2.3.3 RATIO OF MENTOR TO STUDENTS FOR ACADEMIC AND STRESS RELATED ISSUES (10)

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2.3.3 RATIO OF MENTOR TO STUDENTS FOR ACADEMIC AND STRESS RELATED ISSUES (10)

Year	Number of enrolled in the institution	Number of full time teachers	Mentor: Mentee Ratio
2023-2024	801	91	1:10

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DEPARTMENT OF SCIENCE AND HUMANITIES

I- B.Tech (AIDS)

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223243001	AJAY.V	Mr.E.Mathivanan AP/S&H 8056475969 emathivanan@jkkmct.edu.in
2	731223243002	AKALYA B	
3	731223243003	AKHIL DEV P	
4	731223243004	AL AMEEN A	
5	731223243005	ANAS A	
6	731223243006	DHANUSH G	
7	731223243007	DHANUSHIYA A	
8	731223243008	DHUSENDRAN D	
9	731223243009	DILNA R	
10	731223243010	GOWRI R	
11	731223243011	HARINI S	Ms.P.Mahasakthi AP/S&H 9597363115 mahasakthip@jkkmct.edu.in
12	731223243012	HASARUDEEN	
13	731223243013	INDHUPRASANTH S	
14	731223243014	JANA S	
15	731223243015	JANANI P	
16	731223243016	JAYALAKSHMI N	
17	731223243017	JOTHI S	
18	731223243018	KARAN S	
19	731223243019	KARTHIK S	

20	731223243020	KEERTHANA G	
21	731223243021	KIRUBHA B	Mr.S.Premkumar AP/S&H 9994600828 premkumarp@jkkmct.edu.in
22	731223243022	MAHALAKSHMI S	
23	731223243023	MAJNU S	
24	731223243024	MANJUNATH K	
25	731223243025	MAYAKANNAN M	
26	731223243026	MUTHAMIZHAN M	
27	731223243027	NAGAMANI R	
28	731223243028	NAVEEN D	
29	731223243029	NAVYA M	
30	731223243030	NITHYANANDHAM C	
31	731223243031	NIVASHA.P	Mrs.N.Chithra AP/S&H 9894718457 chithran@jkkmct.edu.in
32	731223243032	PRADHAP L	
33	731223243033	PRAVEENRAJA P	
34	731223243034	RAJAPPA S	
35	731223243035	RAJARAVINDHAN A	
36	731223243036	RAJASEKAR P	
37	731223243037	RANJITH B	
38	731223243038	SANKARANARAYANAN K R	
39	731223243039	SATHISH KUMAR M	
40	731223243040	SENTHAMILSELVI M	
41	731223243041	SIDDARTH S	Mr.S.Anbuthangam AP/S&H 9789559933 anbuthangams@jkkmct.edu.in
42	731223243043	SUJITHKUMAR S	
43	731223243044	SURAJ S	

44	731223243045	THAMILKUMARAN P M	
45	731223243046	THANAVARSITH V	
47	731223243047	VISHALINI A	Mr.S.Anbuthangam AP/S&H 9789559933 anbuthangams@jkkmct.edu.in
48	731223243048	VISHNU VARTHAN D	

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DEPARTMENT OF AUTOMOBILE ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731220102001	DHANALAKSHMANA.B	Mr.S.Ganeshkumar AP/AUTO 8012026446 gkstnp@gmail.com

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DEPARTMENT OF AUTOMOBILE ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: III**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	73122102001	KAVIN P	Mr.P.Eswaran AP/AUTO 9677807930 eswaranp@jkkmct.edu.in
2	73122102002	RAJKUMAR B	

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DEPARTMENT OF AUTOMOBILE ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222102001	ELANGOVAN K	Mr.V.P.Arulmurugan AP/AUTO 7010983658 vaparul@gmail.com
2	731222102002	PRADEEP KUMAR V	
3	731222102003	PRAJEESH K	
4	731222102004	SOORAJ P	
5	731222102005	KAVIN P	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223102001	CHINRAJ.M	Mrs.G.Harini AP/S&H 7010983658 harinig@jkkmct.edu.in
2	731223102002	DHANUSH R	
3	731223102003	MATHAPPAN.R	
4	731223102003	SRIRAM K	

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DEPARTMENT OF CIVIL ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731220103001	DIVAKAR R	Mrs.P.Reena AP/CIVIL 9600264870 reenapalanisamy@gmail.com

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: III**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731221103301	SUSITHRA S	G.Ruthishkumar AP/CIVIL 9791011234 ruthishkumarg@jkkmct.edu.in

