lectures Del.	Lectures Attn.	%age of Lecture attended	Marks obtained in MST-2	%	Slow/Advanced Learner
1	2105369	Amit kumar	52	42	81	8	33.33%	Slow Learners
2	2105372	Anmolpreet Kaur	52	34	65	Ab	0.00%	
3	2105373	Anupreet kaur	52	40	77	19	79.17%	
4	2105375	Bharti	52	40	77	20	83.33%	Advaced Learners
5	2105376	Gurchetan Kumar	52	45	87	15	62.50%	
6	2105378	Gurpreet kaur	52	35	67	0	0.00%	Slow Learners
7	2105380	Gursimran Singh	52	34	65	5	20.83%	Slow Learners
8	2105382	Harshpreet singh	52	43	83	15	62.50%	
9	2105383	Harvinder singh	52	36	69	8	33.33%	Slow Learners
10	2105385	Intishab Ahmad Dar	52	38	73	13	54.17%	
11	2105387	Jasleen Kaur	52	0	0	Ab	0.00%	LEFT
12	2195388	Jaspinder kaur	52	34	65	4	16.67%	Slow Learners
13	2105389	Jatin vig	52	34	65	8	33.33%	Slow Learners
14	2105390	Jhanvi Naidu	52	36	69	12	50.00%	
15	2105392	Keshav Lakhesar	52	28	54	13	54.17%	
16	2105393	Kuber Arora	52	34	65	16	66.67%	
17	2105394	Mahesh Raina	52	33	63	11	45.83%	
18	2105395	Maninder Singh	52	41	79	16	66.67%	
19	2105396	Manjeet kour	52	31	60	17	70.83%	
20	2105398	Namhaydeep Singh Kang	52	32	62	Ab	0.00%	
21	2105400	Prabhmeet Singh	52	34	65	19	79.17%	Advaced Learners
22	2105401	Prakash Kumar	52	34	65	18	75.00%	
23	2105402	Rajan	52	45	87	18	75.00%	
24	2105403	Rishikesh Kumar	52	33	63	10	41.67%	
25	2105404	Riya	52	34	65	Ab	0.00%	
26	2105405	Riya	52	42	81	21	87.50%	Advaced Learners
27	2105407	Sahil Dutta	52	38	73	15	62.50%	
28	2105408	Siya Gill	52	34	65	12	50.00%	
29	2105409	Sonali	52	31	60	Ab	0.00%	

Sr. no.	University Regd. no.	Name	Lectures Del.	Lectures Attn.	%age of Lecture attended	Marks obtained in MST-2	%	Slow/Advanced Learner
30	2105410	Sukhmanpreet Singh Virk	52	38	73	15	62.50%	
31	2105411	Suneha Saini	52	41	79	19	79.17%	Advaced Learners
32	2105412	Tanpreet Singh	52	32	62	16	66.67%	
33	2105413	Twinkle sharma	52	39	75	16	66.67%	
34	2205044	Adesh Mishra	52	42	81	14	58.33%	
35	2205045	Prabhnoor Singh	52	42	81	18	75.00%	
36	2205046	Preet Kanwal Singh	52	34	65	1	4.17%	Slow Learners
37	2205048	Priyesh Kumar	52	30	58	1	4.17%	Slow Learners
Note: Less than 40% Marks: Slow Learners						More than 75% Marks: Advaced Learners		

Dr. Jasleen Kaur

Name & Signature of Faculty

SECTION-C

Q4:-

Q4:- • Turing machine is a type of finite automation which is used to study the properties of various algorithms.

• Turing machine is a 7-tuple machine $(Q, \Sigma, b, \Gamma, q_0, F, \delta)$

REPRESENTATION

- Instantaneous Description
- Transition table
- Transition Diagram

1) Instantaneous Description (ID) of Turing Machine :-

In this representation of turing machine, the string accepted is in the form

$$\alpha\beta\gamma$$

where

α :- Left sequence of the string
β :- Current state
γ :- Right sequence of the symbol under R/W head.

(ii) Tape symbols

The description of table can be represented as xq_5L where x = replacement symbol
q_5 = new state
L = direction of movement of R/W head.

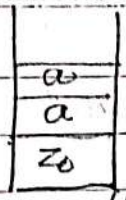
Present state	Tape symbol 0	1	b
$\rightarrow q_0$	$0Rq_1$	-	-
q_1	$0Rq_2$	bRq_1	-
q_2	bLq_3	-	bLq_4
q_3	bLq_2	-	-
(q_4)	-	-	-

Turing machine is an automation that accepts type-0 grammar i.e Recursively enumerable grammar.

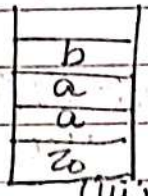
2) Transition diagram :- Another way of representing the Turing machine is Transition diagram, in which the initial state is represented with an arrow and the final state is represented with double / concentric circles.

$\delta(q_0, a, a) = \delta(q_0, aa)$

$\delta(q_0, b, a) = \delta(q_0, ba)$



(ii)



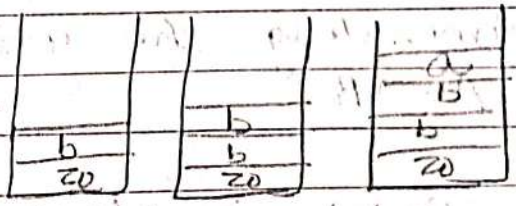
(iii)

(II) Starting with 'b' bbacabb

$\delta(q_0, b, z_0) = \delta(q_0, bz_0)$

$\delta(q_0, b, b) = \delta(q_0, bb)$

$\delta(q_0, a, b) = \delta(q_0, ab)$

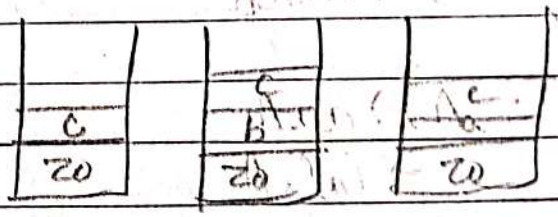


(III) When c is encountered, the R/W head will scan

$\delta(q_0, c, a) = \delta(q_1, a)$

$\delta(q_0, c, b) = \delta(q_1, b)$

$\delta(q_0, c, z_0) = \delta(q_1, z_0)$



(IV) Pop operation

$\delta(q_1, a, a) = \delta(q_1, b, b) = \delta(q_1, \wedge)$

$\delta(q_1, \wedge, z_0) = \delta(q_1, \wedge)$

$A \to C_a C_a A$ $\quad C_2 \to C_a A$

$A \to C_a C_2$

$B \to C_b A C_b$ $\quad C_3 \to A C_b$

$B \to C_b C_3$

The productions in CNF are

$S \to a$, $C_b \to b$, $C_a \to a$, $C_1 \to B C_b$, $C_2 \to C_a A$, $C_3 \to A C_b$
$S \to A C_1$, $B \to C_b C_3$, $A \to C_a C_2$.

(ii) $S \to a \mid A C_1$, $C_b \to b$, $C_a \to a$, $C_1 \to B C_b$, $C_2 \to C_a A$, $C_3 \to A C_b$, $S \to A C_1$, $B \to C_b C_3$, $A \to C_a C_2$.

Now applying lemma 1 after renaming the variables

$S = A_1$
$A = A_2$
$C_1 = A_3$
$B = A_4$
$C_b = A_5$
$C_2 = A_6$
$C_a = A_7$
$C_3 = A_8$

$A_1 \to A_2 A_3$ $\quad (A_i \to A_j)$ $j > i$

$A_3 \to A_4 A_5$

$A_6 \to A_7 A_2$

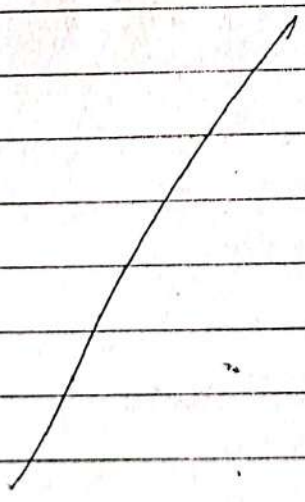
Modification of A_i productions

$A_1 \rightarrow aA_1A_2 \mid A_1bA_2$

$\rightarrow a\beta \mid A_1bA_2$

Modification of Z_i productions

$Z_1 \rightarrow$

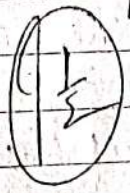


Prem

C. SHEET NO. .....

Context Sensitive grammar is defined as grammar in which there is a restriction on L.H.S and R.H.S of context of the grammar.

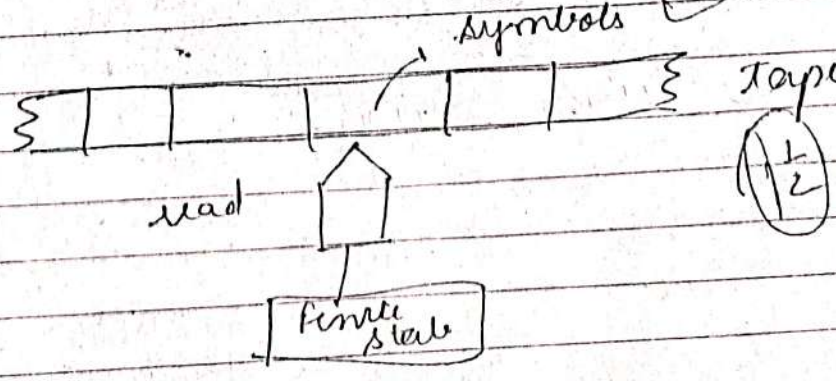
Context Sensitive grammar is accepted by Linear bounded automata.



