Transaction & Concurrency Control - Part I

Complete Course on DBMS for GATE

Sanchit Jain • Lesson 2 • Mar 17, 2022

RANK 1 - 300

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KM
IIT Bombay	M.Tech – Computer Science and Engineering	876	50	65	753	761	673	542	593	-
IISC Bangalore	M.Tech - Artificial Intelligence	838	87	62	792	727	619	427	792	892
IIT Madras	M.Tech - Computer Science and Engineering	816	140	60.33	761	723	596	430	366	-
IIT Delhi	M.Tech - Computer Science and Engineering	800	170	59	800	720	550	550	550	-
IIT Roorkee	M.Tech - Computer Science and Engineering	792	185	58.33	757	713	569	-	-	-
IISC Bangalore	M.Tech - Computational and Data Science	785	200	58	770	730	550	380	730	730
IIT Kharagpur	M.Tech - Computer Science and Engineering	776	242	57.33	731	682	550	412	377	-
IIT Kanpur	M.Tech - Computer Science and Engineering	775	250	57	775	697	516	516	-	-
IIT Guwahati	M.Tech - Computer Science and Engineering	765	280	56.3	686	665	539	-	-	-
IIT Guwahati	M.Tech - Data Science	765	280	56.3	709	707	513	357	-	-

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RANK 300 - 1500

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KN
National Institute of Technology Karnataka, Surathkal	Computational and Data Science	745	369	55	674	652	409	269	-	-
IIT Gandhinagar	M.Tech - Computer Science and Engineering	726	450	53.3	-	619	457	-	-	-
IIT Ropar	M.Tech - Artificial Intelligence	703	580	51.67	680	615	486	326	-	-
IIT Bombay	M.S. by Research - Computer Science and Engineering	700	600	51.33	700	630	467	467	467	-
IIT Madras	M.S. - Computer Science and Engineering	700	600	51.33	630	630	350	350	350	-
National Institute of Technology, Tiruchirappalli	Computer Science & Engineering	700	600	51.33	654	643	500	360		-
IISC	M.Tech – Computer Science and Engineering	680	720	50	650	640	500	400	247	50
National Institute of Technology, Warangal	Computer Science & Engineering	678	720	49.67	646	615	504	315		-
IIT Dhanbad	M.Tech - Computer Science and Engineering	676	750	49.67	650	619	446	354	246	-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering	673	780	49.33	637	637	491	308		-
IIT Patna	M.Tech - Computer Science and Engineering	654	905	48	642	596	427	255	339	-
IIT Ropar	M.Tech - Computer Science and Engineering	639	1020	46.67	600	619	442	369	-	-
National Institute of Technology, Warangal	Computer Science & Information Security	637	1020	46.67	623	597	442	277		-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering (Information Security)	631	1100	46	624	593	450	277		-
National Institute of Technology, Tiruchirappalli	Data Analytics	631	1100	46	593	584	454	339		-
Maulana Azad National Institute of Technology Bhopal	Artificial Intelligence	621	1185	45.33	571	554	403	251		-
National Institute of Technology Calicut	Computer Science & Engineering	616	1278	45	597	577	439	286		-
National Institute of Technology Karnataka, Surathkal	Information Technology	611	1278	45	596	566	439	305		-
National Institute of Technology Karnataka, Surathkal	Signal Processing and Machine Learning	608	1300	44	570	370	392	196		-
National Institute of Technology, Rourkela	Computer Science	601	1400	43.67	558	523	423	304		-
IIT Mandi	M.Tech - Computer Science and Engineering	597	1500	43.33	577	558	-	-	-	-
National Institute of Technology Calicut	Computer Science & Engineering (Information Security)	596	1500	43.33	588	557	415	259		-
Motilal Nehru National Institute of Technology Allahabad	Computer Science & Engineering	593	1500	43.33	573	542	415	255		-

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RANK 1500 - 5000

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KM
Indian Institute of Information Technology, Allahabad	Information Technology	569	1831	41.67	517	485	290	312		
IIT Jammu	M.Tech - Data Science	563			546	410	255	265	200	20
Motilal Nehru National Institute of Technology Allahabad	Software Engineering	557	2008	40.67	517	473	404	0		-
National Institute of Technology, Rourkela	Information Security	554	2075	40.33	492	485	369	262		-
IIT Bhubaneshwar	M.Tech - Computer Science and Engineering	550	2100	40	-	495	368.5	368.5	368.5	-
Malaviya National Institute of Technology Jaipur	Computer Science & Engineering	550	2100	40	473	485	381	270		-
Visvesvaraya National Institute of Technology, Nagpur	Computer Science & Engineering	550	2100	40	488	488	377	268		-
Motilal Nehru National Institute of Technology Allahabad	Information Security	544	2226	39.67	482	500	289	285		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Data Science	543	2226	39.67	508	529	337	0		-
National Institute of Technology Delhi	Computer Science & Engineering (Analytics)	535	2380	39	404	400	312	255		-
National Institute of Technology, Rourkela	Software Engineering	523	2610	38	504	446	375	295		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Computer Science & Engineering	523	2610	38	369	353	369	290		-
Malaviya National Institute of Technology Jaipur	Computer Science & Information Security	522	2619	38	464	459	323	300		-
IIT Jammu	M.Tech - Information Security	515			484	325	321	265	200	20
National Institute of Technology, Kurukshetra	Computer Engineering	504	2981	36.67	462	430	369	250		-
Sardar Vallabhbhai National Institute of Technology, Surat	Computer Engineering	504	2981	36.67	423	419	379	255		-
Maulana Azad National Institute of Technology Bhopal	Advanced Computing	495	3162	36.33	465	373	312	0		-
National Institute of Technology, Jamshedpur	Computer Science & Engineering	486	3475	36	379	423	312	330		-
University of Hyderabad	Artificial Intelligence	486	3475	36	446	321	254	285		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Cyber Security	484	3560	35.33	321	321	281	0		-
National Institute of Technology Durgapur	Computer Science & Engineering	473	3650	34.66	339	360	282	259		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering	459	4175	33.33	377	371	298	298		-

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RANK 1500 - 5000

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KM
Maulana Azad National Institute of Technology Bhopal	Information Security	450	4592	32.67	401	396	281	259		-
National Institute of Technology, Kurukshetra	Computer Engineering (Cyber Security)	450	4592	32.67	384	399	319	250		-
National Institute of Technology, Uttarakhand	Computing Systems	450	4592	32.67	0	329	0	0		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Information Security	442	4784	32.33	383	252	259	0		-
Maulana Azad National Institute of Technology Bhopal	Computer Networking	439	5070	31.67	357	357	268	0		-

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RANK 5000 +

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KM
Indian Institute of Information Technology, Lucknow	Computer Science	437	5170	31.33	366	330	270	0		-
Indian Institute of Information Technology, Design and Manufacturing, Kurnool	uter Science and Engineering with specialization in Data Analytics and Decision Sc	431	5355	31	361	247	290	0		-
National Institute of Technology Mizoram	Computer Science & Engineering	423	5645	30.67	0	384	250	0		-
National Institute of Technology Hamirpur	Computer Science & Engineering	419	5790	30.33	385	321	309	266		-
Central University of Rajasthan	Computer Science & Engineering	415	5934	30	377	326	250	0		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering (Information Security)	412	6121	29.67	377	396	286	0		-
National Institute of Technology Nagaland	Computer Science & Engineering	408	6332	29.33	361	317	273	268		-
National Institute of Technology Sikkim	Computer Science & Engineering	400	6660	28.67	369	326	277	246		-
Central University of Punjab, Bathinda, Punjab	Computer Science & Technology	400	6660	28.67	0	339	263	0		-
National Institute of Technology, Silchar	Computer Science & Engineering	400	6660	28.67	361	321	268	259		-
National Institute of Technology Hamirpur	Computer Science & Engineering (Artificial Intelligence)	394	6988	28.33	343	321	286	304		-
Central Institute of Technology, Kokrajhar	Computer Science & Engineering	394	6988	28.33	0	348	285	0		-
Indian Institute of Information Technology, Pune	Computer Science & Engineering	394	6988	28.33	437	317	258	0		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Artificial Intelligence	394	6988	28.33	430	389	278	313		-
International Institute of Information Technology, Naya Raipur	Computer Science & Engineering	383	7936	27.67	447	346	252	0		-
Pt. Dwarka Prasad Mishra Indian Institute of Information Technology, Design & Manufacturing Jabalpur	Computer Science & Engineering	383	7936	27.67	330	330	239	0		-
Shri Mata Vaishno Devi University, Katra	Computer Science & Engineering	383	7936	27.67	0	321	250	0		-
National Institute of Technology, Srinagar	Communication & Information Technology	383	7936	27.67	0	331	0	0		-
University of Hyderabad	Computer Science	383	7936	27.67	361	321	272	259		-
National Institute of Technology Agartala	Artificial Intelligence	379	8415	26.67	396	330	281	0		-
Sant Longowal Institute of Engineering and Technology	Computer Science & Engineering	379	8415	26.67	339	326	246	0		-
University of Hyderabad	Information Technology	379	8415	26.67	321	335	266	0		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering (Internet of Things)	379	8415	26.67	321	345	259	0		-

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RANK 5000 +

College	Branch	GEN SCORE	Rank	Marks	GEN EWS	OBC	SC	ST	PwD	KN
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Cyber Security	373	8650	26.33	346	371	259	285		-
International Institute of Information Technology, Bhubaneswar	Computer Science & Engineering	363	8886	26	379	331	250	0		-
National Institute of Technology Meghalaya	Computer Science & Engineering	363	8886	26	0	333	250	246		-
National Institute of Technology Arunachal Pradesh	Computer Science & Engineering	363	8886	26	0	321	258	285		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Artificial Intelligence	363	8886	26	361	348	247	0		-
Indian Institute of Information Technology, Design & Manufacturing Kancheepuram, Chennai	ter Science and Engineering with Specialization in Data Science and Artificial Intell	363	8886	26	369	330	299	0		-
Indian Institute of Information Technology Srirangam, Tiruchirappalli	Computer Science & Engineering	357	9236	25.67	400	323	258	0		-
National Institute of Technology Puducherry	Computer Science & Engineering	357	9236	25.67	395	353	263	0		-
National Institute of Technology, Manipur	Computer Science & Engineering	357	9236	25.67	0	321	281	0		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Data Science	357	9236	25.67	474	357	286	0		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Information Technology	357	9236	25.67	512	321	267	293		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Artificial Intelligence and Machine Learning	357	9236	25.67	357	327	259	0		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering	357	9236	25.67	339	321	243	0		-
National Institute of Technology, Jamshedpur	Information Systems Security Engineering	353	9560	25.33	321	326	250	308		-
National Institute of Technology, Silchar	Artificial Intelligence	353	9560	25.33	401	343	270	247		-
National Institute of Technology, Uttarakhand	Artificial Intelligence	353	9560	25.33	464	346	254	0		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Computer Networking	353	9560	25.33	383	415	350	0		-
University of Hyderabad	Information Security	353	9560	25.33	377	329	247	0		-
National Institute of Technology Patna	Information Security	353	9560	25.33	339	337	247	0		-
National Institute of Technology Agartala	Computer Science & Engineering	350	9884	25	435	353	268	0		-
National Institute of Technology Goa	Computer Science & Engineering	350	9884	25	379	335	254	268		-
National Institute of Technology, Andhra Pradesh	Computer Science and Data Analytics	350	9884	25	387	379	259	262		-
Punjab Engineering College, Chandigarh	Computer Science & Information Security	350	9884	25	330	0	258	0		-
Punjab Engineering College, Chandigarh	Computer Science & Engineering	350	9884	25	0	0	238	0		-

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SCHEDULED CASTE

College	Branch	SC	GEN SCORE	Rank	Marks	GEN EWS	OBC	ST	PwD	KM
IIT Bombay	M.Tech – Computer Science and Engineering	673	876	50	65	753	761	542	593	-
IISC Bangalore	M.Tech - Artificial Intelligence	619	838	87	62	792	727	427	792	892
IIT Madras	M.Tech - Computer Science and Engineering	596	816	140	60.33	761	723	430	366	-
IIT Roorkee	M.Tech - Computer Science and Engineering	569	792	185	58.33	757	713	-	-	-
IIT Delhi	M.Tech - Computer Science and Engineering	550	800	170	59	800	720	550	550	-
IISC Bangalore	M.Tech - Computational and Data Science	550	785	200	58	770	730	380	730	730
IIT Kharagpur	M.Tech - Computer Science and Engineering	550	776	242	57.33	731	682	412	377	-
IIT Guwahati	M.Tech - Computer Science and Engineering	539	765	280	56.3	686	665	-	-	-
IIT Kanpur	M.Tech - Computer Science and Engineering	516	775	250	57	775	697	516	-	-
IIT Guwahati	M.Tech - Data Science	513	765	280	56.3	709	707	357	-	-
National Institute of Technology, Warangal	Computer Science & Engineering	504	678	720	49.67	646	615	315		-
National Institute of Technology, Tiruchirappalli	Computer Science & Engineering	500	700	600	51.33	654	643	360		-
IISC	M.Tech – Computer Science and Engineering	500	680	720	50	650	640	400	247	500
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering	491	673	780	49.33	637	637	308		-
IIT Ropar	M.Tech - Artificial Intelligence	486	703	580	51.67	680	615	326	-	-
IIT Bombay	M.S. by Research - Computer Science and Engineering	467	700	600	51.33	700	630	467	467	-
IIT Gandhinagar	M.Tech - Computer Science and Engineering	457	726	450	53.3	-	619	-	-	-
National Institute of Technology, Tiruchirappalli	Data Analytics	454	631	1100	46	593	584	339		-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering (Information Security)	450	631	1100	46	624	593	277		-
IIT Dhanbad	M.Tech - Computer Science and Engineering	446	676	750	49.67	650	619	354	246	-
IIT Ropar	M.Tech - Computer Science and Engineering	442	639	1020	46.67	600	619	369	-	-
National Institute of Technology, Warangal	Computer Science & Information Security	442	637	1020	46.67	623	597	277		-
National Institute of Technology Calicut	Computer Science & Engineering	439	616	1278	45	597	577	286		-
National Institute of Technology Karnataka, Surathkal	Information Technology	439	611	1278	45	596	566	305		-
IIT Patna	M.Tech - Computer Science and Engineering	427	654	905	48	642	596	255	339	-
National Institute of Technology, Rourkela	Computer Science	423	601	1400	43.67	558	523	304		-

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SCHEDULED CASTE

National Institute of Technology Calicut	Computer Science & Engineering (Information Security)	415	596	1500	43.33	588	557	259		-
Motilal Nehru National Institute of Technology Allahabad	Computer Science & Engineering	415	593	1500	43.33	573	542	255		-
National Institute of Technology Karnataka, Surathkal	Computational and Data Science	409	745	369	55	674	652	269	-	-
Motilal Nehru National Institute of Technology Allahabad	Software Engineering	404	557	2008	40.67	517	473	0		-
Maulana Azad National Institute of Technology Bhopal	Artificial Intelligence	403	621	1185	45.33	571	554	251		-
National Institute of Technology Karnataka, Surathkal	Signal Processing and Machine Learning	392	608	1300	44	570	370	196		-
Malaviya National Institute of Technology Jaipur	Computer Science & Engineering	381	550	2100	40	473	485	270		-
Sardar Vallabhbhai National Institute of Technology, Surat	Computer Engineering	379	504	2981	36.67	423	419	255		-
Visvesvaraya National Institute of Technology, Nagpur	Computer Science & Engineering	377	550	2100	40	488	488	268		-
National Institute of Technology, Rourkela	Software Engineering	375	523	2610	38	504	446	295		-
National Institute of Technology, Rourkela	Information Security	369	554	2075	40.33	492	485	262		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Computer Science & Engineering	369	523	2610	38	369	353	290		-
National Institute of Technology, Kurukshetra	Computer Engineering	369	504	2981	36.67	462	430	250		-
IIT Bhubaneshwar	M.Tech - Computer Science and Engineering	368.5	550	2100	40	-	495	368.5	368.5	-
IIT Madras	M.S. - Computer Science and Engineering	350	700	600	51.33	630	630	350	350	-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Computer Networking	350	353	9560	25.33	383	415	0		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Data Science	337	543	2226	39.67	508	529	0		-
Malaviya National Institute of Technology Jaipur	Computer Science & Information Security	323	522	2619	38	464	459	300		-
IIT Jammu	M.Tech - Information Security	321	515			484	325	265	200	200
National Institute of Technology, Kurukshetra	Computer Engineering (Cyber Security)	319	450	4592	32.67	384	399	250		-
National Institute of Technology Delhi	Computer Science & Engineering (Analytics)	312	535	2380	39	404	400	255		-
Maulana Azad National Institute of Technology Bhopal	Advanced Computing	312	495	3162	36.33	465	373	0		-
National Institute of Technology, Jamshedpur	Computer Science & Engineering	312	486	3475	36	379	423	330		-
National Institute of Technology Hamirpur	Computer Science & Engineering	309	419	5790	30.33	385	321	266		-

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SCHEDULED CASTE

Indian Institute of Information Technology, Design & Manufacturing Kancheepuram, Chennai	er Science and Engineering with Specialization in Data Science and Artificial Inte	299	363	8886	26	369	330	0		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering	298	459	4175	33.33	377	371	298		-
Indian Institute of Information Technology, Allahabad	Information Technology	290	569	1831	41.67	517	485	312		-
Indian Institute of Information Technology, Design and Manufacturing, Kurnool	er Science and Engineering with specialization in Data Analytics and Decision S	290	431	5355	31	361	247	0		-
Motilal Nehru National Institute of Technology Allahabad	Information Security	289	544	2226	39.67	482	500	285		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering (Information Security)	286	412	6121	29.67	377	396	0		-
National Institute of Technology Hamirpur	Computer Science & Engineering (Artificial Intelligence)	286	394	6988	28.33	343	321	304		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Data Science	286	357	9236	25.67	474	357	0		-
Central Institute of Technology, Kokrajhar	Computer Science & Engineering	285	394	6988	28.33	0	348	0		-
National Institute of Technology Durgapur	Computer Science & Engineering	282	473	3650	34.66	339	360	259		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Cyber Security	281	484	3560	35.33	321	321	0		-
Maulana Azad National Institute of Technology Bhopal	Information Security	281	450	4592	32.67	401	396	259		-
National Institute of Technology Agartala	Artificial Intelligence	281	379	8415	26.67	396	330	0		-
National Institute of Technology, Manipur	Computer Science & Engineering	281	357	9236	25.67	0	321	0		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Artificial Intelligence	278	394	6988	28.33	430	389	313		-
National Institute of Technology Sikkim	Computer Science & Engineering	277	400	6660	28.67	369	326	246		-
National Institute of Technology Nagaland	Computer Science & Engineering	273	408	6332	29.33	361	317	268		-
University of Hyderabad	Computer Science	272	383	7936	27.67	361	321	259		-
Indian Institute of Information Technology, Lucknow	Computer Science	270	437	5170	31.33	366	330	0		-
National Institute of Technology, Silchar	Artificial Intelligence	270	353	9560	25.33	401	343	247		-
Maulana Azad National Institute of Technology Bhopal	Computer Networking	268	439	5070	31.67	357	357	0		-
National Institute of Technology, Silchar	Computer Science & Engineering	268	400	6660	28.67	361	321	259		-
National Institute of Technology Agartala	Computer Science & Engineering	268	350	9884	25	435	353	0		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Information Technology	267	357	9236	25.67	512	321	293		-
University of Hyderabad	Information Technology	266	379	8415	26.67	321	335	0		-
Central University of Punjab, Bathinda, Punjab	Computer Science & Technology	263	400	6660	28.67	0	339	0		-
National Institute of Technology Puducherry	Computer Science & Engineering	263	357	9236	25.67	395	353	0		-

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SCHEDULED CASTE

Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Information Security	259	442	4784	32.33	383	252	0		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering (Internet of Things)	259	379	8415	26.67	321	345	0		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Cyber Security	259	373	8650	26.33	346	371	285		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Artificial Intelligence and Machine Learning	259	357	9236	25.67	357	327	0		-
National Institute of Technology, Andhra Pradesh	Computer Science and Data Analytics	259	350	9884	25	387	379	262		-
Indian Institute of Information Technology, Pune	Computer Science & Engineering	258	394	6988	28.33	437	317	0		-
National Institute of Technology Arunachal Pradesh	Computer Science & Engineering	258	363	8886	26	0	321	285		-
Indian Institute of Information Technology Srirangam, Tiruchirappalli	Computer Science & Engineering	258	357	9236	25.67	400	323	0		-
Punjab Engineering College, Chandigarh	Computer Science & Information Security	258	350	9884	25	330	0	0		-
IIT Jammu	M.Tech - Data Science	255	563			546	410	265	200	200
University of Hyderabad	Artificial Intelligence	254	486	3475	36	446	321	285		-
National Institute of Technology, Uttarakhand	Artificial Intelligence	254	353	9560	25.33	464	346	0		-
National Institute of Technology Goa	Computer Science & Engineering	254	350	9884	25	379	335	268		-
International Institute of Information Technology, Naya Raipur	Computer Science & Engineering	252	383	7936	27.67	447	346	0		-
National Institute of Technology Mizoram	Computer Science & Engineering	250	423	5645	30.67	0	384	0		-
Central University of Rajasthan	Computer Science & Engineering	250	415	5934	30	377	326	0		-
Shri Mata Vaishno Devi University, Katra	Computer Science & Engineering	250	383	7936	27.67	0	321	0		-
International Institute of Information Technology, Bhubaneswar	Computer Science & Engineering	250	363	8886	26	379	331	0		-
National Institute of Technology Meghalaya	Computer Science & Engineering	250	363	8886	26	0	333	246		-
National Institute of Technology, Jamshedpur	Information Systems Security Engineering	250	353	9560	25.33	321	326	308		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Artificial Intelligence	247	363	8886	26	361	348	0		-
University of Hyderabad	Information Security	247	353	9560	25.33	377	329	0		-
National Institute of Technology Patna	Information Security	247	353	9560	25.33	339	337	0		-
Sant Longowal Institute of Engineering and Technology	Computer Science & Engineering	246	379	8415	26.67	339	326	0		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering	243	357	9236	25.67	339	321	0		-
Pt. Dwarka Prasad Mishra Indian Institute of Information Technology, Design & Manufacturing Jabalpur	Computer Science & Engineering	239	383	7936	27.67	330	330	0		-
Punjab Engineering College, Chandigarh	Computer Science & Engineering	238	350	9884	25	0	0	0		-
National Institute of Technology, Uttarakhand	Computing Systems	0	450	4592	32.67	0	329	0		-
National Institute of Technology, Srinagar	Communication & Information Technology	0	383	7936	27.67	0	331	0		-
IIT Mandi	M.Tech - Computer Science and Engineering	-	597	1500	43.33	577	558	-	-	-