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222103001	ANANDHAN.B	Ms.V.Sathiyapriya AP/CIVIL 8825732710 sathiyapriyadk@gmail.com
2	731222103301	MADHESHWARAN.S	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223103001	JAJEEV KUMAR M	Mrs.G.Harini AP/S&H 7010983658 harinig@jkkmct.edu.in
2	731223103002	KRISHNAMOORTHY K	
3	731223103003	LISHA .R	
4	731223103004	PRIYANKA .P	
5	731223103005	SANGAVI .R	

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731220104001	ABINAYA G	Mr.S.Dharanitharan AP/CSE 9003477790 dharanitharans@jkkmct.edu.in
2	731220104003	BALU R	
3	731220104004	CHARLES WILLIAM.L	
4	731220104005	DEEPAK.S	
5	731220104006	DEEPIKA.S	
6	731220104007	DHARANISELVI. M	
7	731220104008	DODDAMMA.P	
8	731220104009	JAGATHESWARAN.P	
9	731220104010	KARUNYAA.M	
10	731220104011	KATHIRESAN.K	
11	731220104012	KAVIN.M	Mrs.V.Nirosha AP/CSE 6383860677 niroshcse@gmail.com`
12	731220104014	LOGANATHAN.T	
13	731220104019	NIRMALRAJ.S	
14	731220104021	RAMYA.S	
15	731220104022	ROHITH.R	
16	731220104024	SIVALINGAM.K	
17	731220104025	SUNDARAGANESAN.K	
18	731220104028	VIGNESH.M	

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S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
19	731220104029	VINISHA.T	
20	731220104030	VINITHA.A	
21	731220104031	VINOTHKUMAR.R	Mr.S.Satheesh AP/CSE 9095156661 satheesh.sakthivel@gmail.com
22	731220104301	BOOPALAN.M	
23	731220104302	DHAMODARAN.G	

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: III**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731221104001	AADHI SURYA K	Mr.R.Gnanasekar AP/CSE 9894982451 gnanasekar272@gmail.com
2	731221104004	ARUL MURUGAN S	
3	731221104005	BABU SHANKAR S	
4	731221104007	BAMBAVASAN V	
5	731221104008	CHANDRA PRAKASH K	
6	731221104009	DHAKSHINA MOORTHY E	
7	731221104012	DURGA K	
8	731221104013	GUNASEKARAN P	
9	731221104014	GUNASEKARAN S	
10	731221104015	HARIPRABHA V	
11	731221104017	KAMALESH K	Dr.S.B.Manoojkumaar AP/CSE 9944221667 manoojkumaarsb@gmail.com
12	731221104021	LALITHA T	
13	731221104022	MADHAN G	
14	731221104025	MOUSIKA S	
15	731221104026	NANDHINI P	
16	731221104027	PANDIYARAJ P	
17	731221104028	PRIYA DHARSHINI S	
18	731221104029	RAVIKUMAR.P	
19	731221104031	RUBIKA G	
20	731221104033	SENTHILVEL S	
21	731221104034	SHYAM KUMAR	

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S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
22	731221104035	SUGANYA K	Mrs.P.Poornapriya AP/CSE 9698197965 poornapriyap@jkkmct.edu.in
23	731221104036	SURYA S	
24	731221104037	SUSHMINA M	
25	731221104038	VASANTH KUMAR S	
26	731221104039	VIGNESH M	
27	731221104040	YAMUNA K	
28	731221104301	AMUTHAMALAR.R	
29	731221104302	BHARANIDHARAN.M	
30.	731221104303	GAYATHRI.R	
31	731221104305	NANDHINI.M	Mr.S.Satheesh AP/CSE 9095156661 satheesh.sakthivel@gmail.com
32	731221104306	SNEHA.L	
33	731221104307	SRINIVAS.V	
34	731221104308	SUBASHINI.P	
35	731221104701	NIKETHA.S	

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222104001	ABINAYA.P	Mr.K.S.Vinothan AP/CSE 9789389647 vinothanks@gmail.com
2	731222104002	BHARATHKRISHNAN.V	
3	731222104003	CHANDRAKALA.N	
4	731222104004	CHANDRU.K	
5	731222104005	DEEPA.T	
6	731222104006	DEVADHARSHINI.M	
7	731222104007	DHANASEKARAN P	
8	731222104008	ELAKKIYA.K	
9	731222104009	GIBSONSHANTHAKUMAR.R	
10	731222104010	GOKILA.S	
11	731222104011	GOKULRAJA G	Mrs.P.Sasireka AP/CSE 9659949199 sasirekap@jkkmct.edu.in
12	731222104012	HAFILA.A	
13	731222104013	INIKA.C	
14	731222104014	JAYASHREE.K	
15	731222104015	JAYASREE.D	
16	731222104016	JAYASURYA.B	
17	731222104017	JEGADEESHWARAN K	
18	731222104018	JOTHI.N	
19	731222104019	JOTHI.S	
20	731222104020	KARTHI.K	