Example :- $S \rightarrow aAbA$

Explain - - - Automata

Linear bounded Automata is a type of Automation that accepts type-1 Language i.e Context - sensitive Language.



SAT

CNF-SAT

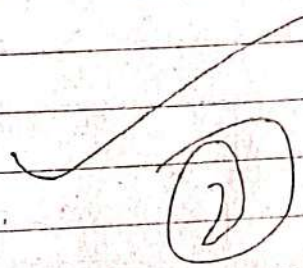
yenctic
ormal
form

3-CNF SAT

→ Combination of CNF and 3-SAT

Simple 3-SAT

→ i/p (n)
→ o/p
→ variables
→ AND, OR, NOT



(2)

Department of Computer Science and Engineering
ACADEMIC YEAR (2023-2024)
ROOT CAUSE ANALYSIS

Name of Faculty: Dr. Jasleen Kaur	**Course Name and Code: Formal Languages and Automata Theory (BTCS 502-18)**
Degree & Program: B.Tech. (CSE)	**Semester: 5th**
MST:II	**University Exam & Year: Dec 2023**
Target = 85 %	**Achieved = 85.7%**

S. No	University Roll.	Name of Student	Causes of Failure	Sign of student with date	Corrective Action	Preventive Action	Follow Up Status	Remarks of H.O.D
1.	2105378	Gurpreet kaur	Failed in MST I & MST II due to health issue	Gurpreet	Assignment was given	Counselling was given and Remedial classes were conducted	She got B grade in final exam.	Improved performance
2.	2105380	Gursimran Singh	Failed in MST II due to lack of preparation	Gursimran	Assignment was given	Remedial classes were conducted and important questions were discussed	He got B+ grade in final exam	Improved performance
3.	2105383	Harvinder singh	Failed in MST I & MST II due to lack of preparation	Harvinder Singh	Assignment was given	Remedial classes were conducted important questions were discussed	He got A grade in final exam	Improved performance
4	2195388	Jaspinder kaur	Failed in MST II due to lack of preparation	Jaspinder	Assignment was given	Counselling was given and Remedial classes were conducted	She got B grade in final exam	Improved performance

5	2105389	Jatin vig	Failed in MST I & MST II due to lack of preparation	Jatin	Assignment was given	Remedial classes were conducted important questions were discussed	He got B+ grade in final exam	Performance improved
6	2205046	Preet Kanwal Singh	Failed in MST II due to lack of preparation	Preet Kanwal	Assignment was given	Remedial classes were conducted important questions were discussed	Failed in final exam	Parents were informed
7	2205048	Priyesh Kumar	Failed in MST I & MST II due to lack of preparation	Priyesh	Assignment was given	Remedial classes were conducted important questions were discussed	He passed the final examination	Improved performance

Signature of Faculty

Sign of H.O.D

Sign of Dean

I K G Punjab Technical University, Jalandhar

Internal Awards Evaluation

Khalsa College of Engineering & Technology, Amritsar

Department: Computer Science & Engineering
Program: B Tech
Course Name: Formal Langauges and Automata Theory

Session: August- Dec 2023
Semester: 5th Semester
Sub Code: BTCS 502-18

Sr. no.	University Regd. no.	Name	Lectures Planned as per study	Lectures Del.	Lectures Attn.	%age of Lecture attended	Wt. Marks for Attendance (6)	Marks obtained in MST-1	Marks obtained in MST-2	Wt. Marks for MST's (24)	Wt. Marks (Assignments) (10)	Wt. Marks (Quiz) (10)	Total Marks (50)	Internal Marks (40)	Extracurricular/ Cocurricular Activities	Remarks	Uni Internal Marks(40)	%age
1	2105369	Amit kumar	42	52	47	90	4	12	8	10	9	8	31	25	2	NT	27	67
2	2105372	Anmolpreet Kaur	42	52	42	81	3	4	Ab	2	8	8	21	17	2	NT	19	47
3	2105373	Anupreet kaur	42	52	47	90	4	12	19	16	9	9	38	30	4	NT/T	34	86
4	2105375	Bharti	42	52	47	90	4	18	20	19	9	9	41	33	2	NT	35	87
5	2105376	Gurchetan Kumar	42	52	50	96	6	11	15	13	8	8	35	28	4	NT/T	32	80
6	2105378	Gurpreet kaur	42	52	42	81	3	6	0	3	8	7	21	17	2	NT	19	47
7	2105380	Gursimran Singh	42	52	42	81	3	10	5	8	8	8	27	22	2	NT	24	59
8	2105382	Harshpreet singh	42	52	48	92	5	18	15	17	9	9	40	32	4	NT/T	36	90
9	2105383	Harvinder singh	42	52	45	87	4	8	8	8	8	8	28	22	4	NT/S	26	66
10	2105385	Intishab Ahmad Dar	42	52	45	87	4	Ab	13	7	9	9	29	23	7	(YF/T/NT)	30	76
11	2195388	Jaspinder kaur	42	52	41	79	2	11	4	8	8	7	25	20	2	NT	22	55
12	2105389	Jatin vig	42	52	42	81	3	3	8	6	8	8	25	20	2	NT	22	55
13	2105390	Jhanvi Naidu	42	52	44	85	3	5	12	9	8	8	28	22	2	NT	24	61
14	2105392	Keshav Lakhesar	42	52	40	77	2	Ab	13	7	8	8	25	20	2	NT	22	55
15	2105393	Kuber Arora	42	52	41	79	2	4	16	10	8	8	28	22	2	NT	24	61
16	2105394	Mahesh Raina	42	52	41	79	2	3	11	7	9	9	27	22	6	(T/NT/NCC)	28	69
17	2105395	Maninder Singh	42	52	47	90	4	11	16	14	8	8	34	27	2	NT	29	73
18	2105396	Manjeet kour	42	52	41	79	2	2	17	10	8	8	28	22	7	(YF/NCC)	29	74
19	2105398	Namhaydeep Singh Kang	42	52	40	77	2	10	Ab	5	8	7	22	18	2	NT	20	49
20	2105400	Prabhmeet Singh	42	52	42	81	3	20	19	20	8	8	39	31	4	NT/T	35	88

Sr. no.	University Regd. no.	Name	Lectures Planned as per study	Lectures Del.	Lectures Attn.	%age of Lecture attended	Wt. Marks for Attendance (6)	Marks obtained in MST-1	Marks obtained in MST-2	Wt. Marks for MST's (24)	Wt. Marks (Assignments) (10)	Wt. Marks (Quiz) (10)	Total Marks (50)	Internal Marks (40)	Extracurricular/ Cocurricular Activities	Remarks	Uni Internal Marks(40)	%age
21	2105401	Prakash Kumar	42	52	42	81	3	15	18	17	8	8	36	29	4	NT/T	33	82
22	2105402	Rajan	42	52	49	94	5	17	18	18	9	9	41	33	4	NT/T	37	92
23	2105403	Rishikesh Kumar	42	52	41	79	2	1	10	6	8	8	24	19	2	NT	21	53
24	2105404	Riya	42	52	41	79	2	13	Ab	7	9	8	26	21	2	NT	23	57
25	2105405	Riya	42	52	49	94	5	21	21	21	9	9	44	35	4	NT/T	39	98
26	2105407	Sahil Dutta	42	52	44	85	3	2	15	9	8	7	27	22	2	NT	24	59
27	2105408	Siya Gill	42	52	41	79	2	10	12	11	9	8	30	24	2	NT	26	65
28	2105409	Sonali	42	52	39	75	0	7	Ab	4	8	8	20	16	2	NT	18	45
29	2105410	Sukhmanpreet Singh Virk	42	52	45	87	4	1	15	8	8	7	27	22	2	NT	24	59
30	2105411	Suneha Saini	42	52	50	96	6	18	19	19	9	9	43	34	5	YF/NT	39	99
31	2105412	Tanpreet Singh	42	52	43	83	3	3	16	10	8	8	29	23	4	NT/NCC	27	68
32	2105413	Twinkle sharma	42	52	45	87	4	2	16	9	9	8	30	24	2	NT	26	65
33	2205044	Adesh Mishra	42	52	46	88	4	11	14	13	8	8	33	26	2	NT	28	71
34	2205045	Prabhnoor Singh	42	52	48	92	5	7	18	13	8	8	34	27	2	NT	29	73
35	2205046	Preet Kanwal Singh	42	52	42	81	3	10	1	6	8	8	25	20	2	NT	22	55
36	2205048	Priyesh Kumar	42	52	40	77	2	0	1	1	8	8	19	15	2	NT	17	43

Note:-

Sports(S), Technical(T), NonTechnical(NT), Cultural (C) , Youth Fest(Y),NCC,NSS

Dr. Jasleen Kaur

Name & Signature of Faculty

H.O.D

Dean Academics

Director

Recommendations of the Rationalization Committee: .....

.....

.....

Signature 1 Signature 2 Signature3

Note:

1. Guide lines for awarding sessional / internal marks circulated vide IKGPTU/DA/2224 DT. 19.07.2017 should be followed for awarding marks.
2. Similar proforma showing detailed breakup should be developed for awarding marks in practical's, projects, seminars etc.