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College	Branch	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	OBC	PwD	KM
IIT Delhi	M.Tech - Computer Science and Engineering	550	550	800	170	59	800	720	550	-
IIT Bombay	M.Tech – Computer Science and Engineering	542	673	876	50	65	753	761	593	-
IIT Kanpur	M.Tech - Computer Science and Engineering	516	516	775	250	57	775	697	-	-
IIT Bombay	M.S. by Research - Computer Science and Engineering	467	467	700	600	51.33	700	630	467	-
IIT Madras	M.Tech - Computer Science and Engineering	430	596	816	140	60.33	761	723	366	-
IISC Bangalore	M.Tech - Artificial Intelligence	427	619	838	87	62	792	727	792	892
IIT Kharagpur	M.Tech - Computer Science and Engineering	412	550	776	242	57.33	731	682	377	-
IISC	M.Tech – Computer Science and Engineering	400	500	680	720	50	650	640	247	500
IISC Bangalore	M.Tech - Computational and Data Science	380	550	785	200	58	770	730	730	730
IIT Ropar	M.Tech - Computer Science and Engineering	369	442	639	1020	46.67	600	619	-	-
IIT Bhubaneshwar	M.Tech - Computer Science and Engineering	368.5	368.5	550	2100	40	-	495	368.5	-
National Institute of Technology, Tiruchirappalli	Computer Science & Engineering	360	500	700	600	51.33	654	643		-
IIT Guwahati	M.Tech - Data Science	357	513	765	280	56.3	709	707	-	-
IIT Dhanbad	M.Tech - Computer Science and Engineering	354	446	676	750	49.67	650	619	246	-
IIT Madras	M.S. - Computer Science and Engineering	350	350	700	600	51.33	630	630	350	-
National Institute of Technology, Tiruchirappalli	Data Analytics	339	454	631	1100	46	593	584		-
National Institute of Technology, Jamshedpur	Computer Science & Engineering	330	312	486	3475	36	379	423		-
IIT Ropar	M.Tech - Artificial Intelligence	326	486	703	580	51.67	680	615	-	-
National Institute of Technology, Warangal	Computer Science & Engineering	315	504	678	720	49.67	646	615		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Artificial Intelligence	313	278	394	6988	28.33	430	389		-
Indian Institute of Information Technology, Allahabad	Information Technology	312	290	569	1831	41.67	517	485		-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering	308	491	673	780	49.33	637	637		-
National Institute of Technology, Jamshedpur	Information Systems Security Engineering	308	250	353	9560	25.33	321	326		-
National Institute of Technology Karnataka, Surathkal	Information Technology	305	439	611	1278	45	596	566		-
National Institute of Technology, Rourkela	Computer Science	304	423	601	1400	43.67	558	523		-
National Institute of Technology Hamirpur	Computer Science & Engineering (Artificial Intelligence)	304	286	394	6988	28.33	343	321		-
Malaviya National Institute of Technology Jaipur	Computer Science & Information Security	300	323	522	2619	38	464	459		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering	298	298	459	4175	33.33	377	371		-
National Institute of Technology, Rourkela	Software Engineering	295	375	523	2610	38	504	446		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Information Technology	293	267	357	9236	25.67	512	321		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Computer Science & Engineering	290	369	523	2610	38	369	353		-
National Institute of Technology Calicut	Computer Science & Engineering	286	439	616	1278	45	597	577		-
Motilal Nehru National Institute of Technology Allahabad	Information Security	285	289	544	2226	39.67	482	500		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Cyber Security	285	259	373	8650	26.33	346	371		-

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College	Branch	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	OBC	PwD	KM
National Institute of Technology Arunachal Pradesh	Computer Science & Engineering	285	258	363	8886	26	0	321		-
University of Hyderabad	Artificial Intelligence	285	254	486	3475	36	446	321		-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering (Information Security)	277	450	631	1100	46	624	593		-
National Institute of Technology, Warangal	Computer Science & Information Security	277	442	637	1020	46.67	623	597		-
Malaviya National Institute of Technology Jaipur	Computer Science & Engineering	270	381	550	2100	40	473	485		-
National Institute of Technology Karnataka, Surathkal	Computational and Data Science	269	409	745	369	55	674	652	-	-
Visvesvaraya National Institute of Technology, Nagpur	Computer Science & Engineering	268	377	550	2100	40	488	488		-
National Institute of Technology Nagaland	Computer Science & Engineering	268	273	408	6332	29.33	361	317		-
National Institute of Technology Goa	Computer Science & Engineering	268	254	350	9884	25	379	335		-
National Institute of Technology Hamirpur	Computer Science & Engineering	266	309	419	5790	30.33	385	321		-
IIT Jammu	M.Tech - Information Security	265	321	515			484	325	200	200
IIT Jammu	M.Tech - Data Science	265	255	563			546	410	200	200
National Institute of Technology, Rourkela	Information Security	262	369	554	2075	40.33	492	485		-
National Institute of Technology, Andhra Pradesh	Computer Science and Data Analytics	262	259	350	9884	25	387	379		-
National Institute of Technology Calicut	Computer Science & Engineering (Information Security)	259	415	596	1500	43.33	588	557		-
National Institute of Technology Durgapur	Computer Science & Engineering	259	282	473	3650	34.66	339	360		-
Maulana Azad National Institute of Technology Bhopal	Information Security	259	281	450	4592	32.67	401	396		-
University of Hyderabad	Computer Science	259	272	383	7936	27.67	361	321		-
National Institute of Technology, Silchar	Computer Science & Engineering	259	268	400	6660	28.67	361	321		-
IIT Patna	M.Tech - Computer Science and Engineering	255	427	654	905	48	642	596	339	-
Motilal Nehru National Institute of Technology Allahabad	Computer Science & Engineering	255	415	593	1500	43.33	573	542		-
Sardar Vallabhbhai National Institute of Technology, Surat	Computer Engineering	255	379	504	2981	36.67	423	419		-
National Institute of Technology Delhi	Computer Science & Engineering (Analytics)	255	312	535	2380	39	404	400		-
Maulana Azad National Institute of Technology Bhopal	Artificial Intelligence	251	403	621	1185	45.33	571	554		-
National Institute of Technology, Kurukshetra	Computer Engineering	250	369	504	2981	36.67	462	430		-
National Institute of Technology, Kurukshetra	Computer Engineering (Cyber Security)	250	319	450	4592	32.67	384	399		-
National Institute of Technology, Silchar	Artificial Intelligence	247	270	353	9560	25.33	401	343		-
National Institute of Technology Sikkim	Computer Science & Engineering	246	277	400	6660	28.67	369	326		-
National Institute of Technology Meghalaya	Computer Science & Engineering	246	250	363	8886	26	0	333		-
National Institute of Technology Karnataka, Surathkal	Signal Processing and Machine Learning	196	392	608	1300	44	570	370		-
Motilal Nehru National Institute of Technology Allahabad	Software Engineering	0	404	557	2008	40.67	517	473		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Computer Networking	0	350	353	9560	25.33	383	415		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Data Science	0	337	543	2226	39.67	508	529		-
Maulana Azad National Institute of Technology Bhopal	Advanced Computing	0	312	495	3162	36.33	465	373		-

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College	Branch	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	OBC	PwD	KM
Indian Institute of Information Technology, Design & Manufacturing Kancheepuram, Chennai	er Science and Engineering with Specialization in Data Science and Artificial Inte	0	299	363	8886	26	369	330		-
Indian Institute of Information Technology, Design and Manufacturing, Kurnool	er Science and Engineering with specialization in Data Analytics and Decision S	0	290	431	5355	31	361	247		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering (Information Security)	0	286	412	6121	29.67	377	396		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Data Science	0	286	357	9236	25.67	474	357		-
Central Institute of Technology, Kokrajhar	Computer Science & Engineering	0	285	394	6988	28.33	0	348		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Cyber Security	0	281	484	3560	35.33	321	321		-
National Institute of Technology Agartala	Artificial Intelligence	0	281	379	8415	26.67	396	330		-
National Institute of Technology, Manipur	Computer Science & Engineering	0	281	357	9236	25.67	0	321		-
Indian Institute of Information Technology, Lucknow	Computer Science	0	270	437	5170	31.33	366	330		-
Maulana Azad National Institute of Technology Bhopal	Computer Networking	0	268	439	5070	31.67	357	357		-
National Institute of Technology Agartala	Computer Science & Engineering	0	268	350	9884	25	435	353		-
University of Hyderabad	Information Technology	0	266	379	8415	26.67	321	335		-
Central University of Punjab, Bathinda, Punjab	Computer Science & Technology	0	263	400	6660	28.67	0	339		-
National Institute of Technology Puducherry	Computer Science & Engineering	0	263	357	9236	25.67	395	353		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Information Security	0	259	442	4784	32.33	383	252		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering (Internet of Things)	0	259	379	8415	26.67	321	345		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Artificial Intelligence and Machine Learning	0	259	357	9236	25.67	357	327		-
Indian Institute of Information Technology, Pune	Computer Science & Engineering	0	258	394	6988	28.33	437	317		-
Indian Institute of Information Technology Srirangam, Tiruchirappalli	Computer Science & Engineering	0	258	357	9236	25.67	400	323		-
Punjab Engineering College, Chandigarh	Computer Science & Information Security	0	258	350	9884	25	330	0		-
National Institute of Technology, Uttarakhand	Artificial Intelligence	0	254	353	9560	25.33	464	346		-
International Institute of Information Technology, Naya Raipur	Computer Science & Engineering	0	252	383	7936	27.67	447	346		-
National Institute of Technology Mizoram	Computer Science & Engineering	0	250	423	5645	30.67	0	384		-
Central University of Rajasthan	Computer Science & Engineering	0	250	415	5934	30	377	326		-
Shri Mata Vaishno Devi University, Katra	Computer Science & Engineering	0	250	383	7936	27.67	0	321		-

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College	Branch	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	OBC	PwD	KM
International Institute of Information Technology, Bhubaneswar	Computer Science & Engineering	0	250	363	8886	26	379	331		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Artificial Intelligence	0	247	363	8886	26	361	348		-
University of Hyderabad	Information Security	0	247	353	9560	25.33	377	329		-
National Institute of Technology Patna	Information Security	0	247	353	9560	25.33	339	337		-
Sant Longowal Institute of Engineering and Technology	Computer Science & Engineering	0	246	379	8415	26.67	339	326		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering	0	243	357	9236	25.67	339	321		-
Pt. Dwarka Prasad Mishra Indian Institute of Information Technology, Design & Manufacturing Jabalpur	Computer Science & Engineering	0	239	383	7936	27.67	330	330		-
Punjab Engineering College, Chandigarh	Computer Science & Engineering	0	238	350	9884	25	0	0		-
National Institute of Technology, Uttarakhand	Computing Systems	0	0	450	4592	32.67	0	329		-
National Institute of Technology, Srinagar	Communication & Information Technology	0	0	383	7936	27.67	0	331		-
IIT Roorkee	M.Tech - Computer Science and Engineering	-	569	792	185	58.33	757	713	-	-
IIT Guwahati	M.Tech - Computer Science and Engineering	-	539	765	280	56.3	686	665	-	-
IIT Gandhinagar	M.Tech - Computer Science and Engineering	-	457	726	450	53.3	-	619	-	-
IIT Mandi	M.Tech - Computer Science and Engineering	-	-	597	1500	43.33	577	558	-	-

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College	Branch	OBC	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	PwD	KM
IIT Bombay	M.Tech – Computer Science and Engineering	761	542	673	876	50	65	753	593	-
IISC Bangalore	M.Tech - Computational and Data Science	730	380	550	785	200	58	770	730	730
IISC Bangalore	M.Tech - Artificial Intelligence	727	427	619	838	87	62	792	792	892
IIT Madras	M.Tech - Computer Science and Engineering	723	430	596	816	140	60.33	761	366	-
IIT Delhi	M.Tech - Computer Science and Engineering	720	550	550	800	170	59	800	550	-
IIT Roorkee	M.Tech - Computer Science and Engineering	713	-	569	792	185	58.33	757	-	-
IIT Guwahati	M.Tech - Data Science	707	357	513	765	280	56.3	709	-	-
IIT Kanpur	M.Tech - Computer Science and Engineering	697	516	516	775	250	57	775	-	-
IIT Kharagpur	M.Tech - Computer Science and Engineering	682	412	550	776	242	57.33	731	377	-
IIT Guwahati	M.Tech - Computer Science and Engineering	665	-	539	765	280	56.3	686	-	-
National Institute of Technology Karnataka, Surathkal	Computational and Data Science	652	269	409	745	369	55	674	-	-
National Institute of Technology, Tiruchirappalli	Computer Science & Engineering	643	360	500	700	600	51.33	654		-
IISC	M.Tech – Computer Science and Engineering	640	400	500	680	720	50	650	247	500
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering	637	308	491	673	780	49.33	637		-
IIT Bombay	M.S. by Research - Computer Science and Engineering	630	467	467	700	600	51.33	700	467	-
IIT Madras	M.S. - Computer Science and Engineering	630	350	350	700	600	51.33	630	350	-
IIT Ropar	M.Tech - Computer Science and Engineering	619	369	442	639	1020	46.67	600	-	-
IIT Dhanbad	M.Tech - Computer Science and Engineering	619	354	446	676	750	49.67	650	246	-
IIT Gandhinagar	M.Tech - Computer Science and Engineering	619	-	457	726	450	53.3	-	-	-
IIT Ropar	M.Tech - Artificial Intelligence	615	326	486	703	580	51.67	680	-	-
National Institute of Technology, Warangal	Computer Science & Engineering	615	315	504	678	720	49.67	646		-
National Institute of Technology, Warangal	Computer Science & Information Security	597	277	442	637	1020	46.67	623		-
IIT Patna	M.Tech - Computer Science and Engineering	596	255	427	654	905	48	642	339	-
National Institute of Technology Karnataka, Surathkal	Computer Science & Engineering (Information Security)	593	277	450	631	1100	46	624		-
National Institute of Technology, Tiruchirappalli	Data Analytics	584	339	454	631	1100	46	593		-
National Institute of Technology Calicut	Computer Science & Engineering	577	286	439	616	1278	45	597		-
National Institute of Technology Karnataka, Surathkal	Information Technology	566	305	439	611	1278	45	596		-
IIT Mandi	M.Tech - Computer Science and Engineering	558	-	-	597	1500	43.33	577	-	-
National Institute of Technology Calicut	Computer Science & Engineering (Information Security)	557	259	415	596	1500	43.33	588		-
Maulana Azad National Institute of Technology Bhopal	Artificial Intelligence	554	251	403	621	1185	45.33	571		-
Motilal Nehru National Institute of Technology Allahabad	Computer Science & Engineering	542	255	415	593	1500	43.33	573		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Data Science	529	0	337	543	2226	39.67	508		-
National Institute of Technology, Rourkela	Computer Science	523	304	423	601	1400	43.67	558		-
Motilal Nehru National Institute of Technology Allahabad	Information Security	500	285	289	544	2226	39.67	482		-
IIT Bhubaneshwar	M.Tech - Computer Science and Engineering	495	368.5	368.5	550	2100	40	-	368.5	-

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College	Branch	OBC	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	PwD	KM
Visvesvaraya National Institute of Technology, Nagpur	Computer Science & Engineering	488	268	377	550	2100	40	488		-
Indian Institute of Information Technology, Allahabad	Information Technology	485	312	290	569	1831	41.67	517		-
Malaviya National Institute of Technology Jaipur	Computer Science & Engineering	485	270	381	550	2100	40	473		-
National Institute of Technology, Rourkela	Information Security	485	262	369	554	2075	40.33	492		-
Motilal Nehru National Institute of Technology Allahabad	Software Engineering	473	0	404	557	2008	40.67	517		-
Malaviya National Institute of Technology Jaipur	Computer Science & Information Security	459	300	323	522	2619	38	464		-
National Institute of Technology, Rourkela	Software Engineering	446	295	375	523	2610	38	504		-
National Institute of Technology, Kurukshetra	Computer Engineering	430	250	369	504	2981	36.67	462		-
National Institute of Technology, Jamshedpur	Computer Science & Engineering	423	330	312	486	3475	36	379		-
Sardar Vallabhbhai National Institute of Technology, Surat	Computer Engineering	419	255	379	504	2981	36.67	423		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Computer Networking	415	0	350	353	9560	25.33	383		-
IIT Jammu	M.Tech - Data Science	410	265	255	563			546	200	200
National Institute of Technology Delhi	Computer Science & Engineering (Analytics)	400	255	312	535	2380	39	404		-
National Institute of Technology, Kurukshetra	Computer Engineering (Cyber Security)	399	250	319	450	4592	32.67	384		-
Maulana Azad National Institute of Technology Bhopal	Information Security	396	259	281	450	4592	32.67	401		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering (Information Security)	396	0	286	412	6121	29.67	377		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Artificial Intelligence	389	313	278	394	6988	28.33	430		-
National Institute of Technology Mizoram	Computer Science & Engineering	384	0	250	423	5645	30.67	0		-
National Institute of Technology, Andhra Pradesh	Computer Science and Data Analytics	379	262	259	350	9884	25	387		-
Maulana Azad National Institute of Technology Bhopal	Advanced Computing	373	0	312	495	3162	36.33	465		-
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Computer Science & Engineering	371	298	298	459	4175	33.33	377		-
Defence Institute of Advanced Technology (Deemed to be University), Girinagar, Pune	Cyber Security	371	285	259	373	8650	26.33	346		-
National Institute of Technology Karnataka, Surathkal	Signal Processing and Machine Learning	370	196	392	608	1300	44	570		-
National Institute of Technology Durgapur	Computer Science & Engineering	360	259	282	473	3650	34.66	339		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Data Science	357	0	286	357	9236	25.67	474		-
Maulana Azad National Institute of Technology Bhopal	Computer Networking	357	0	268	439	5070	31.67	357		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Computer Science & Engineering	353	290	369	523	2610	38	369		-

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College	Branch	OBC	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	PwD	KM
National Institute of Technology Agartala	Computer Science & Engineering	353	0	268	350	9884	25	435		-
National Institute of Technology Puducherry	Computer Science & Engineering	353	0	263	357	9236	25.67	395		-
Central Institute of Technology, Kokrajhar	Computer Science & Engineering	348	0	285	394	6988	28.33	0		-
Indian Institute of Information Technology Vadodara	Computer Science & Engineering with Specialization in Artificial Intelligence	348	0	247	363	8886	26	361		-
National Institute of Technology, Uttarakhand	Artificial Intelligence	346	0	254	353	9560	25.33	464		-
International Institute of Information Technology, Naya Raipur	Computer Science & Engineering	346	0	252	383	7936	27.67	447		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering (Internet of Things)	345	0	259	379	8415	26.67	321		-
National Institute of Technology, Silchar	Artificial Intelligence	343	247	270	353	9560	25.33	401		-
Central University of Punjab, Bathinda, Punjab	Computer Science & Technology	339	0	263	400	6660	28.67	0		-
National Institute of Technology Patna	Information Security	337	0	247	353	9560	25.33	339		-
National Institute of Technology Goa	Computer Science & Engineering	335	268	254	350	9884	25	379		-
University of Hyderabad	Information Technology	335	0	266	379	8415	26.67	321		-
National Institute of Technology Meghalaya	Computer Science & Engineering	333	246	250	363	8886	26	0		-
International Institute of Information Technology, Bhubaneswar	Computer Science & Engineering	331	0	250	363	8886	26	379		-
National Institute of Technology, Srinagar	Communication & Information Technology	331	0	0	383	7936	27.67	0		-
Indian Institute of Information Technology, Design & Manufacturing Kancheepuram, Chennai	er Science and Engineering with Specialization in Data Science and Artificial Inte	330	0	299	363	8886	26	369		-
National Institute of Technology Agartala	Artificial Intelligence	330	0	281	379	8415	26.67	396		-
Indian Institute of Information Technology, Lucknow	Computer Science	330	0	270	437	5170	31.33	366		-
Pt. Dwarka Prasad Mishra Indian Institute of Information Technology, Design & Manufacturing Jabalpur	Computer Science & Engineering	330	0	239	383	7936	27.67	330		-
University of Hyderabad	Information Security	329	0	247	353	9560	25.33	377		-
National Institute of Technology, Uttarakhand	Computing Systems	329	0	0	450	4592	32.67	0		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Artificial Intelligence and Machine Learning	327	0	259	357	9236	25.67	357		-
National Institute of Technology, Jamshedpur	Information Systems Security Engineering	326	308	250	353	9560	25.33	321		-
National Institute of Technology Sikkim	Computer Science & Engineering	326	246	277	400	6660	28.67	369		-
Central University of Rajasthan	Computer Science & Engineering	326	0	250	415	5934	30	377		-
Sant Longowal Institute of Engineering and Technology	Computer Science & Engineering	326	0	246	379	8415	26.67	339		-
IIT Jammu	M.Tech - Information Security	325	265	321	515			484	200	200
Indian Institute of Information Technology Srirangam, Tiruchirappalli	Computer Science & Engineering	323	0	258	357	9236	25.67	400		-
National Institute of Technology Hamirpur	Computer Science & Engineering (Artificial Intelligence)	321	304	286	394	6988	28.33	343		-
Indian Institute of Engineering Science and Technology, Shibpur, District Howrah	Information Technology	321	293	267	357	9236	25.67	512		-