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S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
21	731222104021	KARUNYA.K	Mr.E.Ananth AP/CSE 9791847207 ananthe@jkkmct.edu.in
22	731222104022	KEERTHIGA.V	
23	731222104023	LAKSHMI.B	
24	731222104024	LINGARAJU.K	
25	731222104025	NEETHU.S	
26	731222104026	NIVETHA.P	
27	731222104027	POOMATHI.S	
28	731222104028	PRAZWAL B	
29	731222104029	PUSHPASRI.M	
30	731222104030	RAKSHITHA.V	
31	731222104031	SAHEER.H	Mrs.M.C.Savithri ASP/CSE 93615 37250 savithric@jkkmct.edu.in
32	731222104032	SANJAIKUMAR.S	
33	731222104033	SANJAY.V	
34	731222104034	SANJAYKUMAR.S	
35	731222104035	SATHIYALAKSHMI.M	
36	731222104036	SHAKTHIS	
37	731222104037	SIDDARAJU S	
38	731222104038	SIDHARAJS	
39	731222104039	SOWDESWARI.A	
40	731222104040	SOWNDHAR.D	
41	731222104041	SUMITHRA.S	Mr.S.Satheesh AP/CSE 9095156661 satheesh.sakthivel@gmail .com
42	731222104301	DINESHKUMAR P	
43	731222104302	GOWTHAM.A	

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44	73122204302	PRAVEENKUMAR S	Mr.S.Satheesh AP/CSE 9095156661 satheesh.sakthivel@gmail .com

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DEPARTMENT OF SCIENCE AND HUMANITIES
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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223104001	AJAY V	Mr.M.Ponnusamy HOD/S&H 995258282 ponnusamym@jkkmct.edu.in
2	731223104002	AKILA R	
3	731223104003	AKSHAYA C K	
4	731223104004	ARUN PRASATH T	
5	731223104005	BHARANI S	
6	731223104006	DEEPAK K	
7	731223104007	DHANUSHKUMAR V	
8	731223104008	ELAVARASAN K	
9	731223104010	GOPIKA S	
10	731223104011	GOWTHAM S	
11	731223104013	HARIHARAN M	Mr.S.Premkumar AP/S&H 9994600828 premkumarp@jkkmct.edu.in
12	731223104014	HARISANKAR G	
13	731223104015	JAGAN S	
14	731223104016	JEYAPRIYA R	
15	731223104017	KANIKA M	
16	731223104018	KARISHMA E	
17	731223104019	KARTHICK V	
18	731223104020	KESAVAN M	
19	731223104021	MADHANKUMAR M	
20	731223104022	MANIKANDAN E	

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S.No	Register Number	Name of the Student	Name of the Mentee/Mentor
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22	731223104024	MATHAN M	
23	731223104025	MOHANKUMAR P	
24	731223104026	MOHANPRASATH P	
25	731223104027	MONISHA P	
26	731223104028	MOUNIKA S	
27	731223104029	MUGILARASAN A	
28	731223104030	NANDHANA S	
29	731223104031	NATHIYA N	
30	731223104032	NISHANTH M	
31	731223104033	NITHISHKUMAR S	Mrs.M.Shenbagam AP/S&H 9942651209 shenbagamm@jkkmct.edu.in
32	731223104034	OMVISHNU R	
33	731223104035	PONNARASI V	
34	731223104036	PRIYADHARSHINI M	
35	731223104037	PRIYADHARSINI V	
36	731223104038	RAGUNATHAN P S	
37	731223104039	SACHIN B	
38	731223104040	SADIK BASHA Y	
39	731223104041	SANDHIYA D	
40	731223104042	SANGEETH M	
41	731223104043	SANJAI K	
42	731223104044	SATHEESH P	
43	731223104045	SIVAKUMAR S	

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45	731223104047	SRINATHI A	
46	731223104048	SUDHESI M	
47	731223104049	SUGENDIRAN S	
48	731223104050	VAISHNAVI R	
49	731223104051	VASANTHA KUMAR R	
50	731223104052	VEERAMANI D	
51	731223104053	VIGNESH S	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

S .No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731220105002	DHINESH.P	Mr.G.Palanisamy AP/EEE 9487759811 palanieeeg@gmail.com
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3	731220105004	KIRUBASANKAR.C	
4	731220105005	MUKESH.S	
5	731220105006	NAVEENKUMAR.G	
6	731220105007	ROHAN.R	
7	731220105009	SIVAGIRI.K	
8	731220105011	THIRUMARAN DILEEBAN.S	
9	731220105301	MAHESHWARI P	