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

{Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab)}

Accredited by NAAC Grade "A"

Department of Computer Science & Engineering

Course Exit Survey (August - Dec 2023)

Subject Code and Name : BTCS 502-18- Formal Languages and Automata Theory **Batch: 2021-2025**

Course outcomes(Cos)			CO1:Write a formal notation for strings, languages and machines.	CO2: Design finite automata to accept a set of strings of a language.	CO3: Design context free grammars to generate strings of context free language .	CO4: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	CO5: Distinguish between computability and non-computability and Decidability and undecidability.
S. No	Roll No	Name					
1	2105369	Amit kumar	2	2	3	2	2
2	2105372	Anmolpreet Kaur	3	3	2	2	3
3	2105373	Anupreet kaur	3	3	2	2	3
4	2105375	Bharti	3	2	3	3	2
5	2105376	Gurchetan Kumar	3	2	3	3	3
6	2105378	Gurpreet kaur	3	3	2	3	3
7	2105380	Gursimran Singh	3	2	3	2	3
8	2105382	Harshpreet singh	2	3	3	3	2
9	2105383	Harvinder singh	3	3	3	3	3
10	2105385	Intishab Ahmad Dar	3	3	3	3	3
11	2105387	Jasleen Kaur					
12	2195388	Jaspinder kaur	3	3	3	3	3
13	2105389	Jatin vig	3	3	3	3	3
14	2105390	Jhanvi Naidu	3	3	2	3	3
15	2105392	Keshav Lakhesar	2	2	3	3	2

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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S. No	Roll No	Name					
16	2105393	Kuber Arora	3	3	3	3	3
17	2105394	Mahesh Raina	3	3	3	3	3
18	2105395	Maninder Singh	2	2	2	2	2
19	2105396	Manjeet kour	3	3	2	2	2
20	2105398	Namhaydeep Singh	3	2	3	3	2
21	2105400	Prabhmeet Singh	3	3	3	3	3
22	2105401	Prakash Kumar	3	3	3	3	2
23	2105402	Rajan	3	3	3	3	3
24	2105403	Rishikesh Kumar	3	3	3	3	3
25	2105404	Riya	3	3	3	2	2
26	2105405	Riya	3	3	3	3	3
27	2105407	Sahil Dutta	3	3	3	2	2
28	2105408	Siya Gill	3	3	3	3	3
29	2105409	Sonali	3	2	3	2	3

Khalsa College of Engineering & Technology

ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

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Department of Computer Science & Engineering

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S. No	Roll No	Name					
30	2105410	Sukhmanpreet Singh	3	3	3	3	3
31	2105411	Suneha Saini	3	3	2	3	3
32	2105412	Tanpreet Singh	3	3	2	3	2
33	2105413	Twinkle sharma	3	3	3	3	2
34	2205044	Adesh Mishra	3	3	3	3	3
35	2205045	Prabhnoor Singh	3	2	3	2	3
36	2205046	Preet Kanwal Singh	3	3	2	3	3
37	2205048	Priyesh Kumar	3	2	3	3	2
Correlation Levels			1 to 3	1= Low	2=Medium	3= High	

Sukhman Vir
Suneha Saini
Tanpreet Sin
Twinkle
Adesh Mishra
Prabhnoor Singh
Preet Kanwal Singh
Priyesh Kumar.

Khalsa College of Engineering and Technology Amritsar
Department of Computer Science and Engineering
Internal Assessment- Attainment of Course Outcomes (Through Direct Assessment)

Academic Period 2023-2024/ Odd Semester

Course Name & Code	Formal Languages and Automata Theory (BTCS 502-18)	**Batch**	2021-2025
Semester	5th	**Course Outcome**	CO1 CO2 CO3 CO4 CO5
Course Coordinator	Dr. Jasleen Kaur	**Target**	60 60 60 60 60

Attainment Level	Level	Range
	1	0-55 % of students scored more than or equal to the target
	2	55-69 % of students scored more than or equal to the target
	3	70-100 % of students scored more than or equal to the target

S. No.	Roll.No.	Name of student	MST-1					MST-2					Assignments					Tutorials					Total Outcomes				
			CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5
			12	12						10	4	10	5	5	5	5	10						17	17	15	9	20
1	2105369	Amit kumar	6.5	5						3.5	1.5	2.5	4	4	4	5	9						10.5	9	7.5	6.5	11.5
2	2105372	Anmolpreet Kaur	3	1						0	0	0	4	4	4	4	7						7	5	4	4	7
3	2105373	Anupreet kaur	7.5	4						7.5	2.5	8.5	5	4	4	5	9						12.5	8	11.5	7.5	17.5
4	2105375	Bharti	10	7.5						8	2.5	9.5	4	5	5	4	9						14	12.5	13	6.5	18.5
5	2105376	Gurchetan Kumar	7.5	3						5	2.5	7	4	4	4	4	8						11.5	7	9	6.5	15
6	2105378	Gurpreet kaur	3	3						0	0	0	3	4	4	4	8						6	7	4	4	8
7	2105380	Gursimran Singh	5.5	4						1.5	1.5	1.5	4	4	3	4	8						9.5	8	4.5	5.5	9.5
8	2105382	Harshpreet singh	10.5	7.5						3.5	2.5	8.5	4	4	5	4	9						14.5	11.5	8.5	6.5	17.5
9	2105383	Harvinder singh	4	4						0	3	5	4	4	4	5	8						8	8	4	8	13
10	2105385	Intishab Ahmad	0	0						1.5	4	7	4	4	4	5	9						4	4	5.5	9	16
11	2105388	Jaspinder kaur	5	5.5						0	0.5	3	4	4	4	4	8						9	9.5	4	4.5	11
12	2105389	Jatin vig	0.5	2						1.5	3	3	4	4	4	4	7						4.5	6	5.5	7	10
13	2105390	Jhanvi Naidu	1.5	3						0	3	8.5	4	4	4	4	8						5.5	7	4	7	16.5
14	2105392	Keshav Lakhesar	0	0						4.5	1.5	6.5	4	4	3	4	8						4	4	7.5	5.5	14.5
15	2105393	Kuber Arora	1	3						5	2.5	8.5	4	4	4	4	8						5	7	9	6.5	16.5
16	2105394	Mahesh Raina	1	1.5						2.5	3	5	4	4	5	4	9						5	5.5	7.5	7	14
17	2105395	Maninder Singh	8.5	2						5.5	2.5	8	4	4	4	4	8						12.5	6	9.5	6.5	16
18	2105396	Manjeet kour	0	1.5						6	2	9	4	4	4	4	8						4	5.5	10	6	17
19	2105398	Namhaydeep Singh Kang	5	4.5						0	0	0	3	4	4	4	8						8	8.5	4	4	8
20	2105400	Prabhmeet Singh	9	10.5						6	3	9.5	4	5	4	4	8						13	15.5	10	7	17.5
21	2105401	Prakash Kumar	7.5	7.5						6	3	9	4	4	4	4	8						11.5	11.5	10	7	17
22	2105402	Rajan	8	8.5						6	3	8.5	5	4	4	4	9						13	12.5	10	7	17.5
23	2105403	Rishikesh Kumar	0	0.5						5	1	3.5	4	4	4	4	8						4	4.5	9	5	11.5
24	2105404	Riya	7	5.5						0	0	0	4	5	4	4	9						11	10.5	4	4	9
25	2105405	Riya	11	10						8	3	9.5	5	4	4	5	9						16	14	12	8	18.5
26	2105407	Sahil Dutta	0.5	1.5						5	3	6.5	4	4	4	4	8						4.5	5.5	9	7	14.5
27	2105408	Siya Gill	5.5	4						5	2	5	4	4	4	5	9						9.5	8	9	7	14
28	2105409	Sonali	6	1						0	0	0	4	4	4	4	7						10	5	4	4	7
29	2105410	Sukhmanpreet Singh Virk	0	0.5						6	3	6	4	4	3	4	8						4	4.5	9	7	14
30	2105411	Suneha Saini	11	6.5						7.5	3.5	7.5	5	4	4	4	9						16	10.5	11.5	7.5	16.5
31	2105412	Tanpreet Singh	0	2.5						5.5	3	7.5	4	4	4	4	8						4	6.5	9.5	7	15.5
32	2105413	Twinkle sharma	0	2						5.5	3.5	7	4	4	4	5	9						4	6	9.5	8.5	16
33	2205044	Adesh Mishra	7	4						5.5	3	5.5	4	4	4	4	8						11	8	9.5	7	13.5
34	2205045	Prabhnoor Singh	3.5	3						6.5	2.5	9	4	4	4	4	8						7.5	7	10.5	6.5	17
35	2205046	Preet Kanwal Singh	7	3						0	0	0.5	4	4	4	4	7						11	7	4	4	7.5
36	2205048	Priyesh Kumar	0	0						0	0.5	0	3	4	4	4	8						3	4	4	4.5	8
																							10.2	10.2	9	5.4	12
																							14	8	13	27	24
																							38.889	22.222	36.111	75	66.667

CO Target value
Number students secured above the target
percentage of student secured above the target

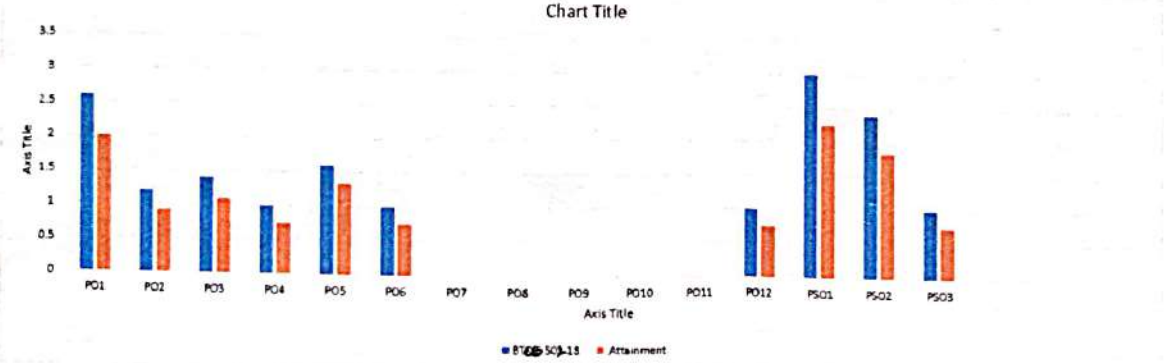
Head
Deptt. of Computer Science
Khalsa College of Engg. &
Amritsar