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College	Branch	OBC	ST	SC	GEN SCORE	Rank	Marks	GEN EWS	PwD	KM
National Institute of Technology Arunachal Pradesh	Computer Science & Engineering	321	285	258	363	8886	26	0		-
University of Hyderabad	Artificial Intelligence	321	285	254	486	3475	36	446		-
National Institute of Technology Hamirpur	Computer Science & Engineering	321	266	309	419	5790	30.33	385		-
University of Hyderabad	Computer Science	321	259	272	383	7936	27.67	361		-
National Institute of Technology, Silchar	Computer Science & Engineering	321	259	268	400	6660	28.67	361		-
Indian Institute of Information Technology (IIIT), Sri City, Chittoor	Cyber Security	321	0	281	484	3560	35.33	321		-
National Institute of Technology, Manipur	Computer Science & Engineering	321	0	281	357	9236	25.67	0		-
Shri Mata Vaishno Devi University, Katra	Computer Science & Engineering	321	0	250	383	7936	27.67	0		-
National Institute of Technical Teachers Training and Research, Chandigarh	Computer Science & Engineering	321	0	243	357	9236	25.67	339		-
National Institute of Technology Nagaland	Computer Science & Engineering	317	268	273	408	6332	29.33	361		-
Indian Institute of Information Technology, Pune	Computer Science & Engineering	317	0	258	394	6988	28.33	437		-
Atal Bihari Vajpayee Indian Institute of Information Technology & Management Gwalior	Information Security	252	0	259	442	4784	32.33	383		-
Indian Institute of Information Technology, Design and Manufacturing, Kurnool	ter Science and Engineering with specialization in Data Analytics and Decision S	247	0	290	431	5355	31	361		-
Punjab Engineering College, Chandigarh	Computer Science & Information Security	0	0	258	350	9884	25	330		-
Punjab Engineering College, Chandigarh	Computer Science & Engineering	0	0	238	350	9884	25	0		-

Sanchit Jain

Months Wise Calendar for GATE-2023 (Unacademy Plus) (Sanchit Jain)

Month	Morning Class (7:30am – 9:00am)	Evening Class (7:00pm – 8:30pm)
Feb-2022	**CN(16-Feb to 26-March) (54 Hours)**	DM (2-Feb to 2-Mar) (50 Hours)
Mar-2022	TOC (30-Mar to 26-April) (58 Hours)	DBMS (16-Mar to 1-May) (50 Hours)
Apr-2022	Compiler (27-April to 24-May) (34 Hours)	DE (2-May to 1-June) (40 Hours)
May-2022	DS & Programming) (26-May to 05-July) (56 Hours)	COA (23-June to 20-July) (38 Hours)
Jun-2022	Algo (7-July to 5-Aug) (38 Hours)	OS (21-July to 24-Aug) (58 Hours)
Jul-2022		
Aug-2022	DM (11-Aug to 20-Sept) (50 Hours)	CN (25-Aug to 5-Oct) (54 Hours)
Sep-2022	DBMS (22-Sept to 29-Oct) (50 Hours)	TOC (6-Oct to 20-Oct) (58 Hours)
Oct-2022	DE (3-Nov to 23-Nov) (40 Hours)	Compiler (24-Oct to 20 Nov) (34 Hours)
Nov-2022	COA (24-Nov to 13-Dec) (38 Hours)	**DS & C** (22-Nov to 20-Dec) **(56 Hours)**
Dec-2022	OS (15-Dec to 31-Jan) (58 Hours)	Algo (21-Dec to 3-Feb) (38 Hours)
Jan-2023		
Feb-2023		

Months Wise Calendar for GATE-2023 (Unacademy Plus) (Sanchit Jain)

Month	Morning Class (7:30am – 9:00am)	Evening Class (7:00pm – 8:30pm)
Feb-2022	**CN(16-Feb to 26-March) (54 Hours)**	DM (2-Feb to 2-Mar) (50 Hours)
Mar-2022	TOC (30-Mar to 26-April) (58 Hours)	DBMS (16-Mar to 1-May) (50 Hours)
Apr-2022	Compiler (27-April to 24-May) (34 Hours)	DE (2-May to 1-June) (40 Hours)
May-2022	DS & Programming) (26-May to 05-July) (56 Hours)	COA (23-June to 20-July) (38 Hours)
Jun-2022	Algo (7-July to 5-Aug) (38 Hours)	OS (21-July to 24-Aug) (58 Hours)
Jul-2022		
Aug-2022	DM (11-Aug to 20-Sept) (50 Hours)	CN (25-Aug to 5-Oct) (54 Hours)
Sep-2022	DBMS (22-Sept to 29-Oct) (50 Hours)	TOC (6-Oct to 20-Oct) (58 Hours)
Oct-2022	DE (3-Nov to 23-Nov) (40 Hours)	Compiler (24-Oct to 20 Nov) (34 Hours)
Nov-2022	COA (24-Nov to 13-Dec) (38 Hours)	**DS & C** (22-Nov to 20-Dec) **(56 Hours)**
Dec-2022	OS (15-Dec to 31-Jan) (58 Hours)	Algo (21-Dec to 3-Feb) (38 Hours)
Jan-2023		
Feb-2023		

Months Wise Calendar for GATE-2022 (Unacademy Plus) (Sanchit Jain)

Month	Morning Class (7:00am – 9:00am)	Evening Class (7:00pm – 9:00pm)
Feb-2021	DS & Programming (15-Feb to 23-Mar) (56 Hours)	DM (22-Feb to 27-Mar) (50 Hours)
Mar-2021	Algo (24-Mar to 26-April) (38 Hours)	DBMS (29-Mar to 30-April) (50 Hours)
Apr-2021	CN(29-April to 15-June) (54 Hours)	DE (7-May to 1-June) (40 Hours)
May-2021	TOC (26-May to 05-July) (58 Hours)	COA (23-June to 20-July) (38 Hours)
Jun-2021	Compiler (7-July to 5-Aug) (34 Hours)	OS (21-July to 24-Aug) (58 Hours)
Jul-2021		
Aug-2021	DM (11-Aug to 20-Sept) (50 Hours)	DS & Programming (25-Aug to 5-Oct) (56 Hours)
Sep-2021	DBMS (22-Sept to 29-Oct) (50 Hours)	Algo (6-Oct to 1-Nov) (38 Hours)
Oct-2021	DE (3-Nov to 23-Nov) (40 Hours)	CN(10-Nov to 5 Jan) (54 Hours)
Nov-2021	COA (24-Nov to 13-Dec) (38 Hours)	**Compiler (12-Jan to 3-Feb) (58 Hours)**
Dec-2021	OS (15-Dec to 11-Jan) (58 Hours)	
Jan-2022	**TOC (12-Jan to 3-Feb) (58 Hours)**	
Feb-2022		

COMPLETED

Computer Networks Schedule For GATE-2023

Morning					
Date	Day	Subject-1	Topic	Time	Duration
16-02-2022	Wednesday	CN	Basics of Computer Networks Part-1	7:30 am to 9:00 am	1.5
17-02-2022	Thursday	CN	Basics of Computer Networks Part-2	7:30 am to 9:00 am	1.5
18-02-2022	Friday	CN	Basics of Computer Networks Part-3	7:30 am to 9:00 am	1.5
19-02-2022	Saturday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
21-02-2022	Monday	CN	Access Control Part-1	7:30 am to 9:00 am	1.5
22-02-2022	Tuesday	CN	Access Control Part-2	7:30 am to 9:00 am	1.5
23-02-2022	Wednesday	CN	Access Control Part-3	7:30 am to 9:00 am	1.5
24-02-2022	Thursday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
25-02-2022	Friday	CN	Flow Control Part-1	7:30 am to 9:00 am	1.5
26-02-2022	Saturday	CN	Flow Control Part-2	7:30 am to 9:00 am	1.5
28-02-2022	Monday	CN	Flow Control Part-3	7:30 am to 9:00 am	1.5
01-03-2022	Tuesday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
02-03-2022	Wednesday	CN	Error Control Part-1	7:30 am to 9:00 am	1.5
03-03-2022	Thursday	CN	Error Control Part-2	7:30 am to 9:00 am	1.5
04-03-2022	Friday	CN	Framing and Ethernet	7:30 am to 9:00 am	1.5
05-03-2022	Saturday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
07-03-2022	Monday	CN	Network Layer protocol Part-1	7:30 am to 9:00 am	1.5
08-03-2022	Tuesday	CN	Network Layer protocol Part-2	7:30 am to 9:00 am	1.5
09-03-2022	Wednesday	CN	Network Layer protocol Part-3	7:30 am to 9:00 am	1.5
10-03-2022	Thursday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
11-03-2022	Friday	CN	IP addressing and routing and Routing Part-1	7:30 am to 9:00 am	1.5
12-03-2022	Saturday	CN	IP addressing and routing and Routing Part-2	7:30 am to 9:00 am	1.5
14-03-2022	Monday	CN	IP addressing and routing and Routing Part-3	7:30 am to 9:00 am	1.5
15-03-2022	Tuesday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
16-03-2022	Wednesday	CN	Transport Layer Part-1	7:30 am to 9:00 am	1.5
17-03-2022	Thursday	CN	Transport Layer Part-2	7:30 am to 9:00 am	1.5
18-03-2022	Friday	CN	Transport Layer Part-3	7:30 am to 9:00 am	1.5
21-03-2022	Monday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5
22-03-2022	Tuesday	CN	Transport Layer Part-4	7:30 am to 9:00 am	1.5
23-03-2022	Wednesday	CN	Application Layer Part-1	7:30 am to 9:00 am	1.5
24-03-2022	Thursday	CN	Application Layer Part-2	7:30 am to 9:00 am	1.5
25-03-2022	Friday	CN	Cryptography Part-1	7:30 am to 9:00 am	1.5
26-03-2022	Saturday	CN	Doubt Clearing Session	7:30 am to 9:00 am	1.5

Evening Batch

Date	Day	Subject-2	Topic	Time	Duration
16-03-2022	Wednesday	DBMS	Basics and Introduction	7:00 pm to 8:30 pm	1.5
17-03-2022	Thursday	DBMS	Transaction & Concurrency Control Part-1	7:00 pm to 8:30 pm	1.5
18-03-2022	Friday	DBMS	Transaction & Concurrency Control Part-2	7:00 pm to 8:30 pm	1.5
21-03-2022	Monday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
22-03-2022	Tuesday	DBMS	Transaction & Concurrency Control Part-3	7:00 pm to 8:30 pm	1.5
23-03-2022	Wednesday	DBMS	Transaction & Concurrency Control Part-4	7:00 pm to 8:30 pm	1.5
24-03-2022	Thursday	DBMS	Transaction & Concurrency Control Part-5	7:00 pm to 8:30 pm	1.5
25-03-2022	Friday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
28-03-2022	Monday	DBMS	E R Diagram Part - 1	7:00 pm to 8:30 pm	1.5
29-03-2022	Tuesday	DBMS	E R Diagram Part - 2	7:00 pm to 8:30 pm	1.5
30-03-2022	Wednesday	DBMS	E R Diagram Part - 3	7:00 pm to 8:30 pm	1.5
31-03-2022	Thursday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
01-04-2022	Friday	DBMS	Functional Dependency Part -1	7:00 pm to 8:30 pm	1.5
04-04-2022	Monday	DBMS	Functional Dependency Part -2	7:00 pm to 8:30 pm	1.5
05-04-2022	Tuesday	DBMS	Functional Dependency Part -3	7:00 pm to 8:30 pm	1.5
06-04-2022	Wednesday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
07-04-2022	Thursday	DBMS	Normalization Part -1	7:00 pm to 8:30 pm	1.5
08-04-2022	Friday	DBMS	Normalization Part -2	7:00 pm to 8:30 pm	1.5
11-04-2022	Monday	DBMS	Normalization Part -3	7:00 pm to 8:30 pm	1.5
12-04-2022	Tuesday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
13-04-2022	Wednesday	DBMS	Indexing and Physical Structure Part-1	7:00 pm to 8:30 pm	1.5
14-04-2022	Thursday	DBMS	Indexing and Physical Structure Part-2	7:00 pm to 8:30 pm	1.5
15-04-2022	Friday	DBMS	Indexing and Physical Structure Part-3	7:00 pm to 8:30 pm	1.5
18-04-2022	Monday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
19-04-2022	Tuesday	DBMS	Relational Algebra Part - 1	7:00 pm to 8:30 pm	1.5
20-04-2022	Wednesday	DBMS	Relational Algebra Part - 2	7:00 pm to 8:30 pm	1.5
21-04-2022	Thursday	DBMS	Relational Algebra Part - 3	7:00 pm to 8:30 pm	1.5
22-04-2022	Friday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
25-04-2022	Monday	DBMS	SQL Part -1	7:00 pm to 8:30 pm	1.5
26-04-2022	Tuesday	DBMS	SQL Part -2	7:00 pm to 8:30 pm	1.5
27-04-2022	Wednesday	DBMS	SQL Part -3	7:00 pm to 8:30 pm	1.5
28-04-2022	Thursday	DBMS	Doubt Clearing Session	7:00 pm to 8:30 pm	1.5
29-04-2022	Friday	DBMS	Relational Calculus Part-1	7:00 pm to 8:30 pm	1.5
02-05-2022	Monday	DBMS	Relational Calculus Part-2	7:00 pm to 8:30 pm	1.5

DBMS Schedule For GATE-2023

GATE & ESE | Plus | All courses | All languages | All topics

HINGLISH CS & IT

Foundation Course on Compiler for GATE 2022

Lesson 15 • Feb 1, 2022 6:30 PM

Sanchit Jain

HINGLISH CS & IT

Foundation Course on Theory of Computation for GATE 2022

Lesson 21 • Feb 3, 2022 8:00 AM

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HINDI CS & IT

Foundation Course on Discrete Mathematics for GATE

Starts on Feb 2, 2022 • 25 lessons

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HINGLISH CS & IT

Complete Course on Operating System for GATE

Ended on Jan 11, 2022 • 28 lessons

Sanchit Jain

HINGLISH ELECTRICAL ENGINEERING

Complete Course on Computer Architecture for GATE

Ended on Dec 13, 2021 • 19 lessons

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HINGLISH CS & IT

Complete Course on Computer Networks for GATE

Ended on Jan 7, 2022 • 27 lessons

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HINDI CS & IT

Complete Course on Digital Electronics for GATE

Ended on Nov 23, 2021 • 18 lessons

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HINGLISH PRACTICE & STRATEGY

FAQ Handbook for GATE

Ended on Nov 26, 2021 • 7 lessons

Ravindrababu Ravula

HINDI CS & IT

Complete Course on Algorithms for GATE

Ended on Nov 9, 2021 • 19 lessons

Sanchit Jain

HINGLISH CS & IT

Complete Course on DBMS for GATE

Ended on Oct 28, 2021 • 25 lessons

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HINDI CS & IT

Complete Course on Programming & Data Structures for GATE

Ended on Oct 12, 2021 • 28 lessons

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HINDI CS & IT

Complete Course on Discrete Mathematics for GATE

Ended on Oct 10, 2021 • 27 lessons

Sanchit Jain

Educator highlights

- Works at **Knowledge Gate**
- Studied at **Delhi Technological University**
- Have qualified gate Have experience of more than 8 years Have a YouTube channel with 5 lakh follower
- Lives in **Ghaziabad, Uttar Pradesh, India**
- Unacademy Educator since **19th July, 2019**
- **844,388 live minutes** taught in last 30 days
- Knows **Punjabi, Hinglish, Hindi and English**

Sanchit Jain

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Comprehensive Course on Engineering Mathematics

Lesson 7 • Today, 12:00 PM

Karumudi Umamaheswara Rao

ENGLISH ENGINEERING MATHEMATICS

Course on Calculus for GATE CSE 2022/2023

Lesson 3 • Today, 6:00 PM

Karumudi Umamaheswara Rao

HINDI ENGINEERING MATHEMATICS

Detailed Course on Engineering Mathematics - Part III

Lesson 16 • Today, 2:00 PM

PALLAV GOUR

HINDI ENGINEERING MATHEMATICS

Detailed Course on Engineering Mathematics - Part I

Lesson 11 • Aug 31, 2021 9:00 AM

PALLAV GOUR

HINGLISH ENGINEERING MATHEMATICS

Comprehensive Course on General Aptitude - Part II

Lesson 7 • Today, 5:00 PM

Sanga N L N Sarma

General Aptitude

Ongoing | All courses | All languages

HINGLISH GENERAL APTITUDE

Course on General Aptitude for GATE 2022-23

Lesson 9 · Started at 9:00 AM

Saurabh Thakur

HINGLISH GENERAL APTITUDE

Practice Course on General Aptitude for GATE 2022

Lesson 9 · Nov 10, 2021 9:30 AM

Aman Raj

HINGLISH GENERAL APTITUDE

Comprehensive Course on General Aptitude - Part II

Lesson 7 · Today, 5:00 PM

Sanga N L N Sarma

ENGLISH GENERAL APTITUDE

Complete Course on General English for GATE 2022 & 2023

Lesson 29 · Today, 12:30 PM

Shreyas A

ENGLISH GENERAL APTITUDE

Comprehensive Course on Numerical Aptitude

Lesson 9 · Dec 1, 2021 5:00 PM

Venkatadri Vaka

HINGLISH GENERAL APTITUDE

Course on Reasoning & Aptitude

Lesson 57 · Today, 12:00 PM

Syed Asif Haider

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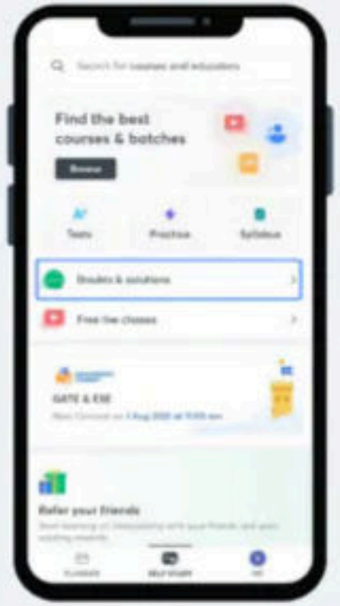

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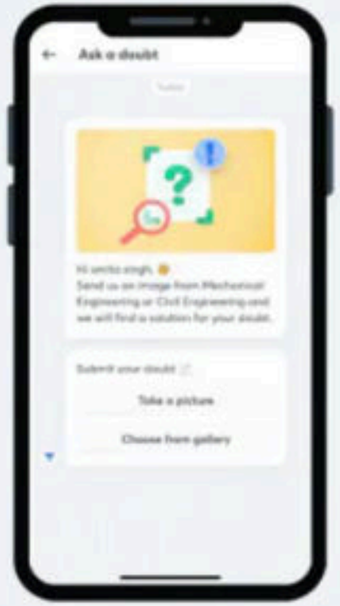

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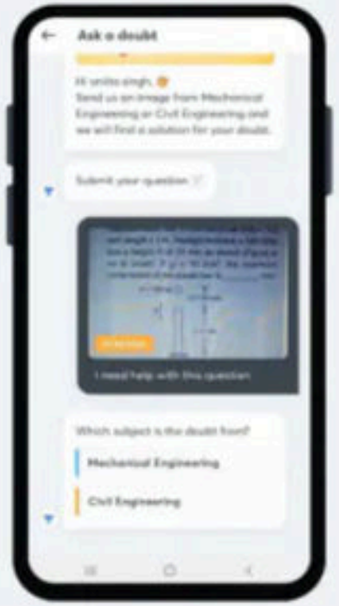
4. Choose the subject that the question falls under



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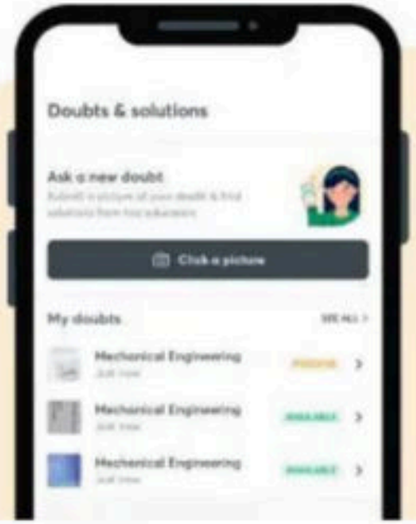

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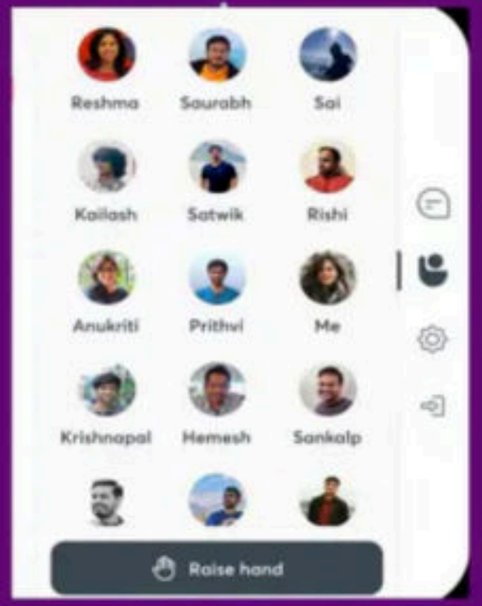

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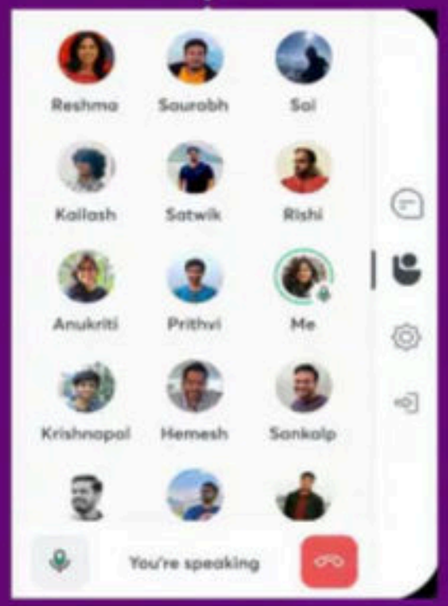