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: III**

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2	731221105002	DEVI M	
3	731221105003	DHAYANITHI M	
4	731221105004	HARIHARAN S	
5	731221105006	JOTHI S	
6	731221105007	KARTHICK M	
7	731221105009	ROJA S	
8	731221105010	SANTHOSH M	
9	731221105011	SANJAY M V	
10	731221105012	SARANKUMAR A	
11	731221105013	SARAVANAN A	Mr.S.M.Pranesh AP/EEE 9080470505 praneshsm@jkkmct.edu.in
12	731221105014	SATHISH P	
13	731221105015	VENKATESHWARAN J	
14	7312211105301	AGIMISH .K.G	
15	731221105302	KARTHICK .C	
16	731221105303	RANJITHA .N	
17	731221105305	TAMILSELVAN .T	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 YEAR: II

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3	731222105003	ELANGOVAN.S	
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6	731222105006	LOGESWARI.E	
7	731222105007	MADHAN.M	
8	731222105008	MANIKANDAN.M	
9	731222105009	MANIKANDAN.S	
10	731222105010	MEGANATHAN.P	
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12	731222105012	MUTHUKUMARAN .S	
13	731222105013	MYTHILI.M	
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16	731222105016	PRAVEENKUMAR V	
17	731222105017	RASU R	
18	731222105018	RATHIPRIYA J	
19	731222105019	RAVI R	
20	731222105020	SANTHOSHKUMAR M	

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22	731222105022	SASIKUMAR S	
23	731222105023	SENATHIPATHINATHAN K	
24	731222105024	SIDDARAJI S	
25	731222105026	SRIKANTH P	
26	731222105027	SURYA S K	
27	731222105028	SUTHARSAN P	
28	731222105029	VASANTHAKUMAR R	
29	731222105301	AADHITHYA.Y	
30	731222105302	ANGAMUTHU.G	
31	731222105303	ANTONY BARATH.M	Mr.P. Manikandan AP/EEE 9994050050 man ikandanp@jkkmct.edu.in
32	731222105304	BALASURYA.S	
33	731222105305	BHARANITHARAN.K	
34	731222105306	CHANDRU.K	
35	731222105307	DHARUN.G	
36	731222105308	DHAYANITHI.T	
37	731222105309	GOKILA.P	
38	731222105310	GOWRIPRASAD.D S	
39	731222105311	HARIHARAN.V S	

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S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
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42	731222105314	KARTHI.M	
43	731222105315	KARTHICK BALA.M	
44	731222105316	KIRITHIKA.N	
45	731222105317	LAKSMANAN.K	
46	731222105318	LINGESHWARAN.S	
47	731222105319	MANIKANDAN.K	
48	731222105320	MANOJ.G	
49	731222105321	MUKILAN.B	
50	731222105322	NAGASUNDHARAMOORTHI.K	
51	731222105323	NAVEEN KMAR.S	Mr.S.M.Pranesh AP/EEE 9080470505 praneshsm@jkkmct.edu.in
52	731222105324	NIVETHIKA.G	
53	731222105325	PADMANABAN.A	
54	731222105326	PALANISAMY.V	
55	731222105327	PECHIAPPAN.P	
56	731222105328	RAGUL.M V	
57	731222105329	RANJITHKUMAR.M	
58	731222105330	SARAN.P M	

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S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
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61	731222105333	SUBTHRA.P	Mr.G. Ramachandran AP/EEE 9994050050 ramachadrang@jkkmct.edu.in
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63	731222105335	SURYAPRAKASH.R	
64	731222105336	SUSHMAKUMARI	
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3	731223105003	DHANUSHKUMAR G	
4	731223105004	DHARSHINI M	
5	731223105005	DINESH T	
6	731223105006	GOWTHAM K	
7	731223105007	GOWTHAMAN N	
8	731223105008	INDHUMATHI P	
9	731223105009	KAMESH M	
10	731223105010	MUNUSAMY M	
11	731223105011	MYTHILI P	
12	731223105012	MYTHILI P	
13	731223105013	NAMITHA G	
14	731223105014	PUHALENTHI V	
15	731223105015	REKA C	

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17	731223105017	SOWMIYA E	
18	731223105018	SURUTHI S	
19	731223105019	THILAKAR G K	
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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

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3	731220106005	MUTHUKUMAR.M	
4	731220106007	SUGUNADEVI.M	
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ACADEMIC YEAR 2023-2024 **YEAR: III**

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3	731221106009	SAKTHISIVAN K	
4	731221106010	SANTHIYA Y	
5	731221106011	SATHASIVAN R	
6	731221106012	SHARMILA V	
7	731221106014	SUBASH K	
8	731221106015	VENESWARI	
9	731221106301	ARTHI V	
10	731221106302	SHARMILA V	
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ACADEMIC YEAR 2023-2024 **YEAR: II**