CO-PO Mapping Matrix																		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
CO1	3	2	1	1	1	1	-	-	-	-	-	1	3	2	1			
CO2	3	1	2	1	2	1	-	-	-	-	-	1	3	3	1			
CO3	3	1	2	1	2	1	-	-	-	-	-	1	3	3	1			
CO4	2	1	1	1	2	1	-	-	-	-	-	1	3	2	1			
CO5	2	1	1	1	1	1	-	-	-	-	-	1	3	2	1			
Avg	2.6	1.2	1.4	1	1.6	1						1	3	2.4	1			

CO Attainment							
	CO Attainment Internal (CO-INT)%	CO Attainment University (CO-UNI)%	Direct CO Attainment (0.60*CO-INT+ 0.40*CO-UNI)%	Indirect CO Attainment (Course Exit Survey)%	Overal CO Attainment (0.80* Direct + 0.20* Indirect)%		Overall CO Attainment Level
CO1	38.889	88.88	58.8854	97.2	66.54832		2
CO2	22.222	88.88	48.8852	92.59	57.62616		2
CO3	36.111	88.88	57.2186	92.59	64.29288		2
CO4	75	88.88	80.552	91.66	82.7736		3
CO5	66.667	88.88	75.5522	89.8	78.40176		3

PO Attainment Level																		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3			
CO1	2	1.3333	0.667	0.6667	0.6667	0.66667	-	-	-	-	-	0.6667	2	1.3333	0.6667			
CO2	2	0.6667	1.333	0.6667	1.3333	0.66667	-	-	-	-	-	0.6667	2	2	0.6667			
CO3	2	0.6667	1.333	0.6667	1.3333	0.66667	-	-	-	-	-	0.6667	2	2	0.6667			
CO4	2	1	1	1	2	1	-	-	-	-	-	1	3	2	1			
CO5	2	1	1	1	1	1						1	3	2	1			
Avg	2	0.9167	1.083	0.75	1.3333	0.75						0.75	2.25	1.8333	0.75			

PO/PSO Attainment Level																		
Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
BTME 503-18	2.6	1.2	1.4	1	1.6	1						1	3	2.4	1			
Attainment	2	0.9167	1.083	0.75	1.3333	0.75						0.75	2.25	1.8333	0.75			



Course PO attainment = (Average Co to PO relevance)/3* Course attainmnet

Head
Deptt. of Computer Science & Engg.
Khalsa Coll... Engg. & Technology
Amritsar

Roll No. Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (Sem.–5)

FORMAL LANGUAGE & AUTOMATA THEORY

Subject Code : BTCS-502-18

M.Code : 78321

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

Answer briefly :

1) If A={a, b} and B={a, c}, Find A* U B*.

2) State Kleene's Theorem.

3) Find Regular Expression over {a,b} having set of all string containing exactly two a's.

4) Differentiate between type1 and type2 grammar.

5) State Arden's Theorem.

6) Describe PDA.

7) Differentiate between Injective and Surjective functions in a set.

8) Write the steps needed for proving that a given set is not regular.

9) Define Derivation Tree.

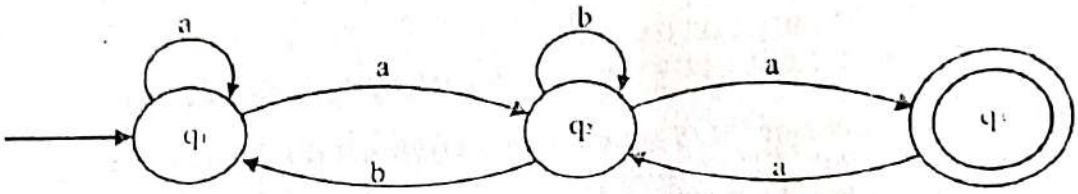
10) State Ambiguous grammar with example.

SECTION-B

11) Describe pumping lemma for regular set with the help of an example.

12) Prove that string represented by following transition system is

(a + a(b + aa)*b)* a(b + aa)*a.



13) Find a reduced grammar equivalent to the given grammar.

S → AB A → a B → b B → C E → c

14) What are the different types of Grammars and Languages associated with it.

15) Discuss the Universality of Cellular Automata.

SECTION-C

16) Find a grammar in GNF equivalent to the grammar.

E → E + T | T T → T * F | F F → (E) | a

17) Discuss the various representations of Turing Machine.

18) Design PDA for $\{wcw^1 \mid w = \{a,b\}^*\}$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No. | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

B.Tech. (CSE) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

M.Code : 71894

Time : 2 Hrs. Max. Marks : 30

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE question(s), each question carries 6 marks.

1. Convert the following grammar G into Greibach normal form.

   S→ABb|a A→aaA|B B→bAb

2. Let G be the grammar S→aB|bA A→a|aS|bAA B→b|bS|aBB. For the string abbbabbba, Find (a) LMD (b) RMD

3. Construct a minimized DFA from the regular expression (b/a)*aab.

4. Find the PDA equivalent to the given CFG with the following productions.

   1. S→A, A→BC, B→ba, C→ac

   2. S→aSb|A, A→bSa|S| ε

5. a. Give regular expressions for the following L1 = set of all strings of 0 and 1 ending in 00 L2 = set of all strings of 0 and 1 beginning with 0 and ending with 1.

   b. Differentiate regular expression and regular language.

6. Construct a minimized DFA from the regular expression 01+(0+11)0×1

7. What is the purpose of normalization? Construct the CNF and GNF for the following grammar and explain the steps.

   S→aAa | bBb |∈ A→C|a B→C|b C→CDE | ∈ D→A|B|ab.

8. Construct a CFG for the regular expression (101+1)(01).

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE) (2011 Onwards) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

Paper ID : [A2986]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1) Write briefly :

a) What are the basic operations for strings?

b) Define a finite automaton.

c) What are type-1 grammars?

d) Define a palindrome.

e) Give example of language that is recursive.

f) What is NDPDA?

g) What are context free languages?

h) What is ambiguity?

i) State pumping lemma for context free languages.

j) What is Greibach Normal Form?

SECTION-B

Q2) What is nondeterministic finite automaton? Show with the help of graph.

Q3) Grammar G,S → 0B| 1A, A → 0|0S|1AA, B → 1|1S|0BB. Find leftmost and rightmost derivation.

Q4) Give the Chomsky hierarchy of languages.

Q5) Find sets represented by regular expressions

a) (a + b) * (aa + bb + ab + ba)*

b) (aa)* + (aaa)*

Q6) Write the properties of LR(k) grammars.

SECTION-C

Q7) What is a Turing Machine? Discuss its halting problem.

Q8) Give proof for the statement: If L is a context free language, then we can construct a pda A accepting L by empty store, i.e. L = N(A)

Q9) Write short notes on :

a) Decidability

b) Post Correspondence problem

Roll No. ______________ Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE) (2011 Batch) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

Paper ID : [A2986]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION A

1. Write briefly :

a. Define an Automation System.

b. Explain the acceptance of a string with NFA and DFA over same alphabet.

c. What is Chomsky classification of formal languages?

d. Explain the languages supported by different automation and their relations.

e. What is decidability, explain?

f. What is the difference between acceptance of string in PDA with null stack or with final state?

g. What is the difference between Mealey and Moore machines?

h. How do we reduce unit production in context free grammars?

i. How Turing machine is different from FA and PDA in terms of capability?

j. What is Lex and YACC explain briefly?

SECTION B

2. Design a turning machine which recognizes the set of all even length palindromes over {0, 1}.

3. Design a PDA which recognizes the set of all even length palindromes over {a, b}.

4. Show that if L1 and L2 are recursive languages, then L1 ∪ L2 and L1 ∩ L2 are also recursive.

5. The language L is defined as the set of all string over {a, b} consisting of twice as many a's as b's construct a context free grammar for language L and a pushdown automata recognizing language L by empty store.

6. Prove that there exist a DFA for every NFA which accept the same language.

SECTION C

7. Which of the following sets are context-free and which are not? Give grammar for those that are context-free and proof for those that are not.

   (a) $\{a^n b^m c^k \mid n, m, k >= 1 \text{ and } (2n = 3k \text{ or } 5k = 7n)\}$

   (b) $\{a^n b^m c^k \mid n, m, k >= 1 \text{ and } (n = 3 m \text{ or } n <= 5k)\}$

   (c) $\{a^n b^m c^k \mid n, m, k >= 1 \text{ and } (n + k = m)\}$

   (d) $\{a^i b^j c^k d^l \mid i, j, k, l >= 1, i = k, j = l\}$

   (e) $\{a^i b^j c^k d^l \mid i, j, k, l >= 1, i = l, j = k\}$

8. (a) A PDA is called restricted if on any transition it can increase the height of the stack by only one symbol, i.e., if E (q, a, z) = (p, y) such that |y| = 2 and E is transition function of PDA. Now show that for any PDA say P we can construct a restricted PDA P' such that L (P) = L (P').

   (b) Construct the equivalent grammar in CNF for the given CFG.

   $S \rightarrow bA \mid aB, A \rightarrow bAA \mid aS \mid a, B \rightarrow aBB \mid bS \mid a.$

9. Describe "equivalent states" in finite state automation and prove that the relation "equivalent" among states is an 'equivalence' relation. How this equivalence relation can be used to minimise the number of states in FA?