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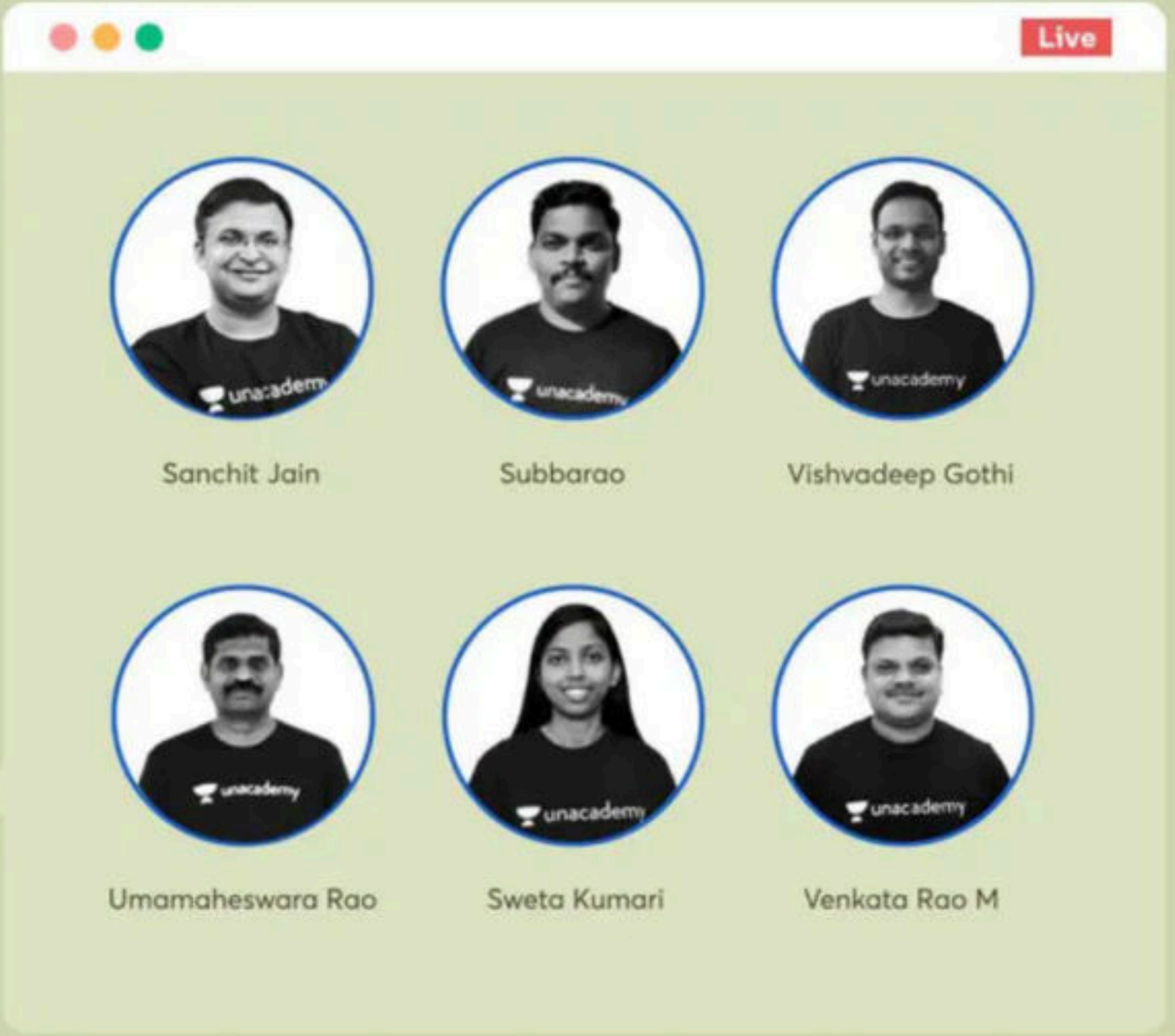

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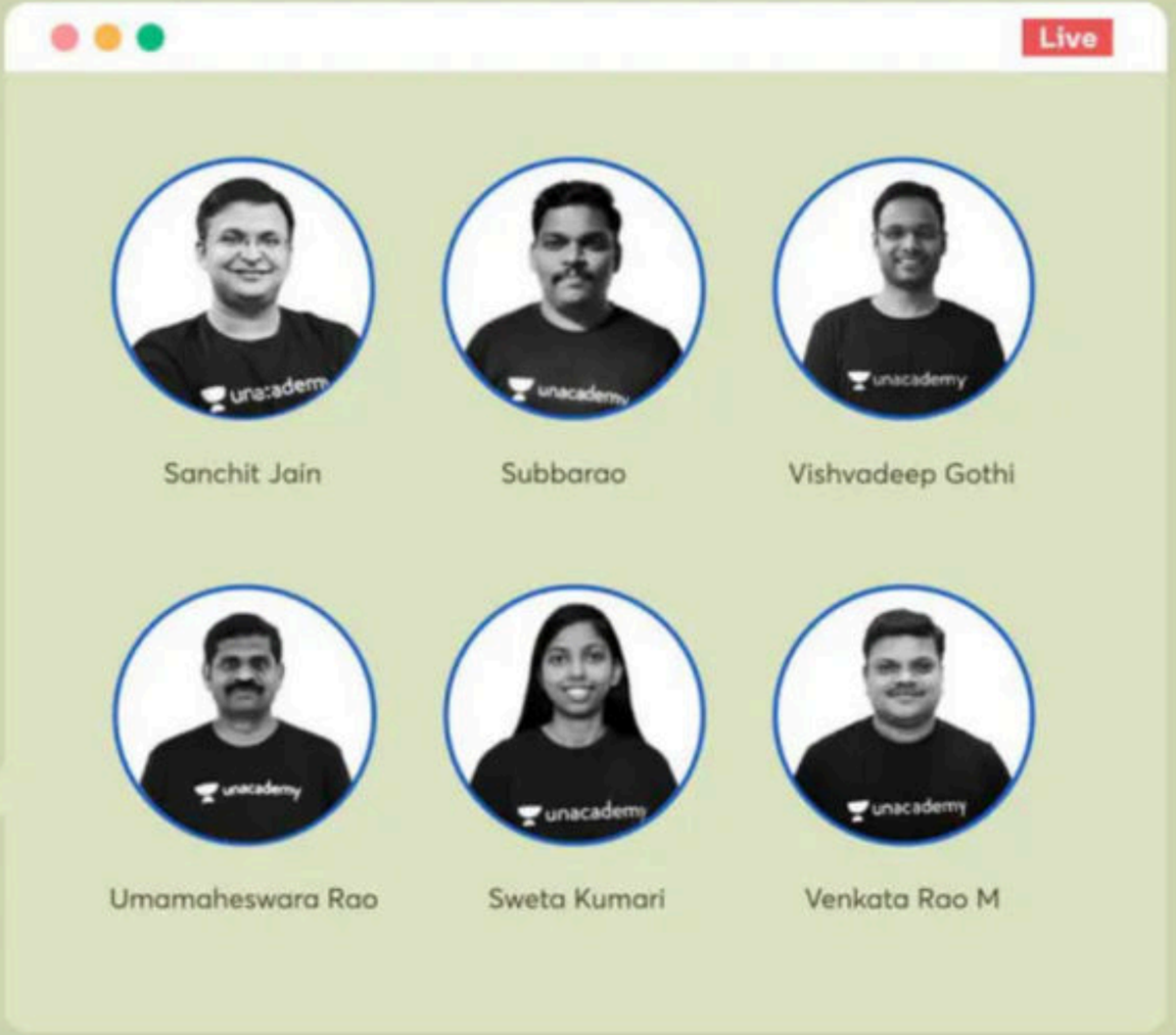

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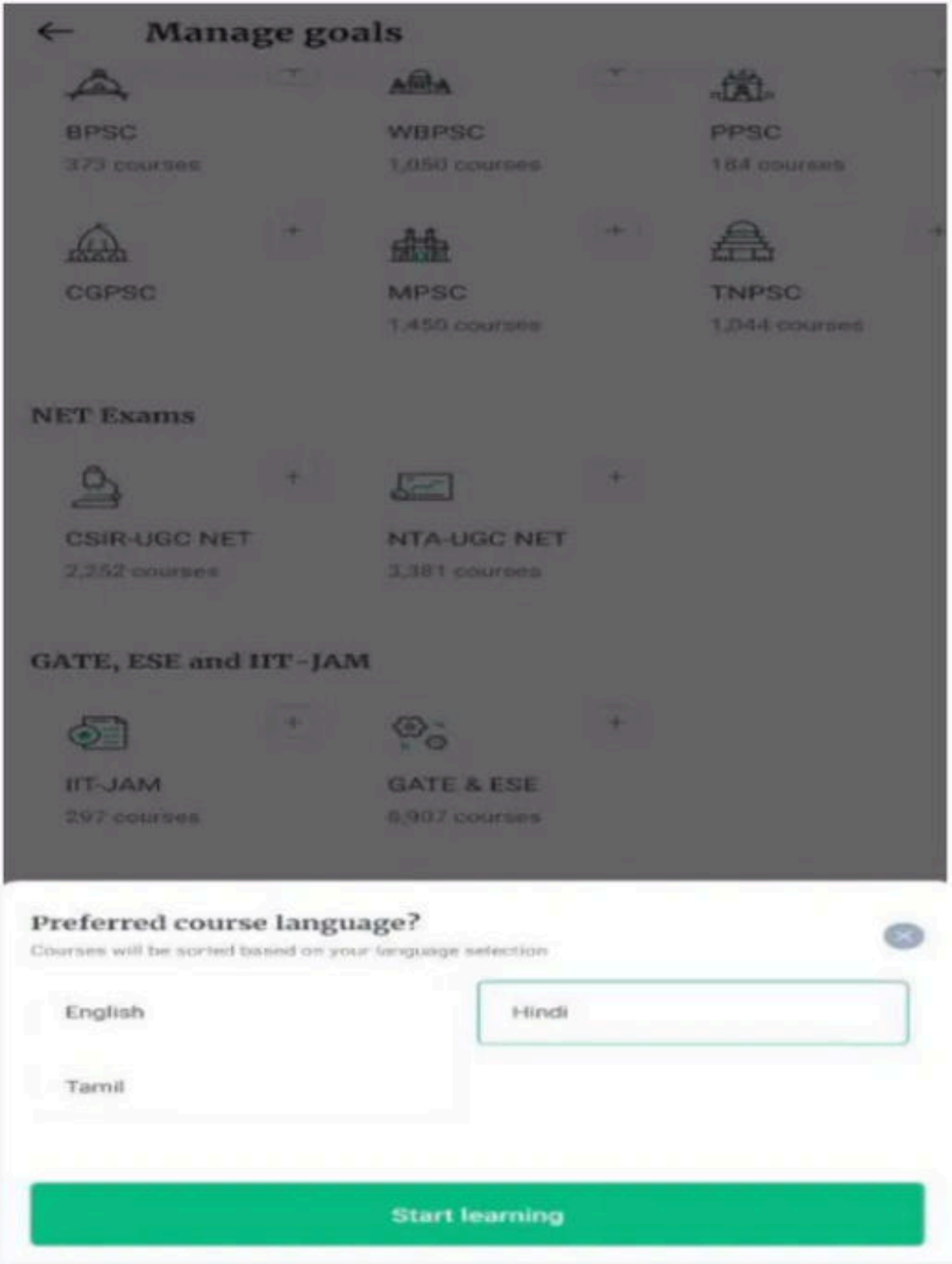
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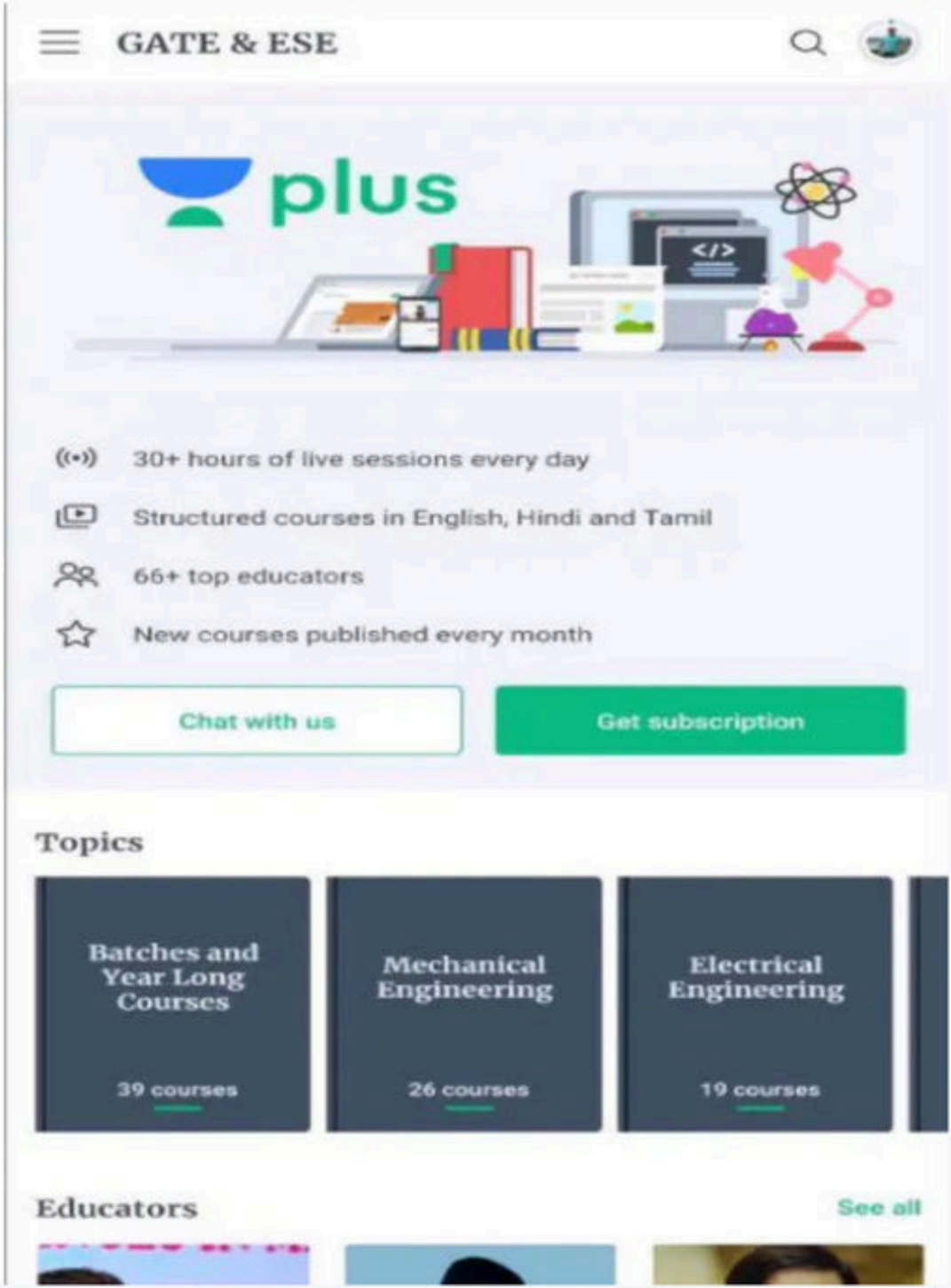
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Abuhujair Javed Khan	3
Gulshan Kumar Gabel	4
Kiran Kumar Kunche	8
Mitesh Khemani	10
Yash Patel	19
Tathagata Dey	21
Preeti Sharma	23
Akash Mondal	52
Anuj Kumar	78
Dhananjay Kumar	78

Name	AIR
Jaskaran Singh	82
Rudrik Shah	121
Samual Jayakumar	121
I.B.V.L. Raju	128
Yash Punjabi	141
Sai Praneeth	141
Khush Jogi	167
Astha Tiwari	167
Rishav Mishra	227
Kushagra Jain	242
Chetan Patidar	289

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Indian edtech Unacademy valued at $3.44 billion in $440 million fundraise

Manish Singh @refsrc / 6:45 AM GMT+5:30 • August 2, 2021

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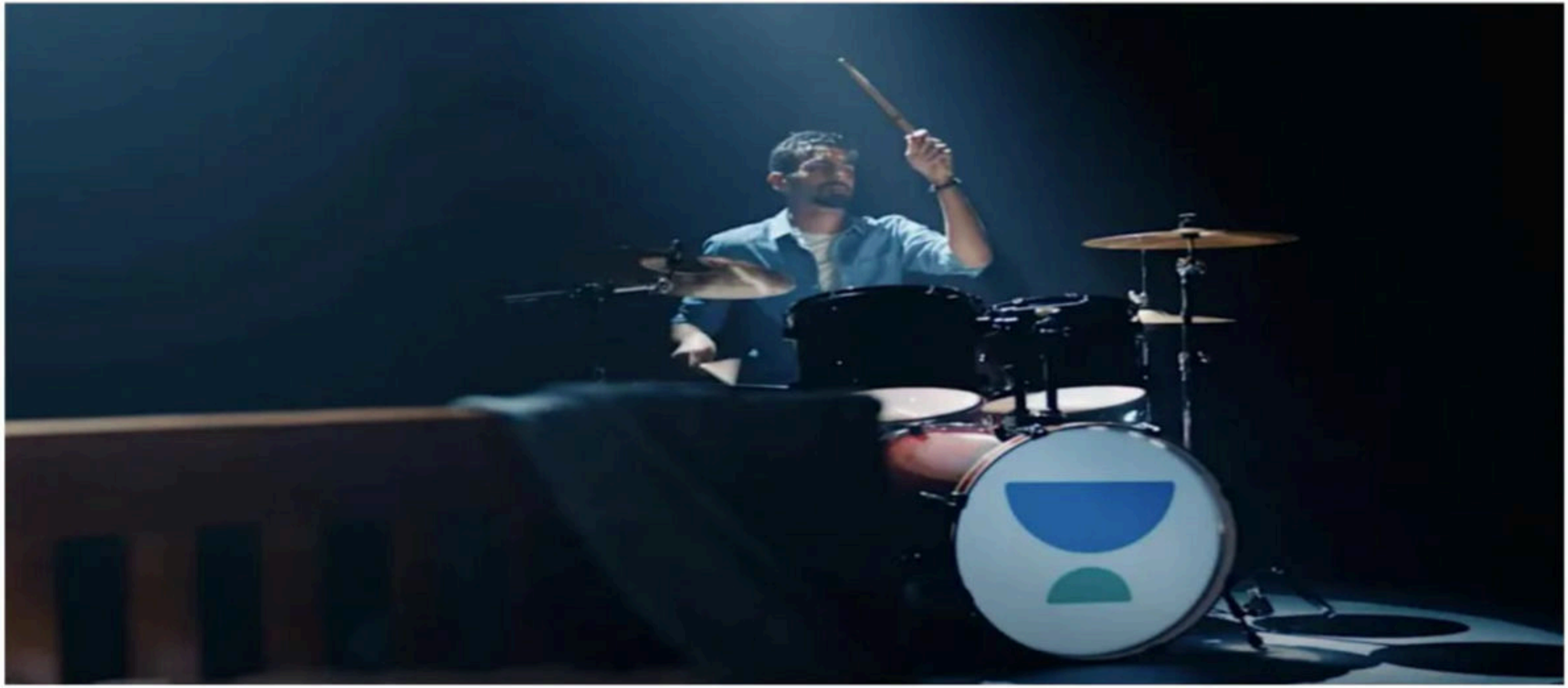