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4	731222106004	ARCHANA.P	
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6	731222106006	DEVI.U	
7	731222106007	DHANRAJ.R	
8	731222106008	DHARANI.K.S	
9	731222106009	DHATCHINAMOORTHY.J	
10	731222106010	DINESH.S	
11	731222106011	HARIHARAN.B	Mrs.B.P.Bright Thanga Mahizh AP/ECE 8220370761 bpmahizh@gmail.com
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13	731222106013	JAYASRI	
14	731222106014	INDRAJITH.A	
15	731222106015	JEEVA DEEPIKA.S	
16	731222106016	LAVANYA.M	
17	731222106017	MAGENDHRA.K	

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19	731222106019	NIVASH.V	
20	731222106020	PAVADHARANI.K	
21	731222106021	PRASANTH.P	Mrs.M.Bhunaneshwari AP/ECE 7604869071 bhuvaneshwarim@jkkmct.edu.in
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23	731222106023	RAMYA.J	
24	731222106024	RESHMA.J	
25	731222106025	RISHIKESAN.R	
26	731222106026	RIYAS MOHAMMED.M	
27	731222106027	ROGAN.B	
28	731222106028	SATHRAPATHI.N	
29	731222106029	SANTHOSH.E	
30	731222106030	SIVARANJANI.G	
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36	731222106036	VIGNESH.V	
37	731222106037	VIJAYAKUMARI.M	
38	731222106301	ABINESH J	
39	731222106302	ARTHI M	
40	731222106303	BALAMURUGAN M	
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43	731222106306	HARISHKUMAR K	
44	731222106307	JEEVITHA P	
45	731222106308	JYOTIPRAKASH PRADHAN	
46	731222106309	KALAMANI G	
47	731222106310	KOWSALYA R	
48	731222106311	LOGESHWARAN D	
49	731222106312	MANOJ KUMAR PUJARI	

50	731222106313	MUHILARASAN K	
51	731222106314	NIBILA SRI P	Mr.P.Dhakshinamoorthy AP/ECE 9842716647 dhakshinamoorthyp@jkkmct.edu.in
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53	731222106316	PONMUTHU LAKSHMANAN M	
54	731222106317	PRITHVIRAJ R	
55	731222106318	RAJESHKANNAN R	
56	731222106319	SADHURAM MUDULI	
57	731222106320	SAMITHA K T	
58	731222106321	SANTHOSHKUMAR N	
59	731222106322	SARAVANAN S	
60	731222106323	SIBIYON K	
61	731222106324	SUJIN I	Mrs.U.Sasikala AP/ECE 9715084075 Sasi302009@gmail.com
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64	731222106327	THARUN A	
65	731222106328	VAIDEGI M	
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ACADEMIC YEAR 2023-2024 **YEAR: I**

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6	731223106006	DEVANANTH.V	
7	731223106007	DHANALAKSHMI.A	
8	731223106008	GOWTHAM.R	
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10	731223106010	JAISON.S	
11	731223106011	JAYAKUMAR.K	Mrs.K.Poongothai AP/S&H 9789559933 poongothaik@jkkmct.edu.in
12	731223106012	KARTHIK.A	
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14	731223106014	KIRANKUMAR R	
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16	731223106016	MARUTHANAYAGAM.S	

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18	731223106018	NAVEEN.K.M	
19	731223106019	PERARASU.S	
20	731223106020	PRAVINKUMAR.S	
21	731223106021	RAJESHWARI.A	Mrs.R.Shanthi AP/S&H 6383464613 shanthir@jkkmct.edu.in
22	731223106022	RANJANIDEVI.D	
23	731223106023	RIJAY C	
24	731223106024	SANTHIYA P	
25	731223106025	SENEGAA.A	
26	731223106026	SHANMUGAM.L	
27	731223106027	SIVA.P	
28	731223106028	SNEKA.M	
29	731223106029	TAMILSELVAN.M	
30	731223106030	VAITHESHWARI.P	

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DEPARTMENT OF MECHNICAL ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731220114001	JAGANKUMAR S	Mr.K.Sriram HOD/MECH 9942241051 sriramk@jkkmct.edu.in
2	731220114002	KODEESWARAN S	
3	731220114003	KUMARAVEL M	
4	731220114004	MAHENDRAN D	
5	731220114005	MANIKANDAN S	
6	731220114006	PARTHIPAN M	
7	731220114007	RAMESH B	
8	731220114008	RAVINDRAN L	
9	731220114010	SENTHILKUMAR G	
10	731220114011	THIRUMURUGAN M	
11	731220114012	THIRUNAVUKKARASU S	Mr.P.Suresh AP/MECH 9789410313 sureshsam985@gmail.com
12	731220114013	VELLINGIRI A	
13	731220114301	GOWRISANKAR M	
14	731220114302	KAVIN A	
15	731220114501	PALANIKUMAR M	