Roll No. [ ] Total No. of Pages : 02

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B.Tech.(CSE) (2011 Onwards) (Sem.--7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

Paper ID : [A2986]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a. Define Transition system.

b. Construct a Grammar which generates all even integer's upto 998.

c. If each of the production in a grammar has some variable on its RHS, what can you say about L(G)?

d. Describe the following set by Regular Expression {01,10}

e. Define a Derivation Tree.

f. Compare the computational powers of Pushdown Automata and Finite Automata.

g. Define LR(k) grammars.

h. Define Pumping Lemma.

i. Give two properties of Regular Languages.

j. Give the representation of Turing machine by Instantaneous Descriptor.

SECTION-B

2. Construct a nondeterministic finite automata accepting {ab, ba}. and use it to find a deterministic automaton accepting the same set.

3. Reduce the following grammar to Greibach normal form :

   S → AB, A → BSB, A → BB, B → aAb, B → a, A →b

4. Prove that the following grammar is ambiguous :

   S → a/abSb/aAb

   A → bS/aAAb

5. Design a PDA to accept the language of nested balanced parentheses where number of opening parenthesis and closing parenthesis is greater than zero.

6. Discuss the Chomsky Hierarchy of Languages by taking suitable example for each classification.

SECTION-C

7. Discuss the various variants of Turing Machines by taking suitable examples.

8. For the PDA M design the corresponding CFG G

   M = ({q_0 q_1}, {0,1}, {Z_0, K}, δ, q_0, Z_0, Φ) with the transition function defined as follows :

   a. δ (q_0,l, Z_0) |--(q_0,KK Z_0)

   b. δ (q_0,0, K) |--(q_1, K)

   c. δ (q_0, ∧, Z_0) |--(q_0, ∧)

   d. δ (q_1, 0, K) |--(q_1, ∧)

   e. δ (q_0,l, K) |--(q_0, KK)

   f. δ (q_1,0, Z_0) |--(q_0, Z_0)

9. Write short notes on following :

   a. Recursively Enumerable Languages

   b. Halting Problem

Roll No. | | | | | | | | | | | Total No. of Pages : 02

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B.Tech.(CSE) (2011 Onwards) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

Paper ID : [A2986]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

1. Differentiate between NFA and DFA.
2. State Pumping Lemma for Context Free Languages.
3. What is Chomsky Classification of formal languages?
4. Differentiate between Moore and Mealy Machine.
5. What is the difference between acceptance of string in PDA with null stack or with final state?
6. Explain briefly Lex and Yacc.
7. Explain the concept of Unit Production.
8. Explain the acceptance of the string over NFA and DFA over the same alphabet.
9. Define terminal and non-terminal symbol.
10. Define leftmost and rightmost derivation.

SECTION-B

11. Explain in brief the properties of LL (k) grammars.

12. Explain in brief various types of languages. Also name the automata accepting those languages.

13. Find the grammar generating $L = \{a^n|b^nc^i\ |n\geq 1,\ i\geq 0\}$.

14. Design a Turing Machine which recognizes the set of all even length palindromes over {0,1}.

15. Consider the following productions.

$S \rightarrow aB|bA \quad A \rightarrow aS|bAA|a \quad B \rightarrow bS|aBB|b$

For the string aaabbabbba, find the

a) Leftmost derivation

b) Rightmost derivation

c) Parse Tree

SECTION-C

16. Write short notes on :

(a) Griebach Normal Form.

(b) Push Down Automata.

(c) Cellular Automata

17. Describe *"equivalent states"* in finite state automaton and prove that the relation *"equivalent"* among states is an 'equivalence' relation. How this equivalence relation can be used to minimize the number of states in FA?

18. Design a PDA which recognizes the set of all even length palindromes over {a,b}.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2011 Onwards) (Sem.–7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

M.Code : 71894

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

1. Justify this statement "*L is a silbset of closure of alphabet*".
2. Define automation.
3. Acceptability of a string by FA?
4. What is a yield of a derivation tree?
5. What is decidability?
6. Write formal definition of DFA.
7. Define regular expression.
8. Give definition of GNF.
9. List some properties of LR (K) grammars.
10. What is meant by halting problem?

SECTION-B

11. Explain NDPDA and DPDA with the help of example.

12. What do you mean by parsing? How Left most and Right most derivation helps to find out the ambiguity in a grammar?

13. Explain pumping lemma for Context free languages with the help of example.

14. Explain Chomsky classification of Grammars.

15. What are properties of regular languages?

SECTION-C

16. What is a context free grammar and explain closure properties of context free grammar?

17. What are Turing machines? Explain different ways by which we can represent the Turing machines.

18. Write short notes on :

    a. Top Down parsing

    b. LR(K) Grammars

    c. NFA

    d. Recursively enumerable language.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Department of Computer Science and Engineering
QUESTION BANK

Subject Code /Title: CS2303-Theory of Computation Year / Sem: III / V

UNIT-I AUTOMATA

PART-A(2-MARKS)

1. List any four ways of theorem proving.
2. Define Alphabets.
3. Write short notes on Strings.
4. What is the need for finite automata?
5. What is a finite automaton? Give two examples.
6. Define DFA.
7. Explain how DFA process strings.
8. Define transition diagram.
9. Define transition table.
10. Define the language of DFA.
11. Construct a finite automata that accepts $\{0,1\}^+$.
12. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings ending in 00.
13. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings with three consecutive 0's.
14. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings with 011 as a substring.
15. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings whose 10^{th} symbol from the right end is 1.
16. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings such that each block of 5 consecutive symbol contains at least two 0's.
17. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings that either begins or end(or both) with 01.
18. Give the DFA accepting the language over the alphabet 0,1 that have the set of all strings such that the no of zero's is divisible by 5 and the no of 1's is divisible by 3.
19. Find the language accepted by the DFA given below.
20. Define NFA.
21. Define the language of NFA.
22. Is it true that the language accepted by any NFA is different from the regular language? Justify your Answer.
23. Define ε-NFA.
24. Define ε closure.
25. Find the εclosure for each state from the following automata.

Part B

1. a) If L is accepted by an NFA with ε-transition then show that L is accepted by an NFA without ε-transition.

b) Construct a DFA equivalent to the NFA.

M=({p,q,r},{0,1}, δ,p,{q,s})

Where δis defined in the following table.

δ	0	1
p	{q,s}	{q}
q	{r}	{q,r}
r	{s}	{p}
s	-	{p}

2. a)Show that the set $L=\{a^n b^n / n>=1\}$ is not a regular. (6) b)Construct a DFA equivalent to the NFA given below: (10)

	0	1
p	{p,q}	P
q	r	R
r	s	-
s	s	S

3. a)Check whether the language $L=(0^n 1^n / n>=1)$ is regular or not? Justify your answer.

b) Let L be a set accepted by a NFA then show that there exists aDFA that accepts L.

4. Define NFA with ε-transition. Prove that if L is accepted by an NFA with ε-transition then L is also accepted by a NFA without ε-transition.

5. a) Construct a NDFA accepting all string in $\{a,b\}^+$ with either two consecutive a's or two consecutive b's.

b) Give the DFA accepting the following language:set of all strings beginning with a 1 that when interpretedas a binary integer is a multiple of 5.

6. Draw the NFA to accept the following languages.

(i) Set of Strings over alphabet {0,1,.....9} such that the final digit has appeared before. (8)

(ii)Set of strings of 0's and 1's such that there are two 0's separated by a number of positions that is a multiple of 4.

7.a)Let L be a set accepted by an NFA.Then prove that there exists a deterministic finite automaton that accepts L.Is the converse true? Justify your answer. (10)

b)Construct DFA equivalent to the NFA given below: (6)

8.a) Prove that a language L is accepted by some ε–NFA if and only if L is accepted by some DFA. (8)

b) Consider the following ε–NFA.Compute the ε–closure of each state and find it's equivalent DFA. (8)

	ε	A	b	C
p	{q}	{p}	Φ	Φ
q	{r}	ϕ	{q}	Φ
*r	Φ	ϕ	ϕ	{r}

9.a) Prove that a language L is accepted by some DFA if L is accepted by some NFA.

b) Convert the following NFA to it's equivalent DFA

	0	1
p	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

10.a) Explain the construction of NFA with ε transition from any given regular expression.

b) Let A=(Q,∑, δ, q0 ,{qf) be a DFA and suppose that for all a in ∑we have δ(q0, a)= δ(qf ,a). Show that if x is a non empty string in L(A),then for all k>0,x^k is also in L(A).