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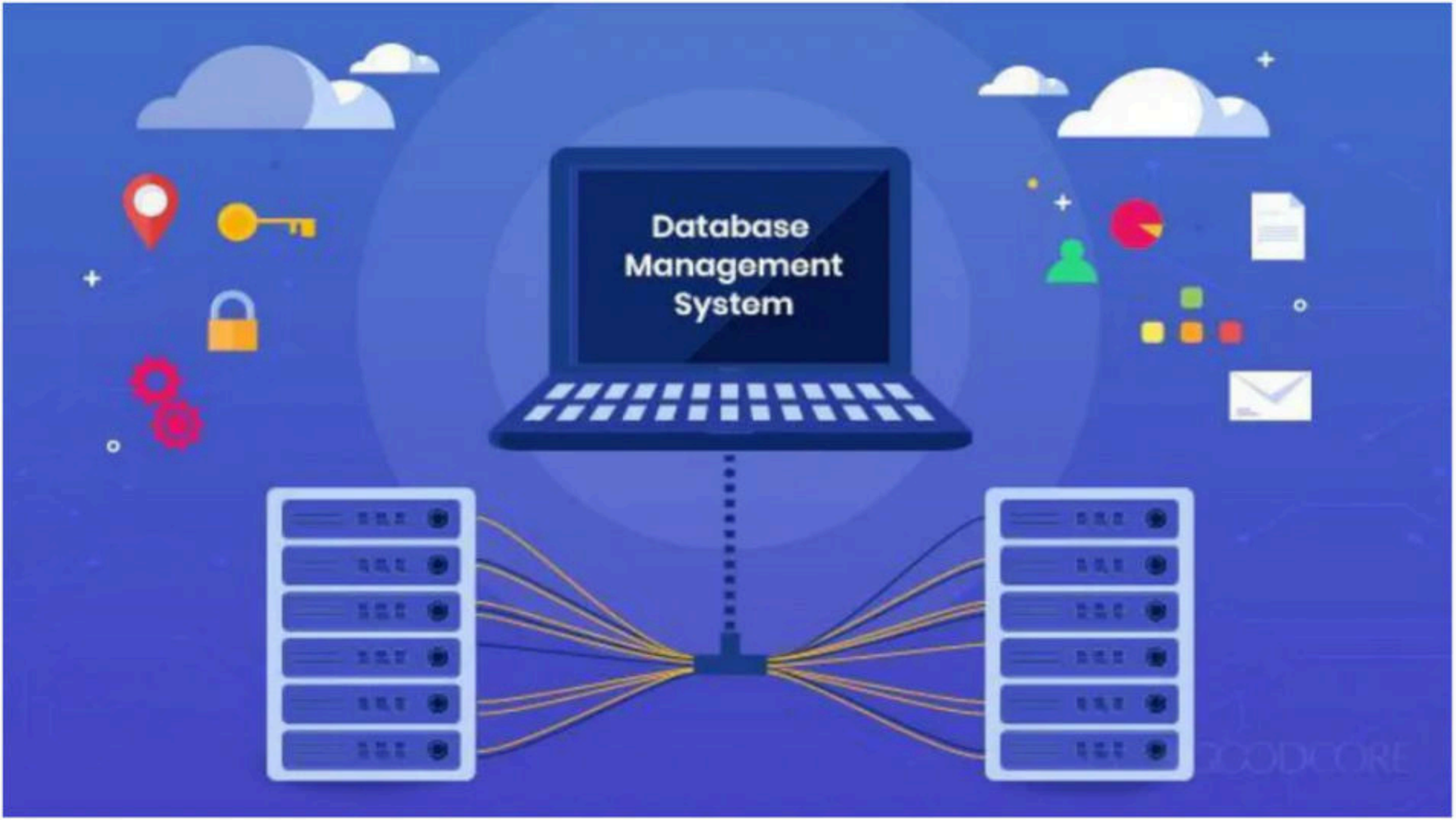
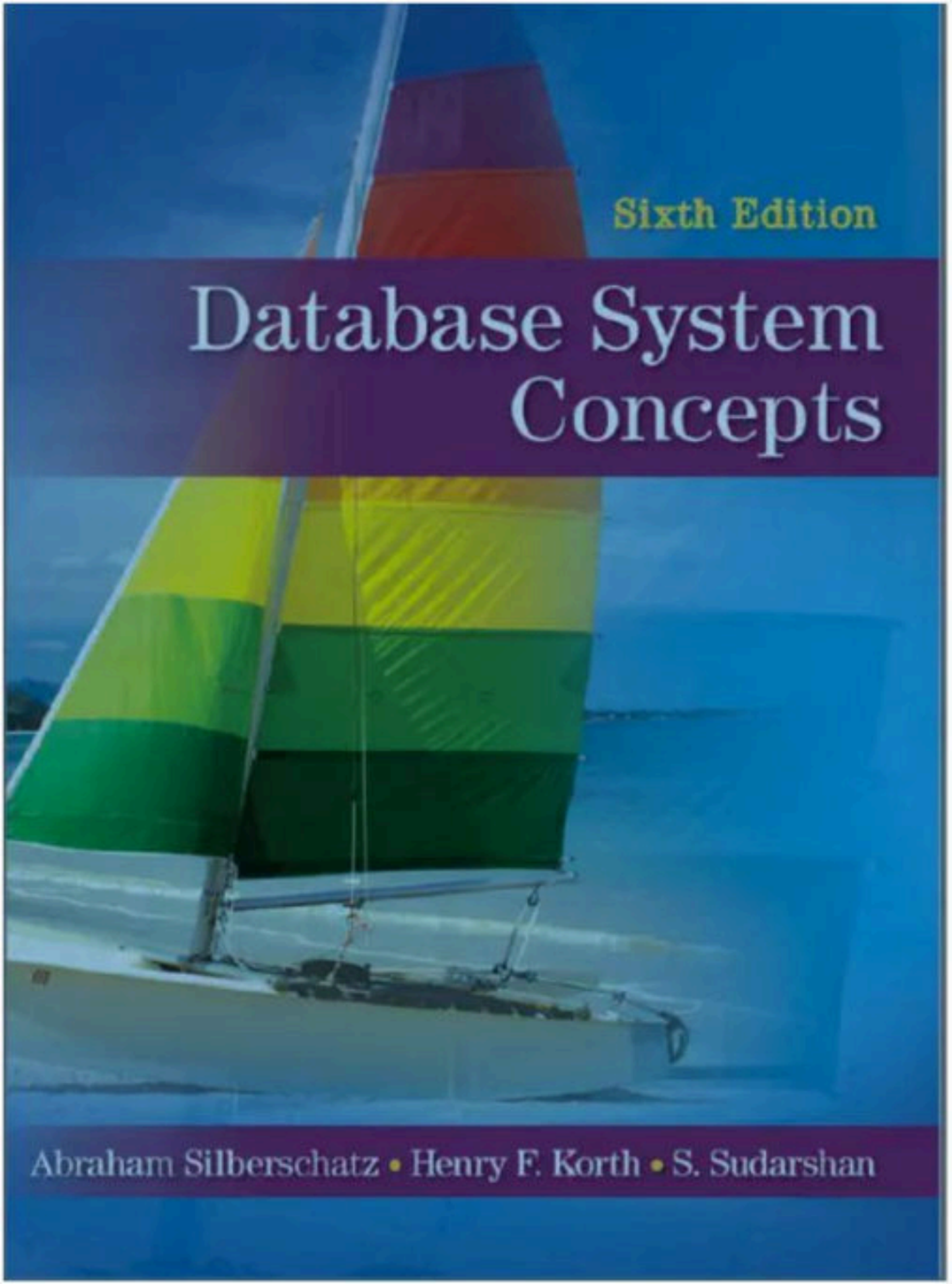
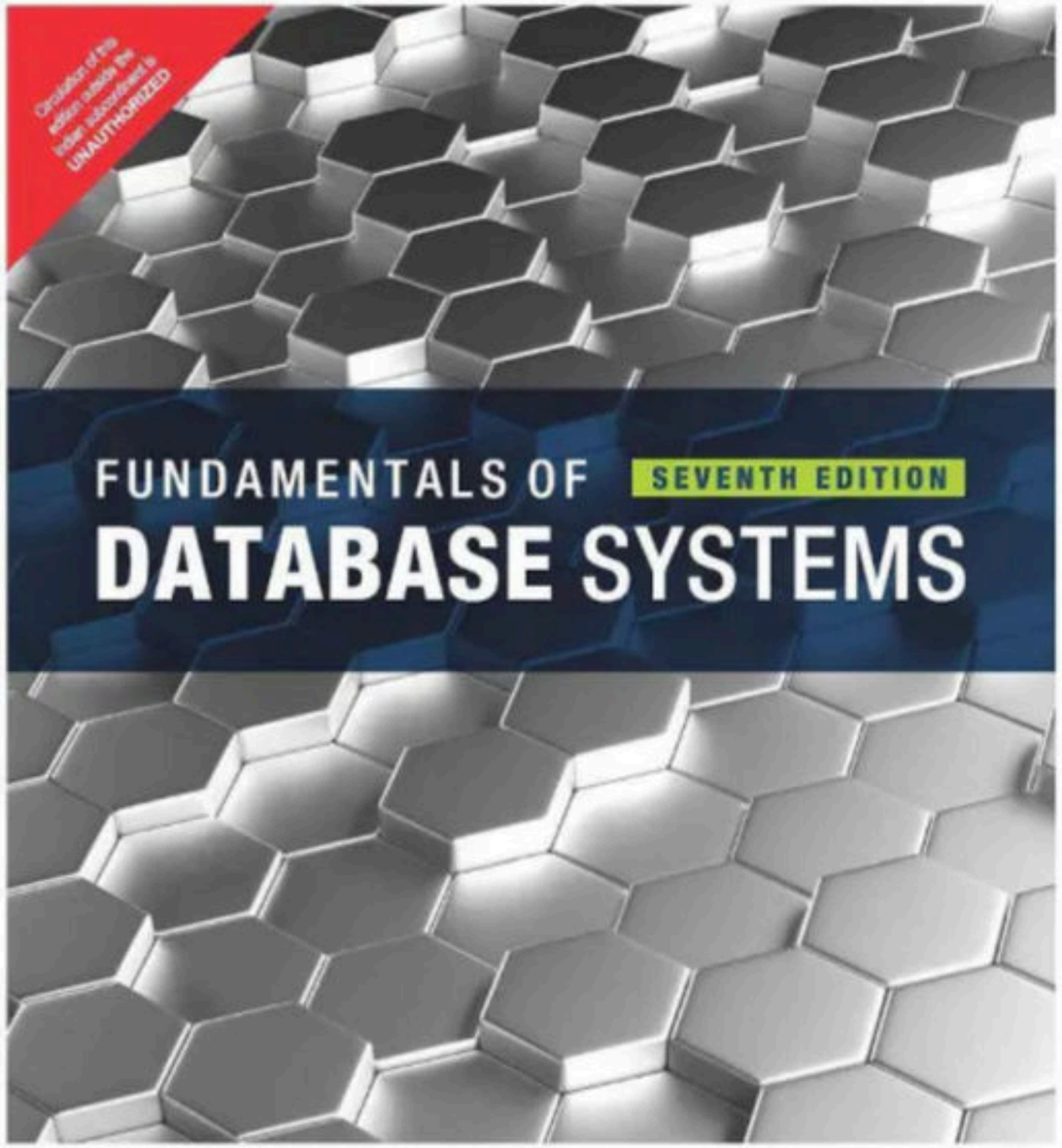

Database
Management
System

Database

- Core subjects for CS/IT Students
- In GATE 7-8 Marks out of 100 Marks, and 5-6 questions on an average
- In NET 15-16 Marks out of 200 marks and 10-12 questions
- Needs less time, very scoring
- Mostly numerical questions
- Indirect Application in Industry, good future



- **Book Name**
  - DATABASE SYSTEM CONCEPTS
- **Writers**
  - Abraham Silberschatz
  - Henry F. Korth
  - S. Sudarshan
- **Publisher** – McGraw-Hill
- **Edition** – 6th



- **Book Name**
  - Fundamentals of Database Systems
- **Writers**
  - Ramez Elmasri
  - Shamkant B. Navathe
- **Publisher** – Pearson
- **Edition** – 7th

Syllabus

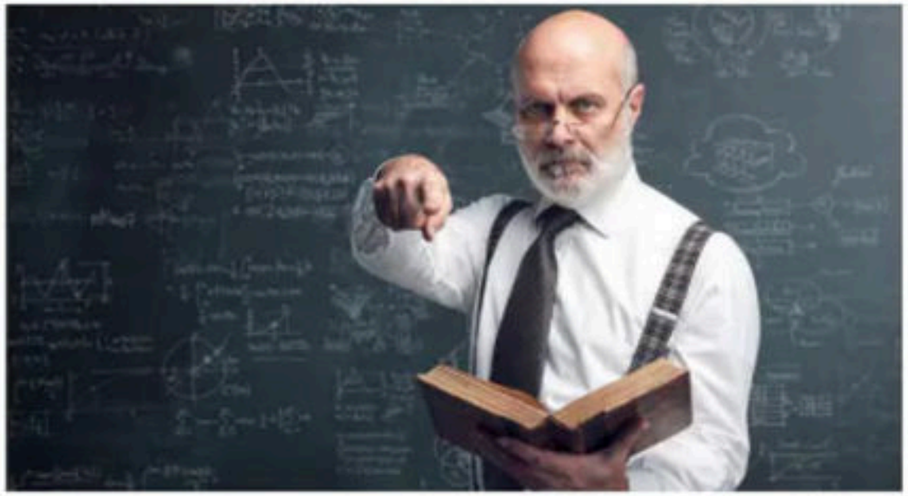
- ER-model
- Relational model
- Integrity constraints
- Normal forms
- File organization, indexing (e.g., B and B+ trees).
- Relational algebra, tuple calculus, SQL.
- Transactions and concurrency control.

What you can expect from me

- Will take care of theory and numerical both
- Will give more weightage to the topics that are asked more frequently in GATE
- Will not emphasize more than required, on a topic
- Will provide PDF of related books

What i expect from you

- There is no hurry, feel free to ask questions any time through out the class, but first listen
- Please revise the entire lecture before and after the class
- Be regular, Consistency is most important
- More you practice, more clarity you will get
- If we follow all the above specified points Success in guaranteed



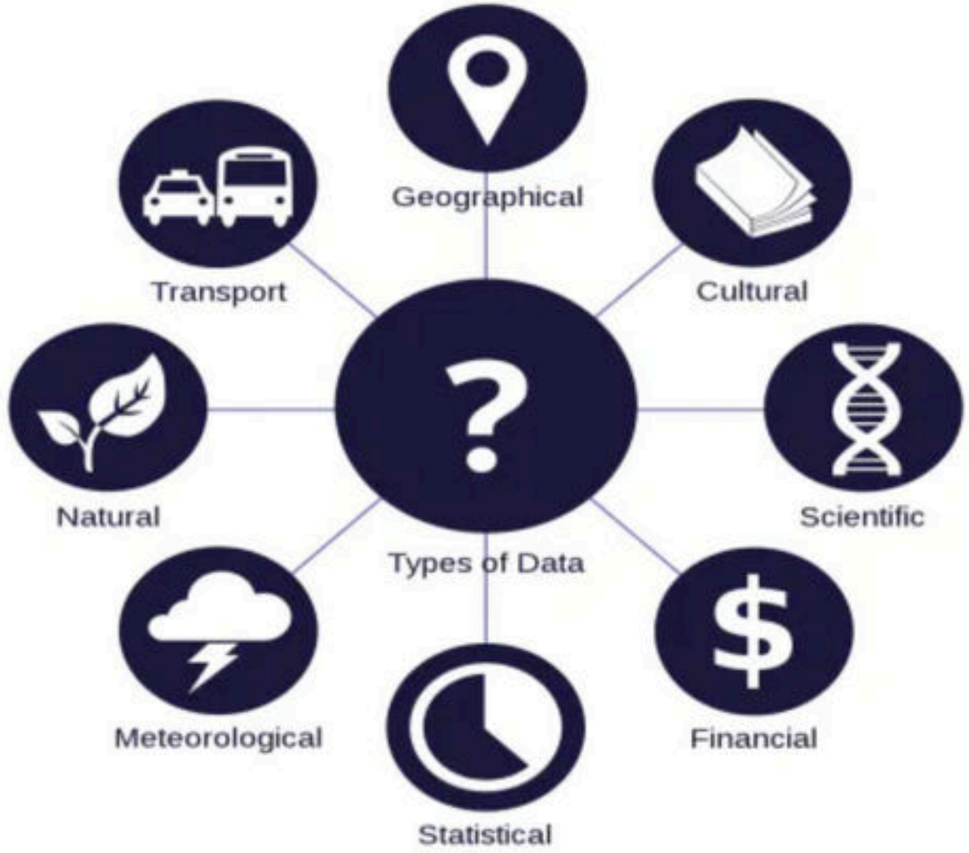
Break

What is Data ?

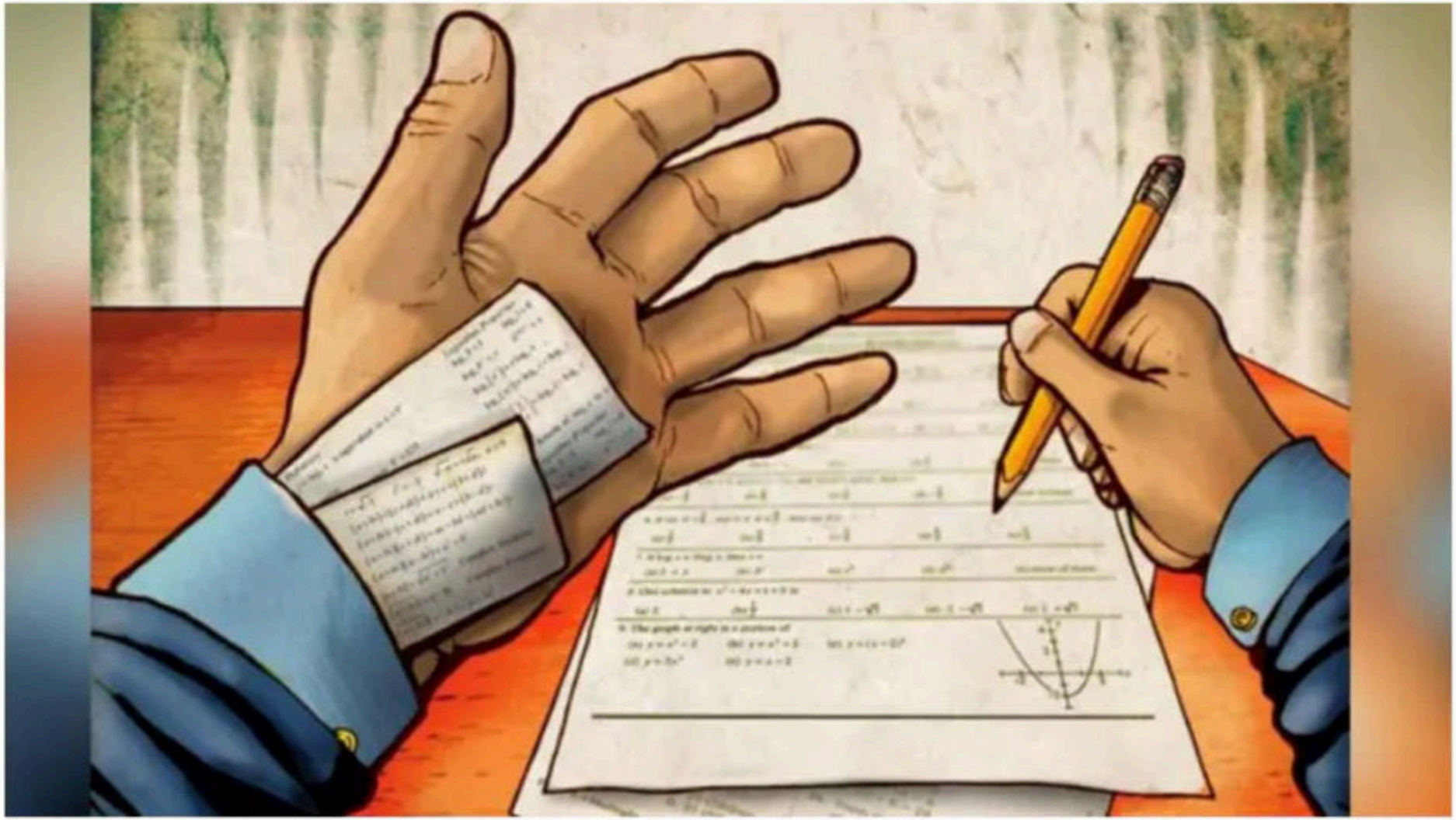
Data

- Data are characteristics, usually numerical, that are collected through observation. In a more technical sense, data are a set of values of qualitative or quantitative variables about one or more persons or objects, while a datum (singular of data) is a single value of a single variable.

- Any facts and figures about an entity is called as Data.



What is Information ?

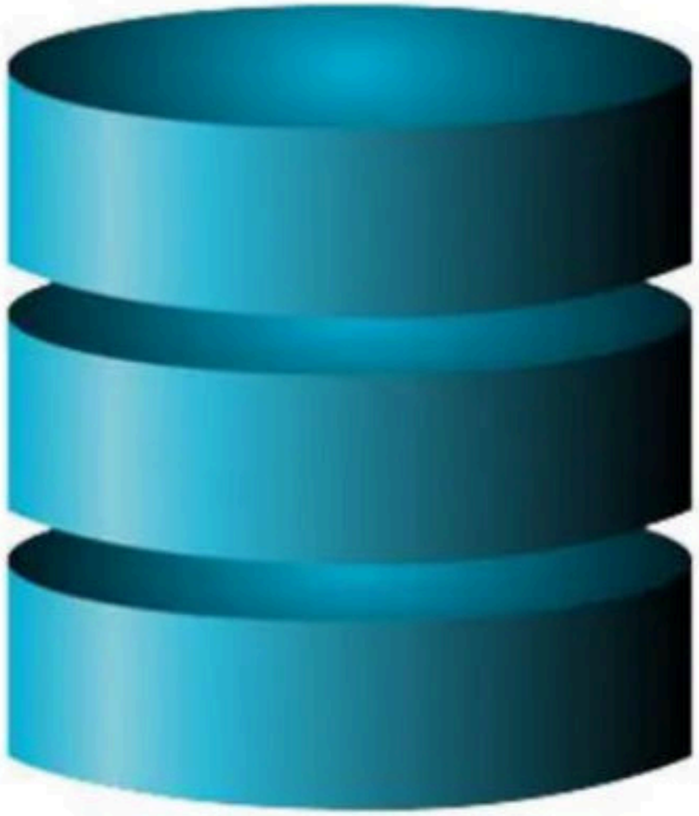


Information

- Although the terms "data" and "information" are often used interchangeably, these terms have distinct meanings. In some popular publications, data are sometimes said to be transformed into information when they are viewed in context or in post-analysis.

- Processed Data is called information.

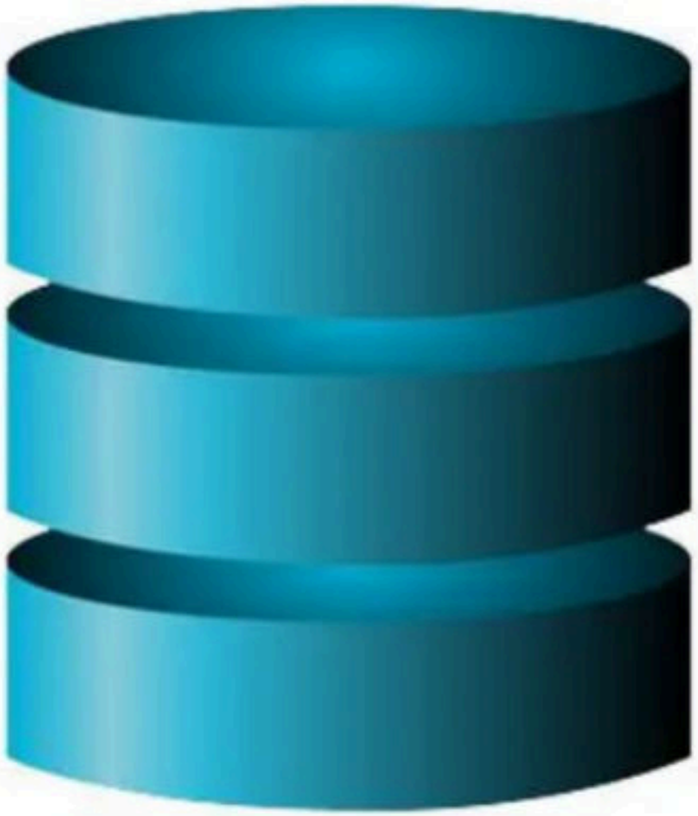
What is Data Base?



Data Base

- A **database** is an organized collection of data, generally stored and accessed electronically from a computer system.

What is Data Base Management System?



Data Base Management System

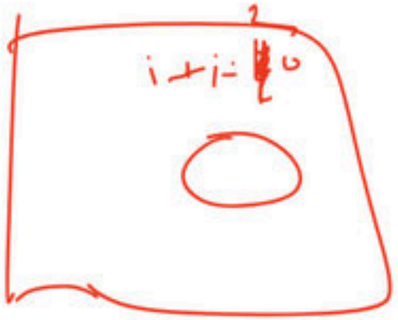
- The database management system (DBMS) is the software that interacts with end users, applications, and the database itself to capture and analyze the data.

- The DBMS software additionally encompasses the core facilities provided to administer the database. The sum total of the database, the DBMS and the associated applications can be referred to as a "database system".