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DEPARTMENT OF MECHNICAL ENGINEERING

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: III**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731221114003	BHUVANESHWARAN M	Mr.M.Sivakumar AP/MECH 9597553594 siva36mech@gmail.com
2	731221114004	MATHANKUMAR M	
3	731221114005	PRABAKARAN S	
4	731221114008	SATHEESH C	
5	731221114009	VAIRAMUTHU S	
6	731221114010	VIGNESH S	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222114001	ARUN S	Mr.K.S.Ramesh AP/MECH 9894114028 rameshks@jkkmct.edu.in
2	731222114002	GOWTHAM V	
3	731222114003	JEEVA P	
4	731222114004	LAKSHMANAN.P	
5	731222114005	NAVEENKUMAR N	
6	731222114006	PARTHASARATHI R	
7	731222114007	RAJESHKUMAR K	
8	731222114009	RAGUPATHI R	
9	731222114011	SANTHOSH M	
10	731222114012	SIVAKUMAR M	
11	731222114013	SURIYAKUMAR S	Mr.E.Deeparaj AP/MECH 9715539027 deeparaje@jkkmct.edu.in
12	731222114014	YOGA PRAKASH M	
13	731222114301	AAKASH A	
14	731222114302	ANNADURAI N	
15	731222114303	DURAI ANBARASU S	
16	731222114304	POOVARASU M	

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S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
17	731222114305	RAGU B	Mr.E.Deeparaj AP/MECH 9715539027 deeparaje@jkkmct.edu.in

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I-MECH

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

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1	731223114001	CHANDRU .J	Mr.G.Tamilselvan AP/CSE 9688667278 tamilselvang@jkkmct.edu.in
2	731223114002	DEEPAK.R	
3	731223114003	ELISA.N	
4	731223114004	HEMACHANDRAN M	
5	731223114005	KARNA.S	
6	731223114006	KAVIYARASAN S	
7	731223114007	MANIKANDAN.A	
8	731223114008	PARIMALA.S	
9	731223114009	SATHIYA PRAKASH R	
10	731223114010	TAMILARASAN V	
11	731223114011	THIRUVIKRAMAN A	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: IV**

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2	731220205004	DEEPAK.A	
3	731220205006	DHARANI.M	
4	731220205007	DHINESHKUMAR .M	
5	731220205008	DINESH.S	
6	731220205009	GOKUL.S	
7	731220205011	KALAISELVI.K	
8	731220205012	KAVIN.P	
9	731220205013	LENA TAMILVANAN.G	
10	731220205014	MAYILRAJ.V	
11	731220205015	MUTHUKUMAR.G	Mr.S.Pradeepan AP/IT 9750534434 pradeepans@gmail.com
12	731220205016	PANDIYARAJ.C	
13	731220205017	PARVATHY.A	
14	731220205018	PRIYANKA.S	
15	731220205019	RAMKUMAR.R	
16	731220205020	RAVI SANKARAN.N	
17	731220205021	SHIJIN KUMAR.K.G	

18	731220205022	SIVABALAJI.N	
19	731220205023	SRIRAM.V	
20	731220205024	THANGESHWARI.G	
21	731220205301	POORANESHWARAN.N	Mr.R.Sudhakar AP/IT 9884174440 sudha_cse02@yahoo.com
22	731220205302	RAVINDHIRAN.R	
23	731220205303	SHILPA.C	

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ACADEMIC YEAR 2023-2024 **YEAR: III**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731221205003	BHUVANESHWARAN M	Mr.K.R.Vigneshwara AP/IT 9884174440 vineshwarakr@jkkmct.edu.in
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3	731221205005	DEVIKA A	
4	731221205006	DHANALAKSHMI C	
5	731221205007	DHARSHINI P	
6	731221205008	DHAYALAN R	
7	731221205009	DINESH M	
8	731221205010	DIVYA S	
9	731221205011	KARTHICKRAJA G	
10	731221205012	KAVIBHARATHI G	
11	731221205014	KOWSALYA G	Mrs.M.Renukadevi AP/IT 9994965917 renukadvim@jkkmct.edu.in
12	731221205015	KRISHNAN S	
13	731221205016	MADHAN KUMAR N	
14	731221205017	MAHADEVAMMA S	
15	731221205019	MANIGANDAN M	
16	731221205020	MANILA K	
17	731221205021	MANOJ KUMAR S	