UNIT-II REGULAR EXPRESSIONS AND LANGUAGES

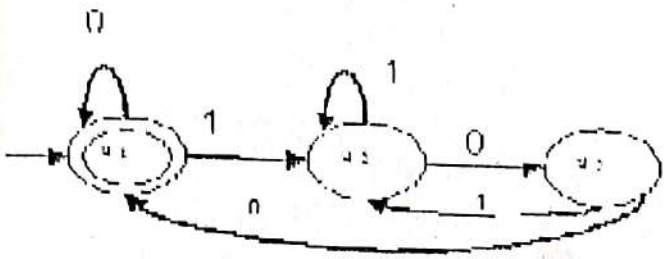
PART-A

1. Define Regular expression. Give an example.
2. What are the operators of RE.
3. Write short notes on precedence of RE operators.
4. Write Regular Expression for the language that have the set of strings over {a,b,c} containing at least one a and at least one b.
5. Write Regular Expression for the language that have the set of all strings of 0's and 1's whose 10^{th} symbol from the right end is 1.
6. Write Regular Expression for the language that has the set of all strings of 0's and 1's with at most one pair of consecutive 1's.
7. Write Regular Expression for the language that have the set of all strings of 0's
8. and 1's such that every pair of adjacent 0's appears before any pair of adjacent
9. 1's.
10. Write Regular Expression for the language that have the set of all strings of 0's and 1's whose no of 0's is divisible by 5.
11. Write Regular Expression for the language that has the set of all strings of 0's and 1's not containing 101 as a substring.
12. Write Regular Expression for the language that have theset of all strings of 0's and 1's such that no prefix has two more 0's than 1's, not two more 1's than 0's.
13. Write Regular Expression for the language that have the set of all strings of 0's and 1's whose no of 0's is divisible by 5 and no of 1's is even.
14. Give English descriptions of the languages of the regular expression (1+ ε)(00*1)*0*.
15. Give English descriptions of the languages of the regular expression (0*1*)*000(0+1)*.
16. Give English descriptions of the languages of the regular expression (0+10)*1*.
17. Convert the following RE to ε-NFA.01*.
18. State the pumping lemma for Regular languages.
19. What are the application of pumping language?
20. State the closure properties of Regular language.
21. Prove that if L and M are regular languages then so is LUM.
22. What do you mean by Homomorphism?
    Suppose H is the homomorphism from the alphabets {0,1,2} to the alphabets {a,b} defined by h(0)=a h(1)=ab h(2)=ba. What is h(0120) and h(21120).
23. Suppose H is the homomorphism from the alphabets {0,1,2} to the alphabets {a,b} defined by h(0)=a h(1)=ab h(2)=ba. If L is the language L(01*2) what is h(L).
24. Let R be any set of regular languages is U Ri regular?Prove it.
25. Show that the compliment of regular language is also regular.
26. What is meant by equivalent states in DFA.

PART-B

1.a)Construct an NFA equivalent to (0+1)*(00+11)

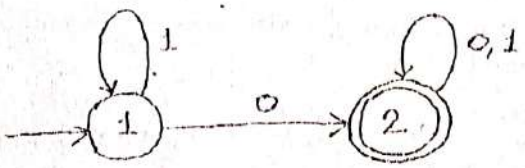
2.a)Construct a Regular expression corresponding to the state diagram given in the following figure.



b) Show that the set $E=\{0^i 1^i | i>=1\}$ is not Regular. (6)

3.a)Construct an NFA equivalent to the regular expression (0+1)*(00+11)(0+1)*.

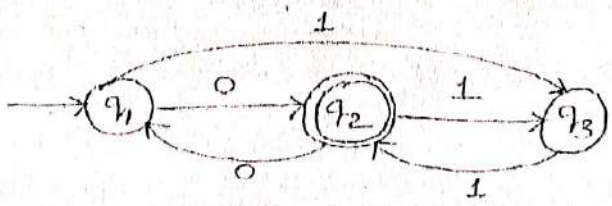
b)Obtain the regular expression that denotes the language accepted by the following DFA.

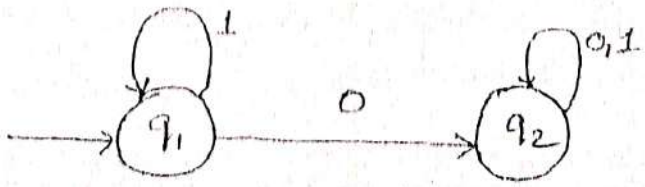


4.a)Construct an NFA equivalent to the regular expression ((0+1)(0+1)(0+1))*

b)Construct an NFA equivalent to 10+(0+11)0*1

5.a)Obtain the regular expression denoting the language accepted by the following DFA (8) b)Obtain the regular expression denoting the language accepted by the following DFA by using the formula R_{ij}^{k}





6. a)Show that every set accepted by a DFA is denoted by a regular Expression

b)Construct an NFA equivalent to the following regular expression01^*+1.

7. a)Define a Regular set using pumping lemma Show that the language $L=\{0i^2 / i$ is an integer,$i>=1\}$ is not regular

b)Construct an NFA equivalent to the regular expression $10+(0+11)0^*1$

8. a) Show that the set $L=\{O^{n2/n}$ is an integer,$n>=1\}$ is not regular.

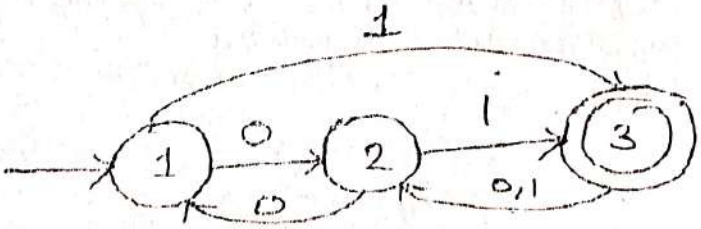
b)Construct an NFA equivalent to the following regular expression $((10)+(0+1)^*01$. (10) 9.a)Prove that if L=L(A) for some DFA A,then there is a regular expression R such that L=L(R).

b) Show that the language $\{0^p$,p is prime$\}$ is not regular.

10.Find whether the following languages are regular or not.

(i) $L=\{w \varepsilon\{a,b\} | w=w^R\}$.
(ii) $L=\{0^n 1^m 2^{n+m}$,n,m>=1$\}$
(iii) $L=\{1^k | k=n^2$,n>=1$\}$. (4)
(iv) L1/L2=$\{x$ | for some y εL2,xy εL1$\}$,where L1 and L2 are any two languages and L1/L2 is the quotient of L1 and L2.

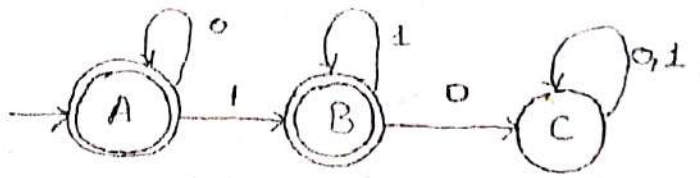
11.a) Find the regular expression for the set of all strings denoted by R^2 13 from the deterministic finite automata given below:



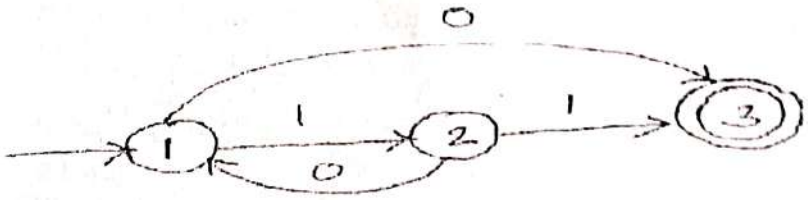
b)Verify whether the finite automata M1 and M2 given below are equivalent over {a,b}.

12.a)Construct transition diagram of a finite automaton corresponding to the regular expression $(ab+c^*)^* b$.

13.a)Find the regular expression corresponding to the finite automaton given below.



b)Find the regular expression for the set of all strings denoted by $R^2$23 from the deterministic finite automata given below.



14.a) Find whether the languages {ww,w is in (1+0)*} and {1^k | k=n^2, n>=1} are regular or not.

b) Show that the regular languages are closed under intersectionand reversal.

UNIT-III CONTEXT FREE GRAMMARS AND LANGUAGES

PART-A

1. Define CFG.2.Find L(G)where G=({S},{0,1},{S->0S1,S->ε},S).
2. Define derivation tree for a CFG(or)Define parse tree.
3. Construct the CFG for generating the language L={$a^n b^n$ /n>=1}.
4. Let G be the grammar S->aB/bA,A->a/aS/bAA,B->b/bS/aBB.for the string aaabbabbba find the left most derivation.
5. Let G be the grammar S->aB/bA,A->a/aS/bAA,B->b/bS/aBB.obtain parse tree for the string aaabbabbba.
6. For the grammar S->aCa,C->aCa/b.Find L(G).
7. Show that id+id*id can be generated by two distinct leftmost derivation in the grammar E->E+E | E*E | (E) | id .
8. For the grammar S->A1B,A->0A | ε, B-> 0B | 1B| ε,give leftmost and rightmost derivations for the string 00101.
9. Find the language generated by the CFG G=({S},{0,1},{S->0/1/ ε, S->0S0/1S1},S).
10. obtain the derivation tree for the grammar G=({S,A},{a,b},P,S) where P consist of S->aAS / a, A->SbA / SS / ba.
11. Consider the alphabet ∑={a,b,(,),+,*, ., ε} .Construct the context free grammar that generates all strings in ∑* that are regular expression over the alphabet {a,b}.
12. Write the CFG to generate the set {$a^m b^n c^p$ | m + n=p and p>=1}.
13. Construct a derivation tree for the string 0011000 using the grammar S->A0S |0 | SS , A-> S1A | 10.

14 Give an example for a context free grammar.

15 Let the production of the grammar be S-> 0B | 1A, A-> 0 | 0S | 1AA, B-> 1|1S | 0BB.for the string 0110 find the right most derivation.

16 What is the disadvantages of unambiguous parse tree. Give an example.

17 Give an example of PDA.

18. Define the acceptance of a PDA by empty stack. Is it true that the language accepted by a PDA by empty stack or by that of final state are different languages.

20 What is additional featurePDA has when compared with NFA? Is PDA superior over NFA in the sense of language acceptance? Justify your answer.

21. Explain what actions take place in the PDA by the transitions (moves) $\delta(q,a,Z)=\{(p1,\gamma1),(p2,\gamma2),.....(pm,\gamma m)\}$ and $\delta(q,\varepsilon,Z)=\{(p1,\gamma1),(p2,\gamma2),.....(pm,\gamma m)\}$.

22. What are the different ways in which a PDA accepts the language? Define them. Is a true that non deterministic PDA is more powerful than that of deterministic PDA? Justify your answer.