Break

Problem With File System

- Data redundancy and inconsistency



Problem With File System

- Difficulty in accessing Data

Problem With File System

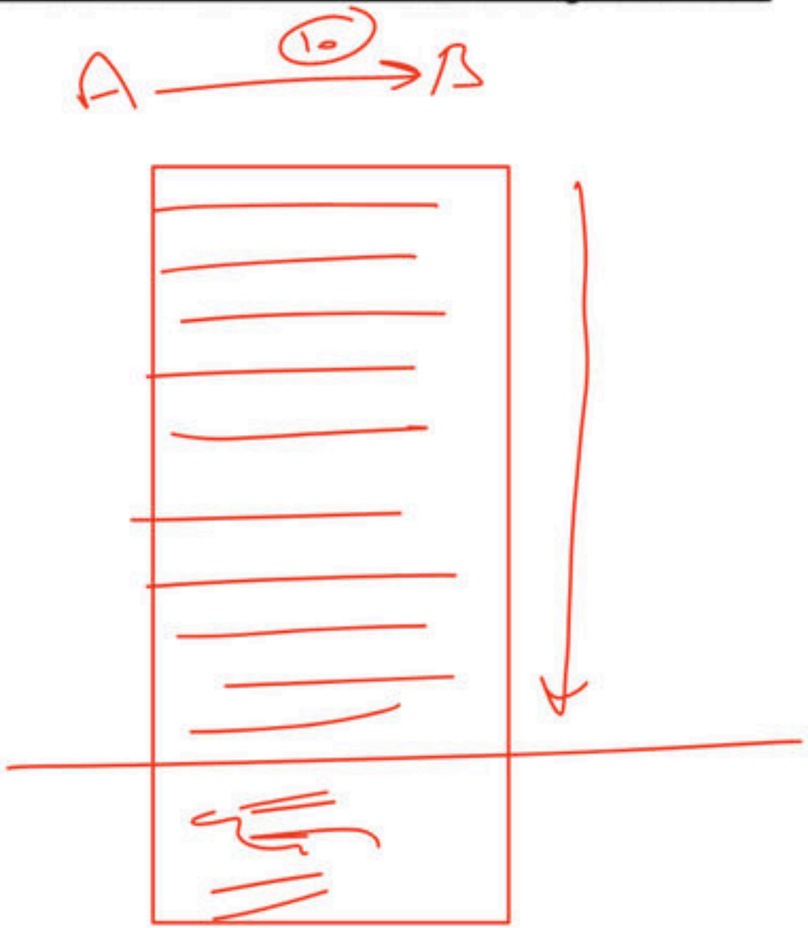
- Data Isolation

Problem With File System

- Integrity Problem

Problem With File System

- Atomicity Problem

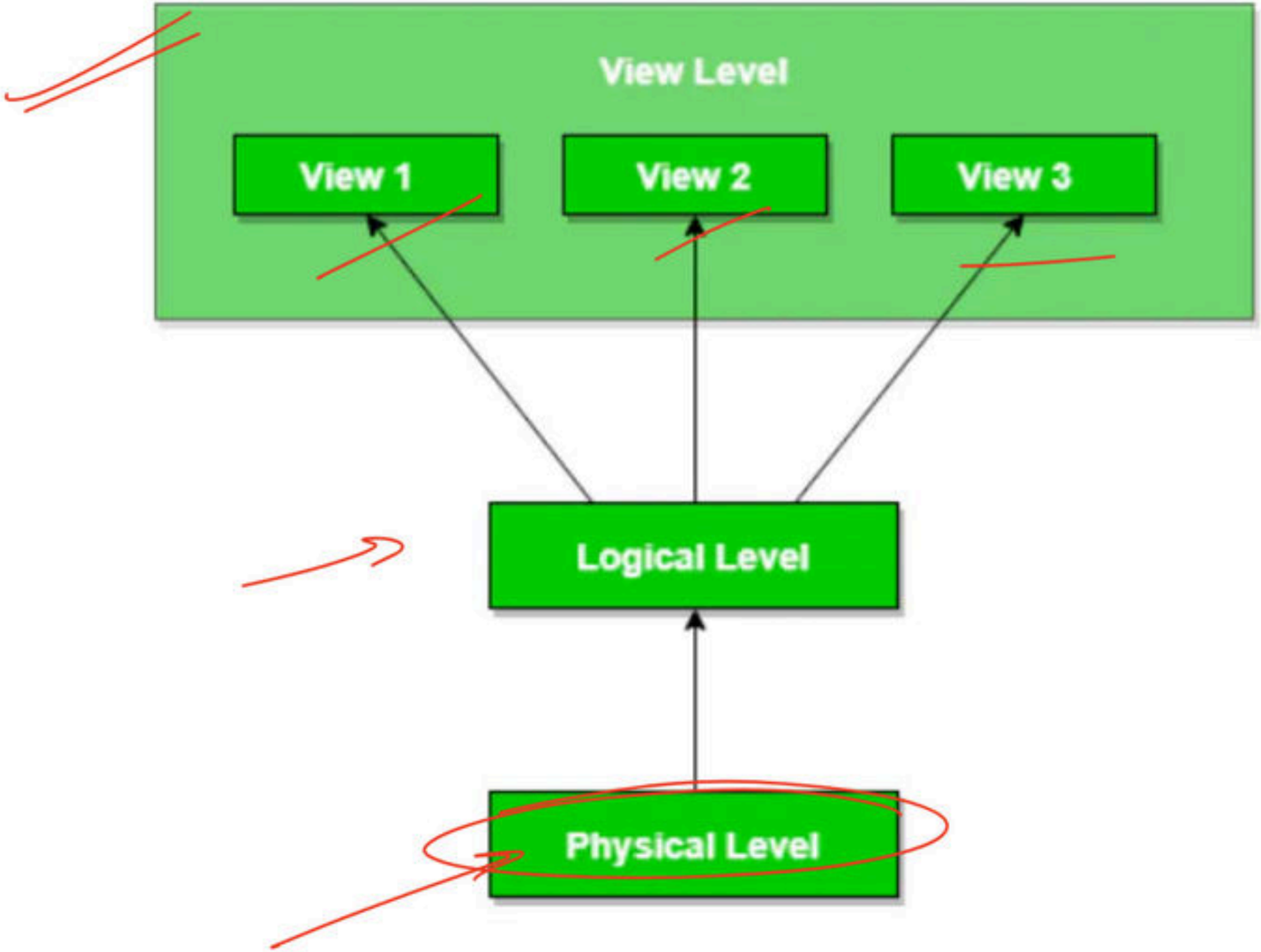


Problem With File System

- Concurrent access Anomalies

Break

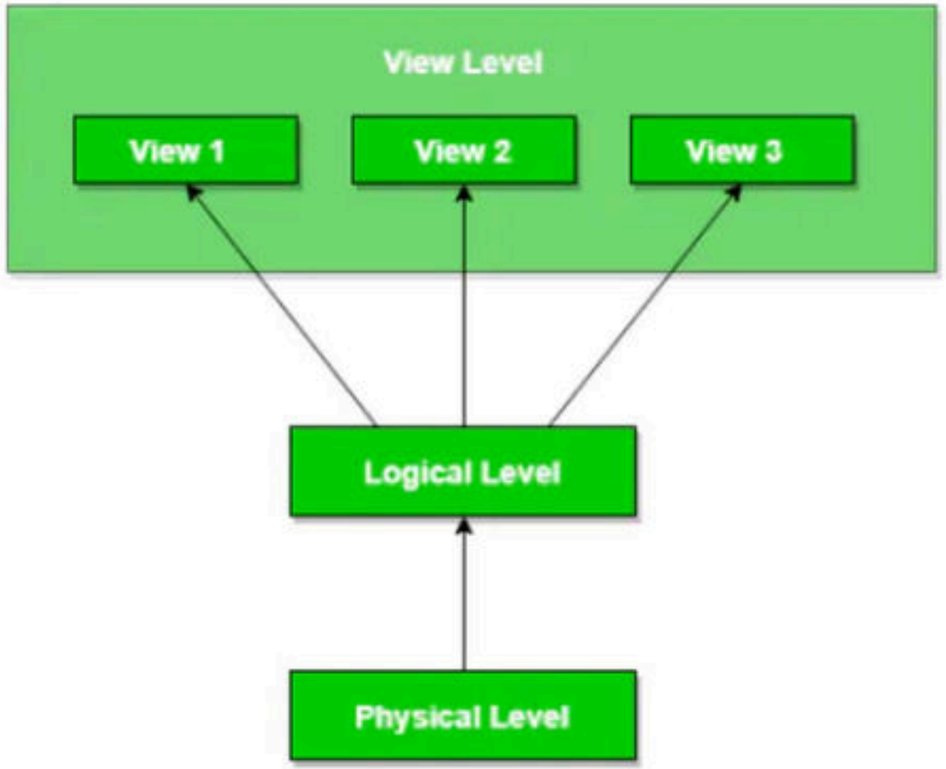
View of Data Base



Physical Level

- The physical or the internal level schema describes how the data is stored in the hardware.

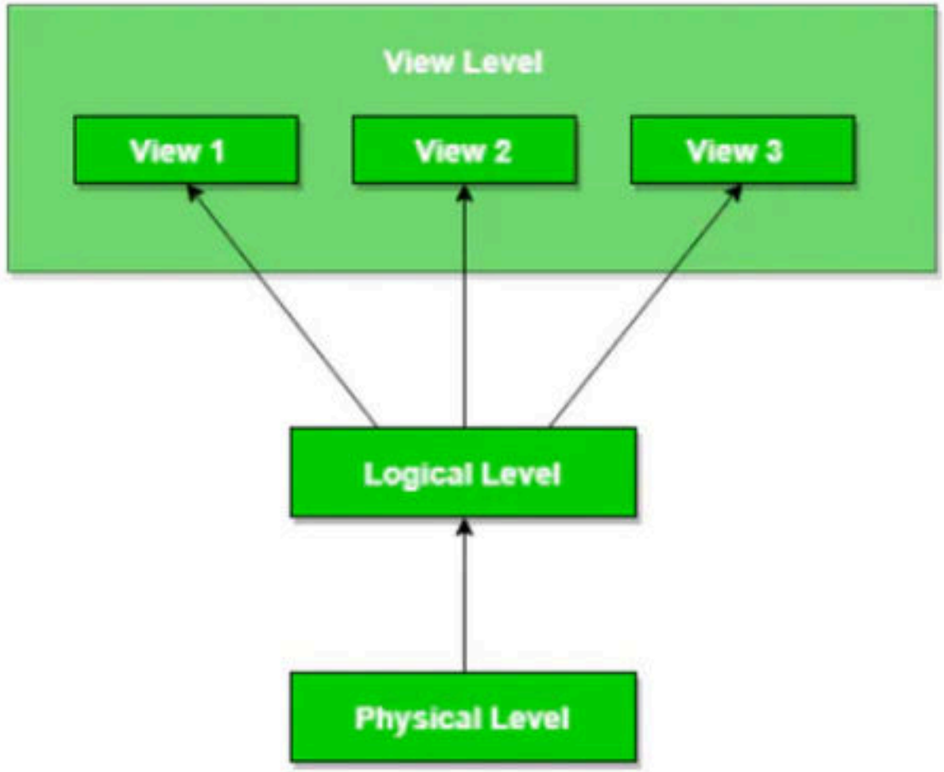
- It also describes how the data can be accessed. The physical level shows the data abstraction at the lowest level and it has complex data structures. Only the database administrator operates at this level.



Logical Level/ Conceptual Level

- It is a level above the physical level. Here, the data is stored in the form of the entity set, entities, their data types, the relationship among the entity sets.

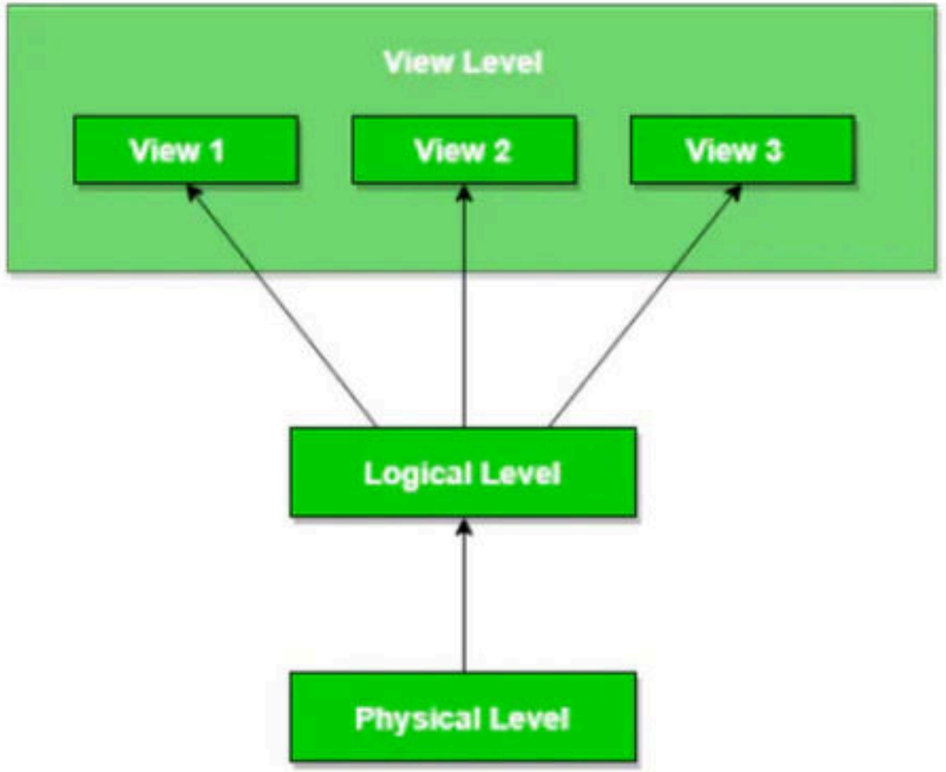
- The next-higher level of abstraction describes what data are stored in the database, what relationships exist among those data.



View Level

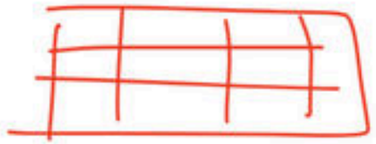
- It is the highest level of data abstraction and exhibits only a part of the whole database. It exhibits the data in which the user is interested.

- The view level can describe many views of the same data. Here, the user retrieves the information using different application from the database.



Break

Instance and Schemas



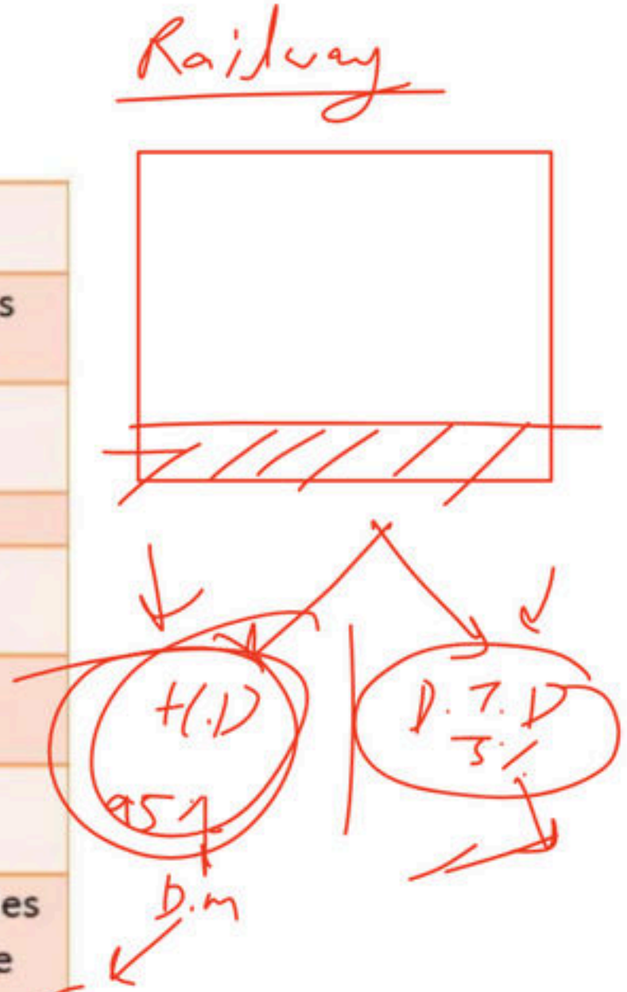
- The collection of information stored in the database at a particular moment is called an instance of the database.

- The overall design of the database is called the database schema.

int i

OLAP Vs OLTP

OLAP	OLTP
✓ Gives a multi-dimensional view of business activities.	✓ Enables a snapshot of ongoing business processes.
✓ Helps with planning, problem solving, and decision support.	✓ Useful for controlling and running fundamental business tasks.
✓ Data source is consolidated data	✓ Data source is the operational data.
✓ Includes Periodic long-running batch jobs that refresh the data.	✓ Has short and fast inserts and updates which are initiated by end users.
✓ OLAP applications are widely used by Data Mining techniques.	✓ Large number of short on-line transactions
✓ Database design is typically de-normalized and contains fewer tables.	✓ Database design in OLTP is highly normalized.
✓ Often involves complex queries along with aggregations, which in turn compels processing speed to be dependent on the amount of data involved; batch data refreshes, etc.	✓ Involves standardized and simple queries that return relatively few records hence is faster.



Break

Types of Data Base

- Commercial

Types of Data Base

- Multimedia

Types of Data Base

- Deductive

Types of Data Base

- Temporal

Types of Data Base

- Geological Info System

DBA

Break

Q Which of the following techniques allow extracting valuable information from large volumes of data and predicting outcomes of future situations? **[Asked in Accenture 2021]**

a) Data warehousing — 5

b) Data mining — 59

c) Data analysis — 24

d) Database management — 12

Ans : b

Solution

Data mining techniques allow extracting valuable information from large volumes of data and predicting outcomes of future situations

Data Mining: Bringing out the most important data from a huge data set is known as data mining. With the help of Artificial Intelligence (AI), a CRM tries to answer the most important data queries of a business. In a CRM, data mining helps to find relations among data, classifies the customers according to business value, and helps to find answers to the following questions –

Which customers the business should target?
What is the cost of customer acquisition?
Which customers are buying (or not buying) the products?
Who are high/medium/low margin customers?
What profile customers are defaulting payment repeatedly?
How can a business segment it's market?
Can the business offer a common price for all customer segments?

For example, an analyst at Flipkart found that customers who buy a smartphone are also looking for tempered glass and cover for it. He used this information to create a bundle in which there is a smartphone, a tempered glass suited to the screen size of the smartphone, and a cover. This helped in accelerating the sale of the tempered glass and the phone back cover.

TRANSACTION

- Why we study transaction?
  - According to general computation principle (operating system) we may have partially executed program, as the level of atomicity is instruction i.e. either an instruction is executed completely or not
  - But in DBMS view, user perform a logical work(operation) which is always atomic in nature i.e. either operation is execute or not executed, there is no concept like partial execution. For example, Transaction T_1 which transfer 100 units from account A to B

T_1
Read(A)
A = A-100
Write(A)
Read(B)
B = B+100
Write(B)

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<4.3>

8

- In this transaction if a failure occurs after Read(B) then the final statue of the system will be inconsistent as 100 units are debited from account A but not credited in account B, this will generate inconsistency.

- Here for 'consistency' before (A + B) == after (A + B)"

T_1
Read(A)
A = A-100
Write(A)
Read(B)
B = B+100
Write(B)

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What is transaction

- To remove this partial execution problem, we increase the level of atomicity and bundle all the instruction of a logical operation into a unit called transaction.

- So formally 'A transaction is a Set of logically related instructions to perform a logical unit of work'.

T_1
Read(A)
A = A-100
Write(A)
Read(B)
B = B+100
Write(B)

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- As here we are only concerned with DBMS so we well only two basic operation on database

- **READ (X)** - Accessing the database item x from disk (where database stored data) to memory variable also name as X.

- **WRITE (X)** - Writing the data item from memory variable X to disk.

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Q A transaction can include following basic database access operations: **(NET-JUNE-2011)**

(A) Read_item(X)

(B) Write_item(X)

(C) Both (A) and (B)

(D) None of these

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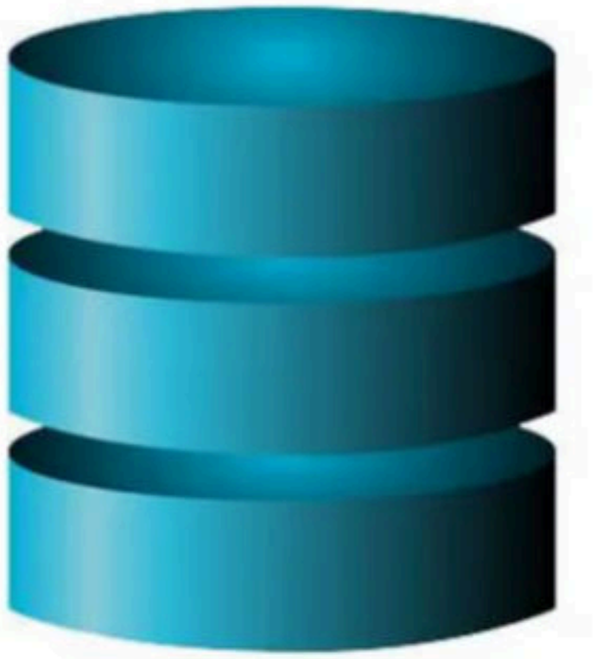
Desirable properties of transaction

- Now as the smallest unit which have atomicity in DBMS view is transaction, so if want that our data should be consistent then instead of concentrating on data base, we must concentrate on the transaction for our data to be consistent.

T_1
Read(A)
A = A-100
Write(A)
Read(B)
B = B+100
Write(B)



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- Transactions should possess several properties, often called the **ACID** properties; to provide integrity and consistency of the data in the database. The following are the ACID properties:

A = Atomicity

C = Consistency

I = Isolation

D = Durability

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- **Atomicity** - A transaction is an atomic unit of processing; it should either be performed in its entirety or not performed at all.