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18	731221205022	MAVURIYA D	
19	731221205023	MEGALA THANGAMANI M	
20	731221205026	MOTHIR.L	
21	731221205027	MOUNASAKTHI G	Mr.R.Sudhakar AP/IT 9884174440 sudha_cse02@yahoo.com
22	731221205028	NANDHINI S	
23	731221205029	NAVEEN S	
24	731221205030	PANDEESWARAN C K	
25	731221205031	PARTHIBAN M	
26	731221205032	RAKSHITHA B	
27	731221205033	RATHNA R	
28	731221205034	RAVIKUMAR M	
29	731221205035	RITHIK S	
30	731221205036	ROHITH V	
31	731221205037	SHARAN KUMAR M V	Mrs.P.Sangeetha AP/IT 9894714454 eswararmurthyv@jkkmct.edu.in
32	731221205038	SIDDAPPA.S	
33	731221205039	SUNDHARESWARI V	
34	731221205040	SUYAMBURAJ C	
35	731221205041	SWETHA S	
36	731221205042	TAMILSELVAN M	

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37	731221205043	TAMILSELVI R	Mrs.P.Sangeetha AP/IT 9894714454 eswararmurthyv@jkkmct.edu.in
38	731221205044	YUSWANTHRAA R	
39	731221205301	AHALYA.J.C	

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ACADEMIC YEAR 2023-2024 **YEAR: II**

S..No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222205001	AKASH.K	Mrs.D.Nivethini AP/IT 9894714454 nivethinid@jkkmct.edu.in
2	731222205002	BENISHA.S	
3	731222205003	BHARATHI.R	
4	731222205004	BOOPATHIRAJA.N	
5	731222205005	DHANUSH.B	
6	731222205006	DHIVAGAR.C	
7	731222205007	DINESH.S	
8	731222205008	DINESHKUMAR.R	
9	731222205009	ELAVARASAN.V	
10	731222205010	GNANAVELM	
11	731222205011	GOKULAKANNAN.J	Mrs.S.Kanimozhi AP/IT 9080683118 kanimozhis@jkkmct.edu.in
12	731222205012	GOMATHI.R	
13	731222205013	GUGAVARSHINI.G	
14	731222205014	GUNA.V	
15	731222205015	HARIHARAN.V	
16	731222205016	JEEVADHARSHINI.S	
17	731222205017	KANISHKA.C	

18	731222205018	KAVIKARTHIK.V	
19	731222205019	KAVIYA.S	
20	731222205020	LAKSHMI.M	
21	731222205021	MADHAN.T	Mrs.P.Sangeetha AP/IT 9894714454 eswararmurthyv@jkkmct.edu.in
22	731222205022	MADHAVAN.P	
23	731222205023	MAGEESHA.N	
24	731222205024	NAVIN.K	
25	731222205025	PAVITHRAK.M	
26	731222205026	PRAKASH.S	
27	731222205027	PREAMKUMAR.S	
28	731222205028	PUSHPARAJAN.M	
29	731222205029	RADHIGA.S	
30	731222205030	RAGUL.P	
31	731222205031	RAJAVIYASHANA.P	Mr.S.Pradeepan AP/IT 9750534434 pradeepans@gmail.com
32	731222205032	RAKSHANAESABELR	
33	731222205033	REENA.S	
34	731222205034	RUHANRAM.S	
35	731222205035	SANJANA.T	
36	731222205036	SANJAY.M.	
37	731222205037	SANTHAMANOJ.P.N	

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38	731222205038	SELVAM.R	
39	731222205039	SIDDARAJ.A	
40	731222205040	SIDDARAJ.K.M	
41	731222205041	STALIN.M	Mr.P.Suresh AP/IT 9080683118 sureshp@jkkmct.edu.in
42	731222205042	SUJITH.P	
43	731222205043	UDHAYAKUMAR.S	
44	731222205044	VANMATHI.S	
45	731222205045	VASANTHKUMAR.H	
46	731222205046	VASUMATHI.K	
47	731222205047	VIGNESH.S	
48	731222205048	VIGNESHVARAN.M	
49	731222205049	VISALATCHI.M	
50	731222205050	VISHNUSANKAR.B	

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Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 YEAR: I

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1	731223205001	AARTHI.R	Ms.P.Mahasakthi AP/S&H 9597363115 mahasakthip@jkkmct.edu.in
2	731223205002	ANBURAJ. G	
3	731223205003	ANUSHA.G	
4	731223205004	ARUN PANDIYAN.S	
5	731223205005	ASHOKAN. S	
6	731223205006	AVINASH. P	
7	731223205007	BALAVIGNESHWARAN. M	
8	731223205008	DEEPIKA. M	
9	731223205009	DHILEEPKUMARV	
10	731223205010	GOBINATH. A	
11	731223205011	GOKULRAJ. R	Mr.N.Madesh AP/S&H 9789559933 madeshn@jkkmct.edu.in
12	731223205012	GOWRISHANKAR. P	
13	731223205013	HARISH. V	
14	731223205014	HARI VARSHINI. M	
15	731223205015	JAISAN.S	
16	731223205016	JEYALAKSHMI P	
17	731223205017	KABINAYA. G	