23. Explain acceptance of PDA with empty stack.

24. Is it true that deterministic push down automata and non deterministic push down automata are equivalent in the sense of language of acceptances? Justify your answer.

25. Define instantaneous description of a PDA.

26. Give the formal definition of a PDA.

27. Define the languages generated by a PDA using final state of the PDA and empty stack of that PDA.

28. Define the language generated by a PDA using the two methods of accepting a language.

29. Define the language recognized by the PDA using empty stack.

PART-B

1. a) Let G be a CFG and let a=>w in G. Then show that there is a leftmost derivation of w.

b) Let G=(V,T,P,S) be a Context free Grammar then prove that if S=> αthen there is a derivation tree in G with yield α.

2. Let G be a grammar s->OB/1A, A->O/OS/1AA, B->1/1S/OBB. For the string 00110101 find its leftmost derivation and derivation tree.

3) a) If G is the grammar S->Sbs/a, Show that G is ambiguous.

b) Give a detailed description of ambiguity in Context free grammar

4. a) Show that E->E+E/E*E/(E)/id is ambiguous. (6) b)Construct a Context free grammar G which accepts N(M), where M=({q0, q1},{a,b},{z0,z},δ,q0,z0,Φ) and where δis given by

$\delta(q0,b,z0)=\{(q0,zz0)\}$

$\delta(q0,\varepsilon,z0)=\{(q0,\varepsilon)\}$

$\delta(q0,b,z)=\{(q0,zz)\}$

$\delta(q0,a,z)=\{(q1,z)\}$

$\delta(q1,b,z)=\{(q1, \varepsilon)\}$

$\delta(q1,a,z0)=\{(q0,z0)\}$

5. a)If L is Context free language then prove that there exists PDA M such that L=N(M).

b)Explain different types of acceptance of a PDA.Are they equivalent in sense of language acceptance? Justify your answer.

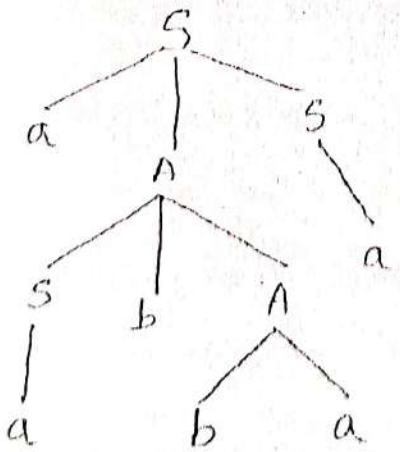
6. Construct a PDA accepting $\{a^n b^m a^n / m,n>=1\}$ by empty stack. Also construct the corresponding context-free grammar accepting the same set.

7. a) Prove that L is L(M2) for some PDA M2 if and only if L is N(M1) for some PDA M1.

b)Define deterministic Push Down Automata DPDA. Is it true that DPDA and PDA are equivalent in the sense of language acceptance is concern? Justify Your answer.

8.a) Construct a equivalent grammar G in CNF for the grammar G1 where G1 =({S,A,B},{a,b},{S->bA/aB,A->bAA/aS/a, B->aBB/bS/b},S)

b)Find the left most and right most derivation corresponding to the tree.



9. a) Find the language generated by a grammar

G=({S},{a,b},{S->aSb, S->ab},S) (4)

b) Given G=({S,A},{a,b},P,S) where P={S->AaS|S|SS,A->SbA|ba}
S-Start symbol. Find the left most and right most derivation of the string w=aabbaaa. Also construct the derivation tree for the string w.

c) Define a PDA. Give an Example for a language accepted byPDA by empty stack.

10. G denotes the context-free grammar defined by the following rules. ` S->ASB/ab/SS A->aA/A ,B->bB/A

(i)Give a left most derivation of aaabb in G. Draw the associated parse tree.

(ii)Give a right most derivation of aaabb in G. Draw the associated parse tree.

(iii) Show that G is ambiguous. Explain with steps.

(iv) Construct an unambiguous grammar equivalent to G. Explain.

11 a) Construct the grammar for the following PDA.

M=({q0, q1},{0,1},{X,z0},δ,q0,Z0,Φ) and where δis given by

δ(q0,0,z0)={(q0,XZ0)}, δ(q0,0,X)={(q0,XX)},δ(q0,1,X)={(q1, ε)},
δ(q1,1,X)={(q1, ε)},δ(q1, ε,X)={(q1, ε)}, δ(q1, ε, Z0)={(q1, ε)}. (12)

b) Prove that if L is N(M1) for some PDA M1 then L is L(M2) for somePDA M2.

12.a) Construct a PDA that recognizes the language

$\{a^i b^j c^k \mid i,j,k>0 \text{ and } i=j \text{ or } i=k\}$.

b) Discuss about PDA acceptance

(1) From empty Stack to final state.
(2) From Final state to Empty Stack.

UNIT-IV PROPERTIES OF CONTEXTFREE LANGUAGES

PART-A

1 Define multitape Turing Machine.
2 Explain the Basic Turing Machine model and explain in one move.What are the actions take place in TM?
3 Explain how a Turing Machine can be regarded as a computing device to compute integer functions.
4 Describe the non deterministic Turing Machine model. Is it true the non deterministic Turing Machine model's are more powerful than the basic Turing Machines? (In the sense of language Acceptance).
5 Explain the multi tape Turing Machine mode. Is it more power than the basic turing machine? Justify your answer.
6 Using Pumping lemma Show that the language $L=\{ a^n b^n c^n \mid n>=1 \}$ is not a CFL.
7 What is meant by a Turing Machine with two way infinite tape.
8 Define instantaneous description of a Turing Machine.
9 What is the class of language for which the TM has both accepting and rejecting configuration? Can this be called a Context free Language?

10.The binary equivalent of a positive integer is stored in a tape. Write the necessary transition to multiply that integer by 2.

1 What is the role of checking off symbols in a Turing Machine?
2 State Pumping lemma for Context free language.
3 Define a Turing Machine.
4 Mention any two problems which can only be solved by TM.
5 State Pumping lemma and its advantages.
6 What are useless symbols in a grammar.

PART-B

1.a)Find a grammar in Chomsky Normal form equivalent to S->aAD;A->aB/bAB; B->b, D->d. (6)

b)Convert to Greibach Normal Form the grammar G=({A1, A2, A3},{a,b},P,A1) where P consists of the following. A1 ->A2 A3, A2 ->A3 A1 /b,A3 ->A1 A2 /a. (10)

2.a)Show that the language $\{0^n 1^n 2^{n^2} / n>=1\}$ is not a Context free language. (6)

b)Convert the grammar S->AB, A->BS/b, B->SA/a into Greibach NormalForm. (10)

3.a)Construct a equivalent grammar G in CNF for the grammar G1 where G1 =({S,A,B},{a,b},{S->bA/aB,A->bAA/aS/a, B->aBB/bS/b},S) (12)

b)Obtain the Chomsky Normal Form equivalent to the grammarS->bA/aB, A->bAA/aS/a, B->aBB/bS/b. (4)

4.a)Begin with the grammar

S->0A0/1B1/BBA->CB->S/AC->S/ ε
and simplify using the safe order Eliminate ε-Productions Eliminate unit production Eliminate useless symbols Put the (resultant) grammar in Chomsky Normal Form (10)

b)Let G=(V,T,P,S) be a CFG. Show that if S=α, then there is a derivation tree in a grammar G with yield α. (6)

5.a)Let G be the grammar S->aS/aSbS/ ε. Prove that L(G)={x/each prefix of x has atleast as many a's as b's} (6)

b)Explain the Construction of an equivalent grammar in CNF for thegrammar G=({S,A,B}{a,b},P,S)

where P={S->bA|aB, A->bAA|aS|a, B->aBB|bS|b} (10)

6.a)Find a Context free grammar with no useless symbol equivalent to

S->AB/CA, B->BC/ABA->a, C->aB/b. (6)

b)Show that any CFL without εcan be generated by an equivalent grammar in Chomsky Normal Form. (10)

7.a)Convert the following CFG to CNF S->ASA|aB A->B|S B->b| ε(12)

b)Explain about Greibach Normal Form. (4)

8.a)Is L={$a^n b^n c^n$ /n>=1} a context free language? Justify Your answer. (8)

b)Prove that for every context free language L without εthere exists an equivalent grammar in Greibach Normal Form. (8)

9.State and Prove pumping lemma for Context free languages. (16)

10.a)State Pumping Lemma for context free language. Show that ($0^n 1^n 2^n$ /n>=1} is not a Context free language. (6)

b)State Pumping lemma for context free language σshow that language {$a^i b^j c^i d^j$ /i>=1, and j>=1} is not context-free. (6)

11.a)Design a Turing Machine M to implement the function "multiplication" using the subroutine 'copy'. (12)

b)Explain how a Turing Machine with the multiple tracks of the tape can be used to determine the given number is prime or not. (4)

12.a)Design a Turing Machine to compute f(m+n)=m+n, V m,n>=0 and simulate their

action on the input 0100. (10)

b)Describe the following Turing machine and their working. Are they more powerful than the Basic Turing Machine? Multi-tape Turing Machine Multi-Dimensional Turing Machine
(3) Non-Deterministic Turing Machine. (6)

13.a) Define Turing machine for computing f(m,n)=m-n (proper subtraction).