- It is the responsibility of ***recovery control manager / transaction control manager of DBMS*** to ensure atomicity

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- **Consistency** - A transaction should be consistency preserving, meaning that if it is completely executed from beginning to end without interference from other transactions, it should take the database from one consistent state to another.

- The definition of consistency may change from one system to another. The preservation of consistency of database is the responsibility of programmers(users) or the DBMS modules that enforces integrity constraints.

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- **Isolation** - A transaction should appear as though it is being executed in isolation from other transactions, even though many transactions are executing concurrently.

- That is, the execution of a transaction should not be interfered with by any other transactions executing concurrently.

- The isolation property of database is the responsibility of ***concurrency control manager of database***.

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- **Durability** - The changes applied to the database by a committed transaction must persist in the database.

- These changes must not be lost because of any failure. It is the responsibility of ***recovery control manager of DBMS.***

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Q NOT a part of the **ACID** properties of database transactions? **(GATE-2016) (1 Marks)**

(a) Atomicity

(b) Consistency

(c) Isolation

(d) Deadlock-freedom

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Q Consider the following transaction involving two bank accounts x and y. **(GATE - 2015) (1 Marks)**

```
read(x);
x: = x – 50;
write(x);
read(y);
y: = y + 50;
write(y)
```

The constraint that the sum of the accounts x and y should remain constant is that of

(A) Atomicity **(B)** Consistency **(C)** Isolation **(D)** Durability

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Q All Oracle transactions obey the basic properties of a database transaction. What is the name of the following property?
'All tasks of a transaction are performed or none of them are. There are no partial transactions.' **[Asked in Wipro NLTH 2021]**

a) Atomicity

b) Durability

c) Consistency

d) Isolation

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Answer: Option 1

ACID Properties:

A transaction in a database system must maintain Atomicity, Consistency, Isolation, and Durability – commonly known as ACID properties – in order to ensure accuracy, completeness, and data integrity.

Atomicity – This property states that a transaction must be treated as an atomic unit, that is, either all its operations are executed or none. There are no partial transactions

Consistency – The database must remain in a consistent state after any transaction. No transaction should have any adverse effect on the data residing in the database.

Isolation – In a database system where more than one transaction is being executed simultaneously and in parallel, the property of isolation states that all the transactions will be carried out and executed as if it is the only transaction in the system.

Durability – The database should be durable enough to hold all its latest updates even if the system fails or restarts.

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Break

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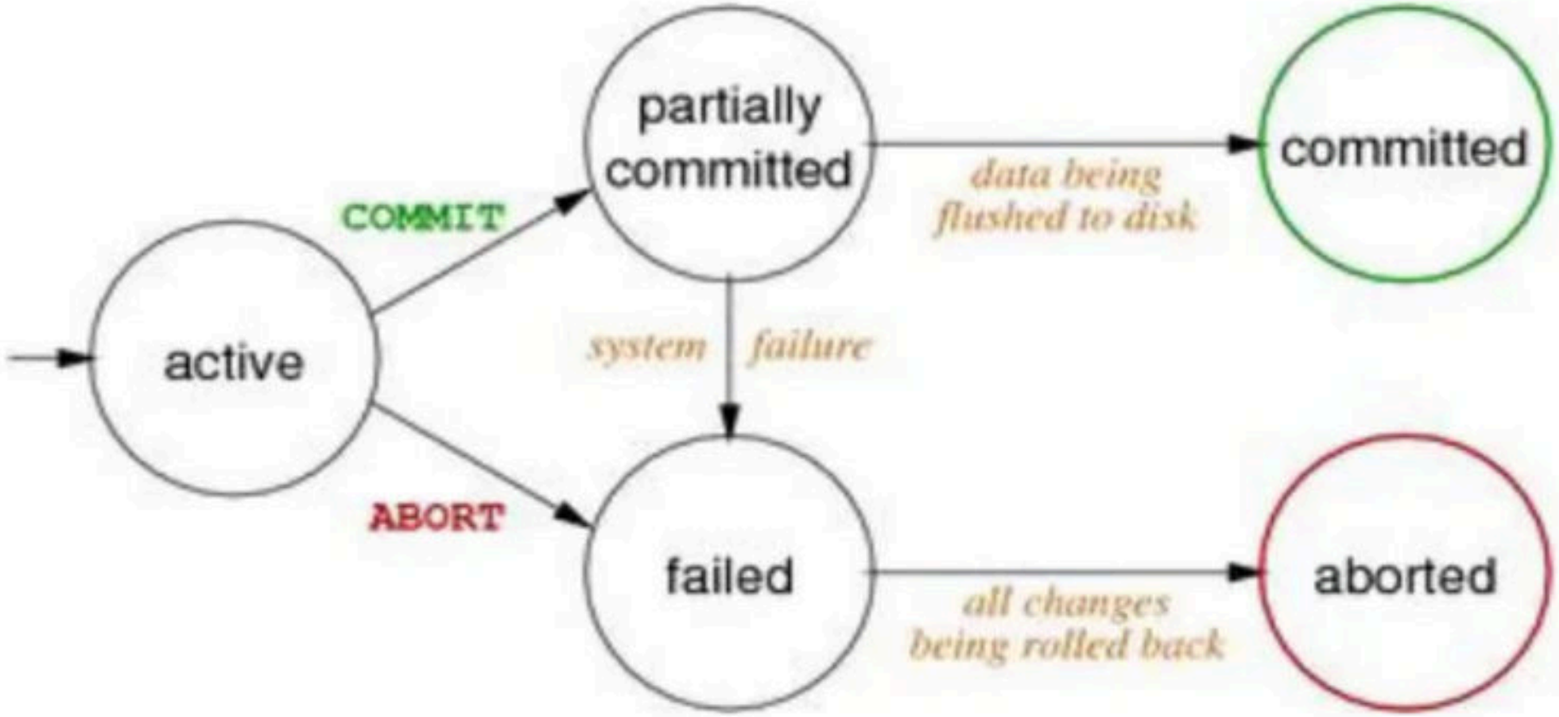
Transaction states

- **ACTIVE** - It is the initial state. Transaction remains in this state while it is executing operations.



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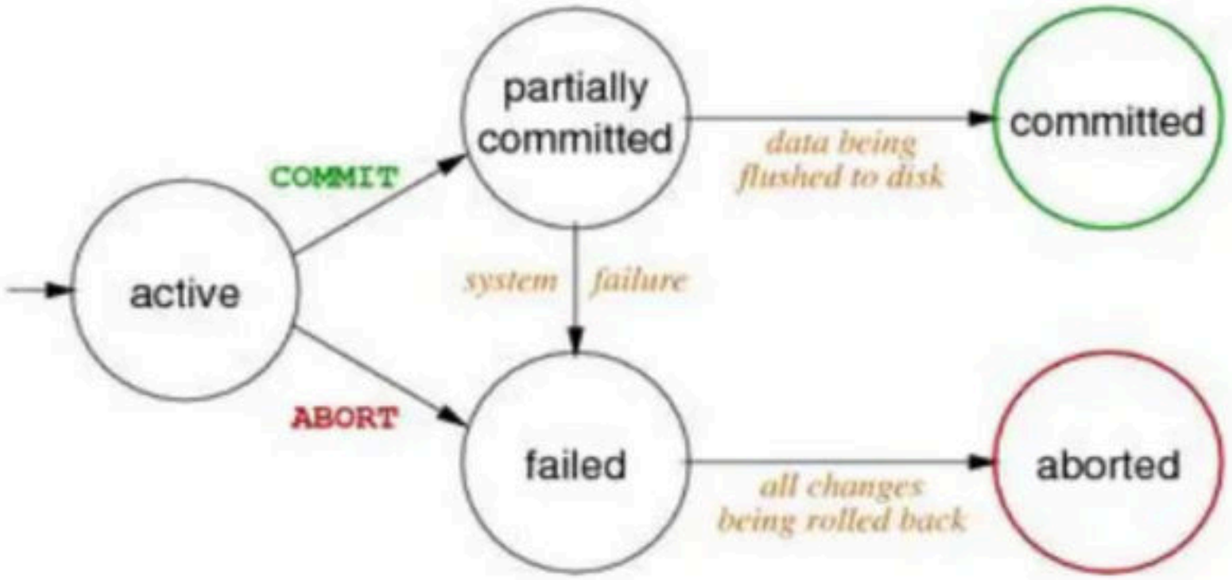
Transaction states

- **PARTIALLY COMMITTED** - After the final statement of a transaction has been executed, the state of transaction is partially committed as it is still possible that it may have to be aborted (due to any failure) since the actual output may still be temporarily residing in main memory and not to disk.



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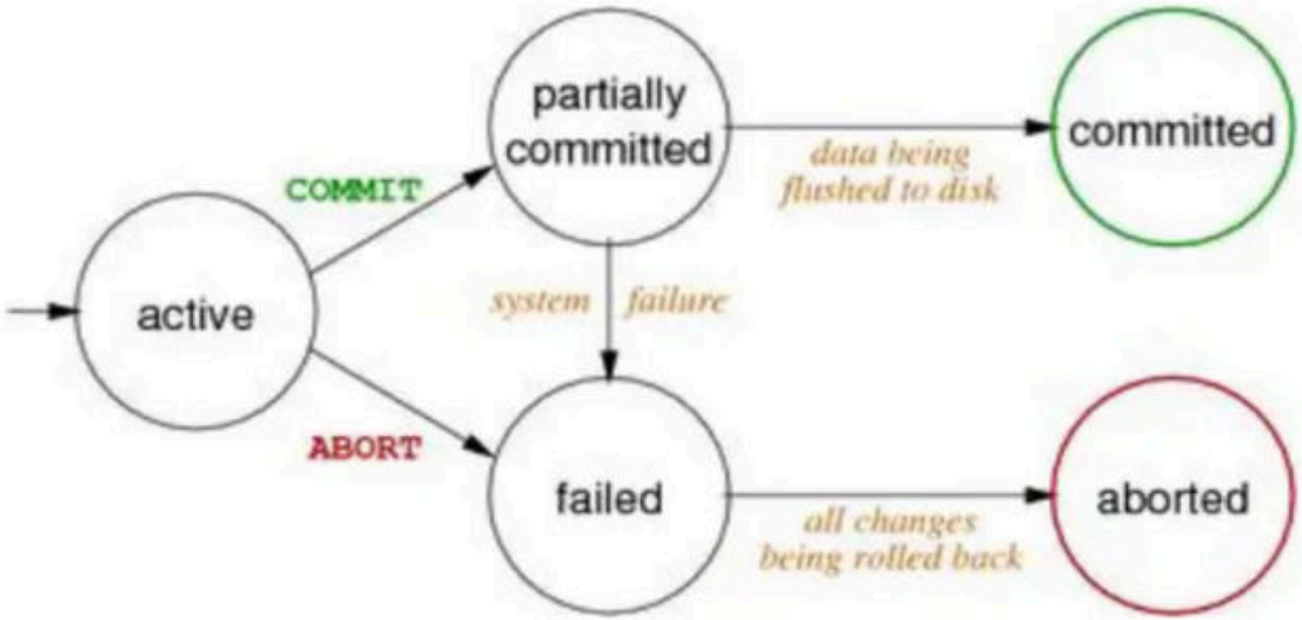
Transaction states

- **FAILED** - After the discovery that the transaction can no longer proceed (because of hardware /logical errors). Such a transaction must be rolled back



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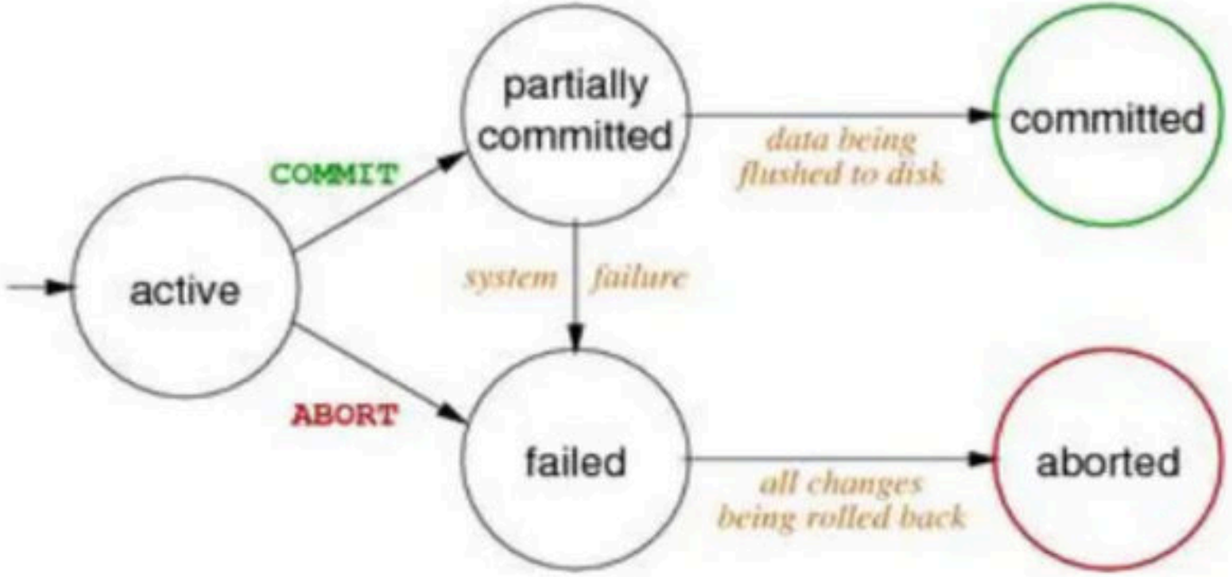
Transaction states

- **ABORTED** - A transaction is said to be in aborted state when the when the transaction has been rolled back and the database has been restored to its state prior to the start of execution.



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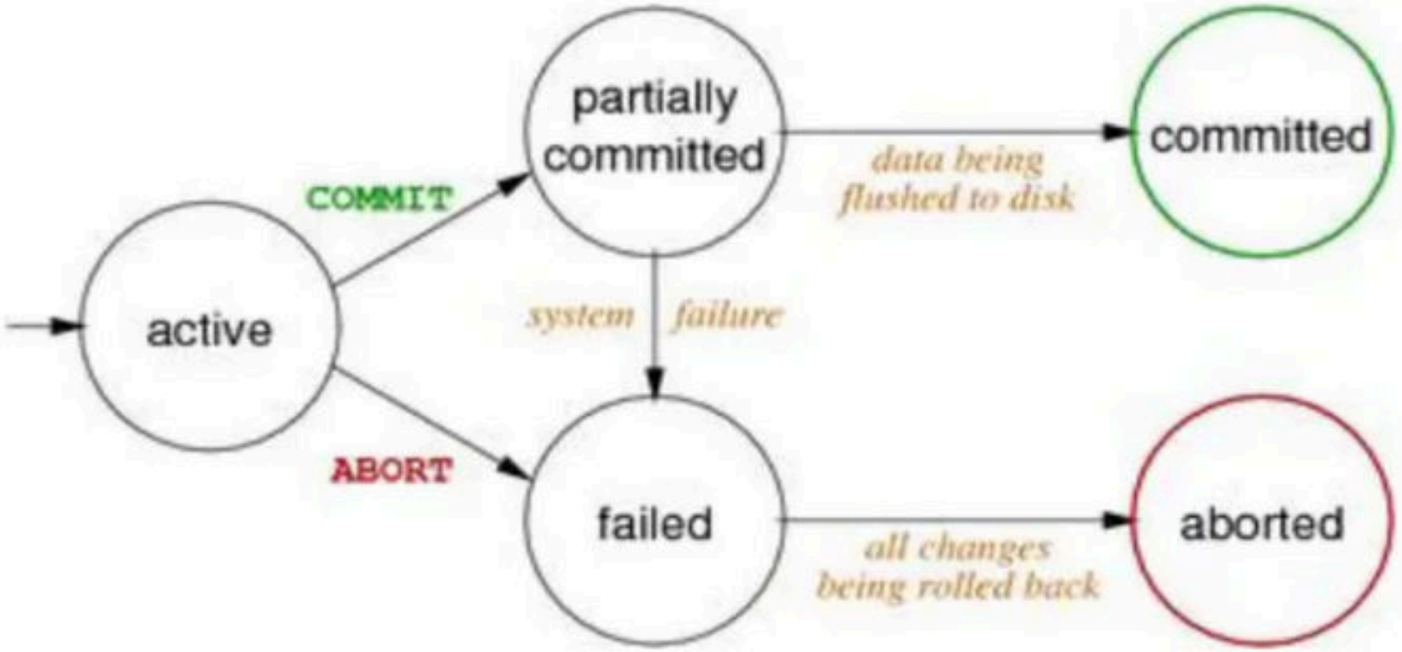
Transaction states

- **COMMITTED** - A transaction enters committed state after successful completion of a transaction and final updation in the database



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Q if the transaction is in which of the state that we can guarantee that data base is in consistent state

a) aborted

b) committed

c) both aborted & committed

d) none

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Q Match:

Column I	Column II
1. Atomicity	A. Recovery Manager
2. Durability	B. Concurrency control manager
3. Isolation	C. Programmer
4. Consistency	

a) 1-a, 2–a, 3-b, 4–c

b) 1-a, 2-b,3-b,4-c

c) 1-a,2-a,3-b,4-b

d) none of these

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Break

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Why we need concurrent execution

- Concurrent execution is necessary because-
  - It leads to good database performance , less weighting time.
  - Overlapping I/O activity with CPU increases throughput and response time.

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PROBLEMS DUE TO CONCURRENT EXECUTION OF TRANSACTION

- But interleaving of instructions between transactions may also lead to many problems that can lead to inconsistent database.

- Sometimes it is possible that even though individual transaction are satisfying the acid properties even though the final statues of the system will be inconsistent.

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Lost update problem / Write - Write problem-

- If there is any two write operation of different transaction on same data value, and between them there is no read operations, then the second write over writes the first write.

T_1	T_2
Read(A)	
Write(A)	
	Write(A)
	Commit
Commit	

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Dirty read problem/ Read -Write problem

- In this problem, the transaction reads a data item updated by another uncommitted transaction, this transaction may in future be aborted or failed.
- The reading transactions end with incorrect results.

T_1	T_2
Read(A)	
Write(A)	
	Read(A)
	Commit
Abort	

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Q The problem that occurs when one transaction updates a database item and then the transaction fails for some reason is _____. **(NET-JUNE-2012)**

(A) Temporary Select Problem

(B) Temporary Modify Problem

(C) Dirty Read Problem

(D) None

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Unrepeatable read problem

- When a transaction tries to read a value of a data item twice, and another transaction updates the data item in between, then the result of the two read operation of the first transaction will differ, this problem is called, Non-repeatable read problem

T_1	T_2
Read(A)	
	Read(A)
	Write(A)
Read(A)	

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Phantom read problem

T_1	T_2
Read(A)	
	Delete(A)
Read(A)	

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Q The following schedule is suffering from

T_1	T_2
R(y)	
	R(x) R(y) y = x + y w(y)
R(y)	

a) Lost update problem

b) Unrepeatable read problem

c) Both A and B

d) Neither A and B

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Q Which of the following scenarios may lead to an irrecoverable error in a database system? **(GATE – 2008) (1 Marks)**

(A) A transaction writes a data item after it is read by an uncommitted transaction

(B) A transaction reads a data item after it is read by an uncommitted transaction

(C) A transaction reads a data item after it is written by a committed transaction

(D) A transaction reads a data item after it is written by an uncommitted transaction

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Break

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Solution is Schedule

- When two or more transaction executed together or one after another then they can be bundled up into a higher unit of execution called schedule.

- A **schedule** of n transactions $T_1, T_2, ..., T_n$ is an ordering of the operations of the transactions. Operations from different transactions can be interleaved in the schedule S.

- However, schedule for a set of transaction must contain all the instruction of those transaction, and for each transaction T_i that participates in the schedule S, the operations of T_i in S must appear in the same order in which they occur in T_i.

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- **Serial schedule** - A serial schedule consists of sequence of instruction belonging to different transactions, where instructions belonging to one single transaction appear together. Before complete execution of one transaction another transaction cannot be started.

T_0	T_1
read(A)	
write(A)	
read(B)	
write(B)	
	read(A)
	write(A)
	read(B)
	write(B)

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- For a set of n transactions, there exist **n!** different valid serial schedules. Every serial schedule lead database into consistent state. Throughput of system is less.

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- **Non-serial schedule** - A schedule in which sequence of instructions of a transaction appear in the same order as they appear in individual transaction but the instructions may be interleaved with the instructions of different transactions i.e. concurrent execution of transactions takes place.

T_2	T_3
read(B)	
	read(B)
	write(B)
read(A)	
	read(A)
	write(A)

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- So the number of schedules for n different transaction T_1, T_2, T_3,---------T_N where each transaction conations n_1, n_2, n_3, ----------,n_4 respectively will be.

- $\{(n_1 + n_2 + n_3 + \text{----------} + n_n)!\} / (n_1!\ n_2!\ n_3!\ \text{----------} n_n!)\}$

- $\{(n_1 + n_2 + n_3 + \text{----------} + n_n)!\} / (n_1!\ n_2!\ n_3!\ \text{----------} n_n!)\} - n!$

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- **Conclusion of schedules**
  - We do not have any method to proof that a schedule is consistent, but from the above discussion we understand that a serial schedule will always be consistent, so if somehow we proof that a non-serial schedule will also have same effects as of a serial schedule that we get a proof that, this particular non-serial schedule will also be consistent "find those schedules that are logically equal to serial schedules".

  - For a concurrent schedule to result in consistent state, it should be equivalent to a serial schedule. i.e. it must be serializable.

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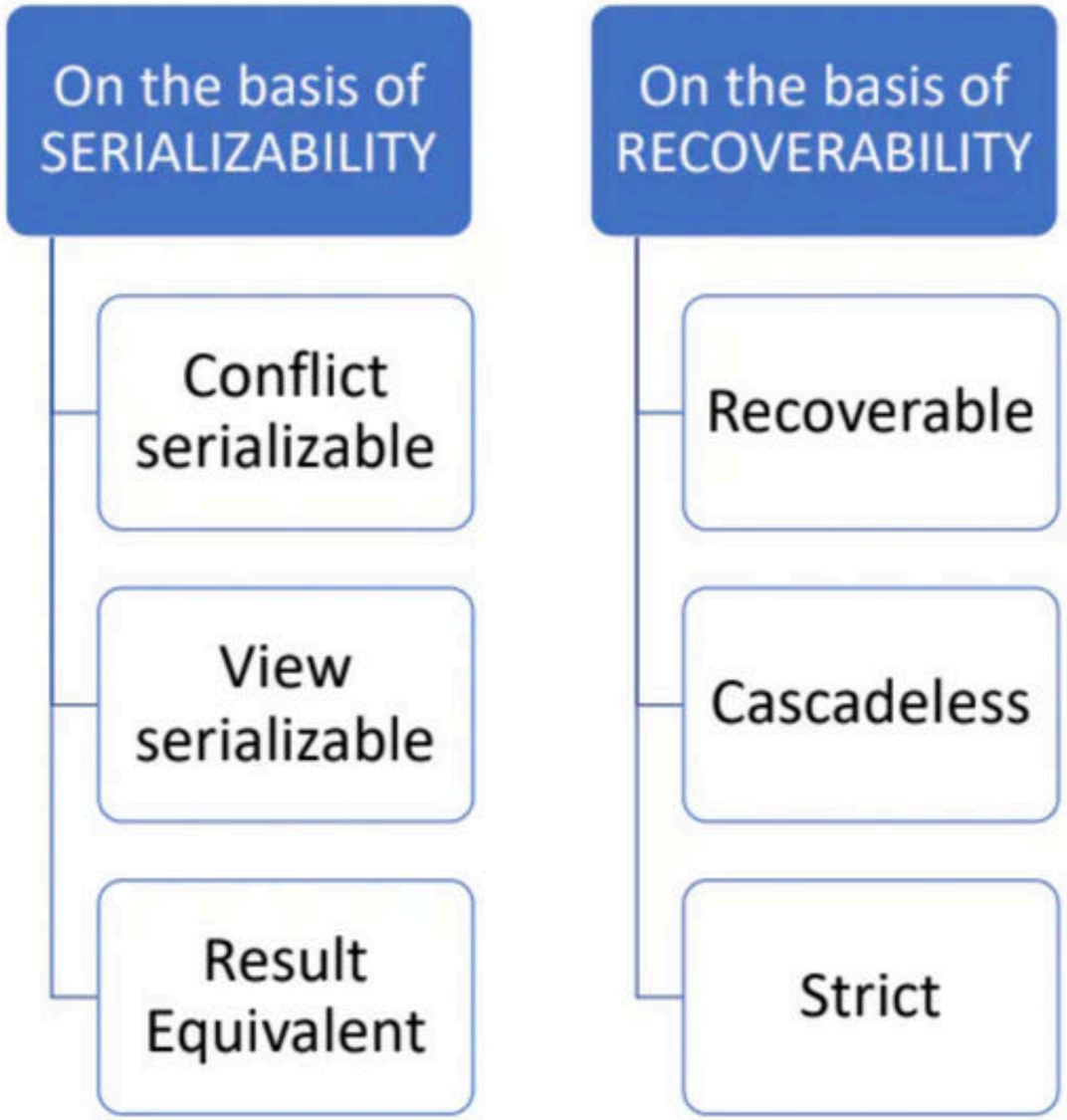

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T_1	T_2
R(A)	
	R(B)

T_1	T_2
	R(B)
R(A)	

T_1	T_2
R(A)	
	W(A)

T_1	T_2
	W(A)
R(A)	

T_1	T_2
R(A)	
	W(B)

T_1	T_2
R(A)	
	W(B)

T_1	T_2
	R(A)
W(A)	

T_1	T_2
W(A)	
	R(A)

T_1	T_2
R(A)	
	R(A)

T_1	T_2
R(A)	
	R(A)

T_1	T_2
	W(A)
W(A)	

T_1	T_2
W(A)	
	W(A)

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SERIALIZABILITY

- ***Conflicting instructions*** - Let I and J be two consecutive instructions belonging to two different transactions T_i and T_j in a schedule S, the possible I and J instruction can be as-
  - I= READ(Q), J=READ(Q) ->*Non-conflicting*
  - I= READ(Q), J=WRITE(Q) ->*Conflicting*
  - I= WRITE(Q), J=READ(Q) ->*Conflicting*
  - I= WRITE(Q), J=WRITE(Q) ->*Conflicting*

- So, the instructions I and J are said to be conflicting, if they are operations by different transactions on the same data item, and at least one of these instructions is a write operation.

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Conflict equivalent – if one schedule can be converted to another schedule by swapping of non-conflicting instruction then they are called conflict equivalent schedule.

T_1	T_2
R(A)	
A=A-50	
	R(B)
	B=B+50
R(B)	
B=B+50	
	R(A)
	A=A+10

T_1	T_2
	R(B)
	B=B+50
R(A)	
A=A-50	
R(B)	
B=B+50	
	R(A)
	A=A+10

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Q Consider a schedule of transactions T_1 and T_2:
Here, RX stands for "Read(X)" and WX stands for "Write(X)". Which one of the following schedules is conflict equivalent to the above schedule?**(Gate-2020) (2 Marks)**

S	
T_1	T_2
RA	
	RB
	WB
RC	
	RD
WD	
	WC
WB	
Commit	
	Commit

a)

S	
T_1	T_2
	RB
	WB
	RD
RA	
RC	
WD	
WB	
	WC
Commit	
	Commit

b)

S	
T_1	T_2
RA	
RC	
WD	
WB	
	RB
	WB
	RD
	WC
Commit	
	Commit

c)

S	
T_1	T_2
RA	
RC	
WD	
	RB
	WB
	RD
WB	
	WC
Commit	
	Commit

d)

S	
T_1	T_2
	RB
	WB
	RD
	WC
RA	
RC	
WD	
WB	
Commit	
	Commit

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CONFLICT SERIALIZABLE

- The schedules which are conflict equivalent to a serial schedule are called conflict serializable schedule.

- If a schedule S can be transformed into a schedule S' by a series of swaps of non- conflicting instructions, we say that S and S' are ***conflict equivalent.***

- A schedule S is ***conflict serializable***, if it is conflict equivalent to a serial schedule.

T_1	T_2
read(A)	
write(A)	
	read(A)
	write(A)
read(B)	
write(B)	
	read(B)
	write(B)

T_1	T_2
read(A)	
write(A)	
read(B)	
write(B)	
	read(A)
	write(A)
	read(B)
	write(B)

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Procedure for determining conflict serializability of a schedule

- It can be determined using PRECEDENCE GRAPH method:
- A precedence graph consists of a pair G (V, E)
- V= set of vertices consisting of all the transactions participating in the schedule.
- E= set of edges consists of all edges $T_i \rightarrow T_j$, for which one of the following conditions holds:
  - T_i executes write(Q) before T_j executes read(Q)
  - T_i executes read(Q) before T_j executes write(Q)
  - T_i executes write(Q) before T_j executes write(Q)

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- If an edge $T_i \rightarrow T_j$ exists in the precedence graph, then in any serial schedule S' equivalent to S, Ti must appear before T_j.

- **If the precedence graph for S has no cycle, then schedule S is conflict serializable, else it is not.** This cycle detection can be done by cycle detection algorithms, one of them based on depth first search takes **$O(n^2)$** time.

- The serialializibility order of transactions of equivalent serial schedule can be determined using **topological order** in a precedence graph.

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Break

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Q Let $r_i(z)$ and $w_i(z)$ denote read and write operations respectively on a data item z by a transaction T_i. Consider the following two schedules.

- $S_1: r_1(x) r_1(y) r_2(x) r_2(y) w_2(y) w_1(x)$
- $S_2: r_1(x) r_2(x) r_2(y) w_2(y) r_1(y) w_1(x)$

Which one of the following options is correct? **(GATE - 2021) (2 Marks)**

a) S_1 is conflict serializable, and S_2 is not conflict serializable

b) S_1 is not conflict serializable, and S_2 is conflict serializable

c) Both S_1 and S_2 are conflict serializable

d) Neither S_1 nor S_2 is conflict serializable

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Q Let $r_i(z)$ and $w_i(z)$ denote read and write operations respectively on a data item z by a transaction T_i. Consider the following two schedules.

- $S_1: r_1(x) r_1(y) r_2(x) r_2(y) w_2(y) w_1(x)$
- $S_2: r_1(x) r_2(x) r_2(y) w_2(y) r_1(y) w_1(x)$

Which one of the following options is correct? **(GATE - 2021) (2 Marks)**

a) S_1 is conflict serializable, and S_2 is not conflict serializable

b) S_1 is not conflict serializable, and S_2 is conflict serializable

c) Both S_1 and S_2 are conflict serializable

d) Neither S_1 nor S_2 is conflict serializable

S_1	
T_1	T_2
R(X)	
R(Y)	
	R(X)
	R(Y)
	W(Y)
W(X)	

S_2	
T_1	T_2
R(X)	
	R(X)
	R(Y)
	W(Y)
R(Y)	
W(X)	

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Q Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item X, denoted by r(X) and w(X) respectively. Which one of them is conflict serializable? **(NET-NOV-2018)** **(GATE - 2014) (2 Marks)**

S_1: $r_1(X); r_2(X); w_1(X); r_3(X); w_2(X)$

S_2: $r_2(X); r_1(X); w_2(X); r_3(X); w_1(X)$

S_3: $r_3(X); r_2(X); r_1(X); w_2(X); w_1(X)$

S_4: $r_2(X); w_2(X); r_3(X); r_1(X); w_1(X)$

(a) S_1 **(b)** S_2 **(c)** S_3 **(d)** S_4

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Q Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item X, denoted by r(X) and w(X) respectively. Which one of them is conflict serializable? **(NET-NOV-2018)** **(GATE - 2014) (2 Marks)**

S_1: $r_1(X); r_2(X); w_1(X); r_3(X); w_2(X)$

	S_1	
T_1	T_2	T_3
R(X)		
	R(X)	
W(X)		
		R(X)
	W(X)	

S_2: $r_2(X); r_1(X); w_2(X); r_3(X); w_1(X)$

	S_2	
T_1	T_2	T_3
	R(X)	
R(X)		
	W(X)	
		R(X)
W(X)		

S_3: $r_3(X); r_2(X); r_1(X); w_2(X); w_1(X)$

	S_3	
T_1	T_2	T_3
		R(X)
	R(X)	
R(X)		
	W(X)	
W(X)		

S_4: $r_2(X); w_2(X); r_3(X); r_1(X); w_1(X)$

	S_4	
T_1	T_2	T_3
	R(X)	
	W(X)	
		R(X)
R(X)		
W(X)		

(a) S_1 **(b)** S_2 **(c)** S_3 **(d)** S_4

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Q Consider following schedules involving two transactions :

S_1 : $r_1(X); r_1(Y); r_2(X); r_2(Y); w_2(Y); w_1(X)$

S_2 : $r_1(X); r_2(X); r_2(Y); w_2(Y); r_1(Y); w_1(X)$

Which of the following statement is true ? **(NET-JAN-2017)** **(GATE - 2007) (2 Marks)**

(a) Both S_1 and S_2 are conflict serializable.

(b) S_1 is conflict serializable and S_2 is not conflict serializable.

(c) S_1 is not conflict serializable and S_2 is conflict serializable.

(d) Both S_1 and S_2 are not conflict serializable.

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Q Consider following schedules involving two transactions :

$S_1 : r_1(X); r_1(Y); r_2(X); r_2(Y); w_2(Y); w_1(X)$

T_1	T_2
r(x)	
r(y)	
	r(x)
	r(y)
	w(y)
w(x)	

$S_2 : r_1(X); r_2(X); r_2(Y); w_2(Y); r_1(Y); w_1(X)$

T_1	T_2
r(x)	
	r(x)
	r(y)
	w(y)
r(y)	
w(x)	

Which of the following statement is true ? **(NET-JAN-2017)** **(GATE - 2007) (2 Marks)**

(a) Both S_1 and S_2 are conflict serializable.

(b) S_1 is conflict serializable and S_2 is not conflict serializable.

(c) S_1 is not conflict serializable and S_2 is conflict serializable.

(d) Both S_1 and S_2 are not conflict serializable.

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Q Consider the following transactions with data items P and Q initialized to zero: **(GATE-2012) (2 Marks)**

T_1: read (P);
read (Q);
if P = 0 then Q: = Q + 1;
write (Q);

T_2: read (Q);
read (P);
if Q = 0 then P: = P + 1;
write (P);

Any non-serial interleaving of T_1 and T_2 for concurrent execution leads to

(A) A serializable schedule
(B) A schedule that is not conflict serializable
(C) A conflict serializable schedule
(D) A schedule for which a precedence graph cannot be drawn

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Q Consider the following transactions with data items P and Q initialized to zero: **(GATE-2012) (2 Marks)**

T_1: read (P);
read (Q);
if P = 0 then Q: = Q + 1;
write (Q);

T_2: read (Q);
read (P);
if Q = 0 then P: = P + 1;
write (P);

T_1
r(P)
r(Q)
w(Q)

T_2
r(Q)
r(P)
w(P)

Any non-serial interleaving of T1 and T2 for concurrent execution leads to

(A) A serializable schedule
(B) A schedule that is not conflict serializable
(C) A conflict serializable schedule
(D) A schedule for which a precedence graph cannot be drawn

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Q Consider the following schedule for transactions T_1, T_2 and T_3: **(GATE – 2010) (2 Marks)**
Which one of the schedules below is the correct serialization of the above?

T1	T2	T3
Read (X)		
	Read (Y)	
		Read (Y)
	Write (Y)	
Write (X)		
		Write (X)
	Read (X)	
	Write (X)	

(A) T_1->>T_3->>T_2 **(B)** T_2->>T_1->>T_3 **(C)** T_2->>T_3->>T_1 **(D)** T_3->>T_1->>T_2

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Q Consider two transactions T_1 and T_2 which form schedules S_1, S_2, S_3 and S_4 as follows: -

T_1: R_1 [A], W_1 [A], W_1 [B]

T_2: R_2 [A], R_2 [B], W_2 [B]

S_1: R_1[A], R_2 [A], R_2[B], W_1[A], W_2[B], W_1[B]

S_2: R_1[A], R_2 [A], R_2[B], W_1[A], W_1[B], W_2 [B]

S_3: R_2[A], R_1 [A], R_2[B], W_1[A], W_1[B], W_2[B]

S_4: R_1[A], R_2 [A], R_2[B], W_1[B], R_2[B], W_2[B]

Which of the above schedules is conflicts serializable? **(GATE - 2009) (2 Marks)**

a) Only S_1 **b)** Both S_1 and S_2 **c)** Both S_1 and S_4 **d)** Both S_3 and S_4

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Q Consider two transactions T_1 and T_2 which form schedules S_1, S_2, S_3 and S_4 as follows: -

T_1: R_1 [A], W_1 [A], W_1 [B]

T_2: R_2 [A], R_2 [B], W_2 [B]

S_1: R_1[A], R_2 [A], R_2[B], W_1[A], W_2[B], W_1[B]

S_1	
T_1	T_2
R(A)	
	R(A)
	R(B)
W(A)	
	W(B)
W(B)	

S_2: R_1[A], R_2 [A], R_2[B], W_1[A], W_1[B], W_2 [B]

S_2	
T_1	T_2
R(A)	
	R(A)
	R(B)
W(A)	
W(B)	
	W(B)

S_3: R_2[A], R_1 [A], R_2[B], W_1[A], W_1[B], W_2[B]

S_3	
T_1	T_2
	R(A)
R(A)	
	R(B)
W(A)	
W(B)	
	W(B)

S_4: R_1[A], R_2 [A], R_2[B], W_1[B], R_2[B], W_2[B]

S_4	
T_1	T_2
R(A)	
	R(A)
	R(B)
W(A)	
	R(B)
	W(B)

Which of the above schedules is conflicts serializable? **(GATE - 2009) (2 Marks)**

a) Only S_1 **b)** Both S_1 and S_2 **c)** Both S_1 and S_4 **d)** Both S_3 and S_4

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Q Consider the transactions T_1, T_2, and T_3 and the schedules S_1 and S_2 given below. **(GATE - 2006) (2 Marks)**

T_1: $r_1(X)$; $r_1(Z)$; $w_1(X)$; $w_1(Z)$

T_2: $r_2(Y)$; $r_2(Z)$; $w_2(Z)$

T_3: $r_3(Y)$; $r_3(X)$; $w_3(Y)$

S_1: $r_1(X)$; $r_3(Y)$; $r_3(X)$; $r_2(Y)$; $r_2(Z)$;$w_3(Y)$; $w_2(Z)$; $r_1(Z)$; $w_1(X)$; $w_1(Z)$

S_2: $r_1(X)$; $r_3(Y)$; $r_2(Y)$; $r_3(X)$; $r_1(Z)$;$r_2(Z)$; $w_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_1(Z)$

Which one of the following statements about the schedules is TRUE?

(A) Only S_1 is conflict-serializable.

(B) Only S_2 is conflict-serializable.

(C) Both S_1 and S_2 are conflict-serializable.

(D) Neither S_1 nor S_2 is conflict-serializable.

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Q Consider the transactions T_1, T_2, and T_3 and the schedules S_1 and S_2 given below. **(GATE - 2006) (2 Marks)**

T_1: $r_1(X)$; $r_1(Z)$; $w_1(X)$; $w_1(Z)$

T_2: $r_2(Y)$; $r_2(Z)$; $w_2(Z)$

T_3: $r_3(Y)$; $r_3(X)$; $w_3(Y)$

S_1: $r_1(X)$; $r_3(Y)$; $r_3(X)$; $r_2(Y)$; $r_2(Z)$;$w_3(Y)$; $w_2(Z)$; $r_1(Z)$; $w_1(X)$; $w_1(Z)$

	S_1	
T_1	T_2	T_3
R(X)		
		R(Y)
		R(X)
	R(Y)	
	R(Z)	
		W(Y)
	W(Z)	
R(Z)		
W(X)		
W(Z)		

S_2: $r_1(X)$; $r_3(Y)$; $r_2(Y)$; $r_3(X)$; $r_1(Z)$;$r_2(Z)$; $w_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_1(Z)$

	S_2	
T_1	T_2	T_3
R(X)		
		R(Y)
	R(Y)	
		R(X)
R(Z)		
	R(Z)	
		W(Y)
W(X)		
	W(Z)	
W(Z)		

Which one of the following statements about the schedules is TRUE?

(A) Only S_1 is conflict-serializable.

(B) Only S_2 is conflict-serializable.

(C) Both S_1 and S_2 are conflict-serializable.

(D) Neither S_1 nor S_2 is conflict-serializable.

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Q Consider three data items D_1, D_2 and D_3 and the following execution schedule of transactions T_1, T_2 and T_3. In the diagram, R(D) and W(D) denote the actions reading and writing the data item D respectively. **(GATE – 2003) (2 Marks)**

Which of the following statements is correct?

	T1	T2	T3
		R(D3);	
		R(D2);	
		W(D2);	
			R(D2);
			R(D3);
time	R(D1);		
	W(D1);		
			W(D2);
			W(D3);
		R(D1);	
	R(D2);		
	W(D2);		
		W(D1);	

(A) The schedule is serializable as T_2; T_3; T_1

(B) The schedule is serializable as T_2; T_1; T_3

(C) The schedule is serializable as T_3; T_2; T_1

(D) The schedule is not serializable

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Break

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Q Suppose a database schedule S involves transactions T_1, T_2, ...,T_n. Consider the precedence graph of S with vertices representing the transactions and edges representing the conflicts. If S is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule?

(NET-NOV-2017) (GATE- 2016) (1 Marks)

(a) Topological order

(b) Depth - first order

(c) Breadth - first order

(d) Ascending order of transaction indices

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Q Consider a simple checkpointing protocol and the following set of operations in the log.

(start, T_4);
(write, T_4, y, 2, 3);
(start, T_1);
(commit, T_4);
(write, T_1, z, 5, 7);
(checkpoint);
(start, T_2);
(write, T_2, x, 1, 9);
(commit, T_2);
(start, T_3);
(write, T_3, z, 7, 2);

If a crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and the redo list **(GATE - 2015) (2 Marks)**

(A) Undo: T_3, T_1; Redo: T_2

(B) Undo: T_3, T_1; Redo: T_2, T_4

(C) Undo: none; Redo: T_2, T_4, T_3; T_1

(D) Undo: T_3, T_1, T_4; Redo: T_2

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Q Consider a simple checkpointing protocol and the following set of operations in the log.

(start, T_4);
(write, T_4, y, 2, 3);
(start, T_1);
(commit, T_4);
(write, T_1, z, 5, 7);
(checkpoint);
(start, T_2);
(write, T_2, x, 1, 9);
(commit, T_2);
(start, T_3);
(write, T_3, z, 7, 2);

S			
T_1	T_2	T_3	T_4
			START
			(write, y, 2, 3)
START			
			COMMIT
(write, z, 5, 7)			
(checkpoint)	(checkpoint)	(checkpoint)	(checkpoint)
	START		
	(write, x, 1, 9)		
	COMMIT		
		START	
		(write, z, 7, 2)	

If a crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and the redo list **(GATE - 2015) (2 Marks)**

(A) Undo: T_3, T_1; Redo: T_2
(B) Undo: T_3, T_1; Redo: T_2, T_4
(C) Undo: none; Redo: T_2, T_4, T_3; T_1
(D) Undo: T_3, T_1, T_4; Redo: T_2

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Q.18 Suppose a database system crashes again while recovering from a previous crash. Assume checkpointing is not done by the database either during the transactions or during recovery.

(Gate-2021) (1 Marks)

Which of the following statements is/are correct?

(a) The same undo and redo list will be used while recovering again.

(b) The system cannot recover any further.

(c) The database will become inconsistent.

(d) All the transactions that are already undone and redone will not be recovered again.

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Q.24 Let S be the following schedule of operations of three transactions T_1, T_2 and T_3 in a relational database system:

(GATE-2021)

$$R_2(Y),\ R_1(X),\ R_3(Z),\ R_1(Y),\ W_1(X),\ R_2(Z),\ W_2(Y),\ R_3(X),\ W_3(Z)$$

Consider the statements P and Q below:

P : S is conflict-serializable.

Q : If T_3 commits before T_1 finishes, then S is recoverable.

Which one of the following choices is correct?

(a) P is true and Q is false.

(b) Both P and Q are false.

(c) Both P and Q are true.

(d) P is false and Q is true.

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