(10)

b)Explain how the multiple tracks in a Turing Machine can be used for testing given positive integer is a prime or not. (6)

14.a)Explain in detail:" The Turing Machine as a Computer of integer functions". (8)

b)Design a Turing Machine to accept the language $L=\{0^n 1^n / n>=1\}$ (8)

15.a)What is the role of checking off symbols in a Turing Machine? (4)

b)Construct a Turing Machine that recognizes the language
{wcw/w in {a+b}+ }
(12)

16.Prove that the language L is recognized by a Turing Machine with a two way infinite tape if and only if it is recognized by a Turing Machine with a one way infinite tape. (16)

17.For each of the following Context free languages L, find the smallest pumping length that will satisfy the statement of the Context free pumping lemma. In each case, Your answer should include a number(the minimum pumping length), a detailed explanation of why that the number is indeed a valid pumping length for the given language L, and a detailed explanation of why no smaller number qualifies as a valid pumping length for that particular language L.

(i) $L=\{a^n b^n / n>=0\}$ (6)
(ii) L={w in {a,b}*/w has the same number of a's and b's} (6) (iii)L={w in {a,b}*/ w has twice as many a's as b's.} (4)

18.Design a Turing Machine M that decides $A=\{0^k / n>0$ and $k=2^n\}$ the language consisting of all strings of 0's whose length is a power of 2. (16)

19.a)Give a High level implementation description with a neat sketch of a Turing Machine M that performs the following computation.M=on input w: writes a copy of w on the tape immediately after w,leaving the string w#w on the tape.Assume that the input string initially appears at the left most end of the tape and that the input alphabet does not contain the blank character' : The end of the input string is therefore determined by the location of the first blank cell on the input tape. The symbol # is assumed to be in the tape alphabet,and the input alphabet is {a,b}.

(12)

b)Demonstrate the working of your TM with an example. (4)

20.a)Show that the language $\{0^n 1^n 2^n / n>=1\}$ is not context free. (8)

b)Show that the context free languages are closed under union operation but not under intersection. (8)

UNIT-V UNDECIDABILITY

PART-A

1 When a recursively enumerable language is said to be recursive.

2 Is it true that the language accepted by a non deterministic Turing Machine is different from recursively enumerable language?

3 When we say a problem is decidable? Give an example of undecidable problem?

4 Give two properties of recursively enumerable sets which are undecidable.

5 Is it true that complement of a recursive language is recursive? Justify your answer.

6 When a language is said to be recursive or recursively enumerable?

7 When a language is said to be recursive? Is it true that every regular set is not recursive?

8 When a problem is said to be decidable or undecidable? Give an example of an undecidable.

9 What do you mean by universal Turing Machine?

10.When a problem is said to be undecidable? Give an example of an decidable problem.

11.Show that the union of recursive language is recursive.

12.Show that the union of two recursively enumerable languages is recursively enumerable.

13.What is undecidability problem?

14.Show that the following problem is undecidable."Given two CFG's G1 and G2, is $L(G1)\cap L(G2)=\Phi$?".

15.Define Ld.

16.Define recursively enumerable language.

17.Give an example for a non recursively enumerable language.

1 Differentiate between recursive and recursively enumerable languages.

2 Mention any two undecidability properties for recursively enumerable language.

21.Define Diagonal languages.

22.Give an example for an undecidable problem.

PART-B

1.a)Show that union of recursive languages is recursive.
(4)
b)Define the language Ld and show that Ld is not recursively enumerable language. (8)

c)Explain the Halting problem. Is it decidable or undecidable problem
(4)

2.Define Universal language Lu.Show that Lu is recursively enumerable but not recursive.

3.a)Obtain the code for the TM
M=({q1,q2,q3},{0,1},{0,1,B}, δ,q1,B,{q2}) With the moves δ(q1,1)=(q3,0,R) δ(q3,0)=(q1,1,R) δ(q3,1)=(q2,0,R) δ(q3,B)=(q3,1,L) δ(q3,B)=(q3,1,L)

b)Show that Ln is recursively enumerable.

4.a)Define Ld and show that Ld is not recursively enumerable.
(12)

b)Whether the problem of determining given recursively enumerable language is empty or not? Is decidable? Justify your answer.

(4) 5.Define the language Lu. Check whether Lu is recursively enumerable? or Lu is recursive? Justify your answer. (16) 6.a)Show that the language Ld is neither recursive nor recursively enumerable. (12) b)Describe how a Turing Machine can be encoded with 0 and 1 and give an example. (4) 7.a)Show that any non trivial property J of the recursively enumerable languages is undecidable. (8) b)Show that if L and L are recursively enumerable then L and L recursive.
8.Define the universal language and show that it is recursively enumerable but not recursive. (16)

9.Prove that the universal language Lu is recursively enumerable. (16)

10.State and Prove Rice's Theorem for recursive index sets. (16)

11.a)Show that the following language is not decidable. L={<M>| M is a TM that accepts the string aaab}. (8)

b)Discuss the properties of Recursive and Recursive enumerable languages. (8)

12.a)Define Post correspondence problem with an example. (8)

b)Prove that the function $f(n)=2^n$ does not grow at a polynomial rate, in other words, it does not satisfy $f(n)=O(n^p)$ for any finite exponent p.

13.a)Define the language Ld.Show that Ld is neither recursive nor recursively enumerable. (12)

b)Show that if a language L and its complement L are both recursively enumerable then L is recursive. (4) 14.a)What are the features of a Universal Turing Machine? (4)

b)Show that "If a language L and its compliment L are both recursively enumerable,then both languages are recursive". (6)

c)Show that halting problem of Turing Machine is undecidable. (6)

15.a)Does PCP with two lists x=(b,b ab^3,ba) and y=(b^3,ba , a)have a solution?. (6) b)Show that the characteristic function of the set of all even numbers is recursive. (6) c)Let $\sum$={0,1}.Let A and B be the lists of three strings each,defined as List A List B

i Wi Xi1 1 1112 10111 10310 0

Does this PCP have a solution? (4)

16.a)Show that it is undecidable for arbitrary CFG's G1 and G2 whether L(G1)∩L(G2)Is a CFL. (8)

b)Show that "finding whether the given CFG is ambiguous or not" is undecidable by reduction technique. (8)

17.Find whether the following languages are recursive or recursively enumerable.

(i) Union of two recursive languages. (4)

(ii) Union of two recursively enumerable languages. (4)

(iii) L if L and complement of L are recursively enumerable. (4)(iv)Lu (4)

18. Consider the Turing Machine M and w=01, where M=({q1,q2,q3},{0,1},{0,1,B},δ,q1,B,{q3}) and δis given by

Reduce the above problem to Post's correspondence Problem and find whether that PCP has a solution or not. (16)

2 Explain the Post's Correspondence Problem with an example (16)

3 Find the languages obtained from the following operations:

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ਖ਼ਾਲਸਾ ਕਾਲਜ ਆਫ਼ ਇੰਜੀਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨੋਲੋਜੀ

(Approved by AICTE, New Delhi & Affiliated to IKG Punjab Technical University, Jalandhar(Govt. of Punjab))

Accredited by NAAC Grade "A"

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Odd Sem Time Table(Sep'23–Nov'23) for REMEDIAL CLASSES wef 25-09-2023 .

DAY	*TIMINGS :4:20 PM - 5:00PM*		
	CSE 3RD SEM (R-243)	*CSE 5TH SEM (R-341)*	*CSE 7TH SEM (R-342)*
Monday	M-III	TOC	NS&C
Tuesday	OOPS	CN	A&WN
Wednesday	DE	PYTHON	DM&W
Thursday	DS	SE	SC
Friday	M-III	DBMS	DL

SUBJECT	CODE	FACULTY
DE	BTES 301-18	JASDEEP SINGH
DS	BTCS 301-18	SARBJOT KAUR
OOPS	BTCS 302-18	PARMJEET KAUR
M-3	BTAM 304-18	RUCHI HANDA
DBMS	BTCS-501-18	SUPREET KAUR
TOC	BTCS-502-18	JASLEEN KAUR
SE	BTCS-503-18	SUKHMEET KAUR
CN	BTCS-504-18	LOVELEEN KAUR
PYTHON	BTCS-520-18	ANURADHA VASHISHTHA
NS&C	BTCS-701-18	LOVELEEN KAUR
DM&W	BTCS-702-18	HARPREET SINGH
SC	BTEC-907C-18	AVTAR SINGH
DL	BTCS-704-18	ANURADHA VASHISHTHA
A&WN	BTCS-716-18	SUPREET KAUR

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Students Attendance Record

Class CSE-5th Group 2+2 Subject PLAT Remedial Classes Name of Faculty Dr. Jasleen kaur

S. No.	University Roll No.	Date of Regn.	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
1.	2105372		Anmolpreet Kaur	1	2	X	3	4																																											
2.	2105378		Gurpreet kaur	1	X	2	3	4																																										
3.	2105383		Harvinder Singh	1	2	3	X	4																																										
4.	2105389		Jatin Vij	X	1	2	3	4																																									
5.	2105390		Jhonir Naidu	1	2	X	3	4																																									
6.	2105393		Kuber Arora	X	1	2	3	4																																									
7.	2105394		Mahesh Raina	1	2	3	4	5																																									
8.	2105396		Manjeet kaur.	1	2	3	4	X																																									
9.	2105403		Rishikesh Kumar	1	X	2	3	X																																									
10.	2105407		Sahil Dutta	1	2	3	X	4																																									
11.	2105409		Sonali Barki	X	1	2	3	X																																									
12.	2105410		Sukhmanpreet Singh	1	2	3	4	X																																									
13.	2105412		Tanpreet Singh	1	2	3	4	X																																									
14.	2105413		Twinkle Sharma	1	2	3	4	5																																									
15.	2205045		Prabhnoor Singh	1	2	3	X	4																																									
16.	2205048		Priyesh kumar	1	2	X	3	X																																									
17.																																																