S..No.	Register Number	Name of the Student	Name of the Mentee/Mentor
18	731223205018	KARTHIKEYAN. S	
19	731223205019	KISHOR. A	
20	731223205020	KUYILARASAN A	
21	731223205021	MADHAN KUMAR. M	Ms.S.Samyuktha AP/S&H 8940299325 samyukthas@jkkmct.edu.in
22	731223205022	MADHUVARSHINI. V	
23	731223205023	MUTHUKUMAR. B	
24	731223205024	NANDHAKUMAR. K	
25	731223205025	NANTHITHA. S	
26	731223205026	NAVEENPRASANTH. T	
27	731223205027	NISHA K	
28	731223205028	PREMKUMAR.M	
29	731223205029	ROSHINI.T	
30	731223205030	SAKTHI SUNDHARAM. M	
31	731223205031	SANJAY. K	Mr.P.Ramesh AP/S&H 9750036658 rameshp@jkkmct.edu.in
32	731223205032	SANTHOSH. S	
33	731223205033	SANTHOSH KUMAR.P	
34	731223205034	SRIVARMAN. V	
35	731223205035	SUJITH KUMAR. G	
36	731223205036	TAMILSELVAN. A	

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S..No.	Register Number	Name of the Student	Name of the Mentee/Mentor
37	731223205037	TAMILSELVAN. V	
38	731223205038	TAMIZHARASAN. R	
39	731223205039	THILAGAVATHI.G	
40	731223205040	THINAGARAN	
41	731223205041	UMA MAHESHWARI A	Mrs.M.Kavitha APS&H 9585930656 kavitham@jkkmct.edu.in
42	731223205042	VAISHNAVI. M	
43	731223205043	VIDUTHALAISELVAN. K	
44	731223205044	VINISHKUMAR. K	
45	731223205045	VISHALI .P	
46	731223205046	VIVEGA. R	

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

I-CYBER SECURITY

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

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3	731223149003	DHATCHAYINI V	
4	731223149004	GOWSIKA P	
5	731223149005	HARIRAM K	
6	731223149006	MEIYAZHAGAN G	
7	731223149007	NANDHAKUMAR Y	
8	731223149008	PADMAPRIYA P	
9	731223149009	PASUPATHAN R	
10	731223149010	RANGANATHAN S	
11	731223149011	RANIL K	Mr.S.Tamilarasu AP/S&H 9942651209 tamilarasus@jkkmct.edu.in
12	731223149012	SANDHIYA M	
13	731223149013	SATHISH KUMAR S	
14	731223149015	SIVAKUMAR K	
15	731223149016	TAMILARASAN J	
16	731223149017	THIRUMALAI S	
17	731223149018	VENKATESH E	

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20	731223149021	YASIKA R	
21	731223149022	YOGESH V	
22	731223149023	YUVANANDHINI T	

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T.N.Palayam (Po), Gobi (Tk), Erode(Dt)-638 506

DEPARTMENT OF MANAGEMENT STUDIES

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S..No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223631001	AADHITHYA T	Mr.R.Prasanth AP/MBA 7094054451 prasanthr@jkkmct.edu.in
2	731223631002	ABINAYA S	
3	731223631003	AJAY G	
4	731223631004	AKASH.R	
5	731223631005	AKHILA	
6	731223631006	ARUNAGIRI	
7	731223631007	BARATHWAJ T R	
8	731223631008	DEEPA K	
9	731223631009	DESIKA S	
10	731223631010	DHARSHINI P	
11	731223631011	DINESH A	Mr.G.Alagar AP/MBA 7598614661 alagargaps@gmail.com
12	731223631012	ELAKIYA	
13	731223631013	GANDHI H	
14	731223631014	GOKUL M	
15	731223631015	GOPIKA G	
16	731223631017	HALISHA B	
17	731223631018	HARIPRIYA S	

18	731223631019	ILANGOVAN G	
19	731223631020	JOSHUA E	
20	731223631021	KALAISELVAN M	
21	731223631022	KARANRAJ R	Mr.C.Somasundaram. AP/MBA 9942427252 c.somasundrammba@gmail.com
22	731223631023	KAVINKUMAR K	
23	731223631024	KEERTHANA K	
24	731223631026	KISHORE S	
25	731223631028	MANOJKUMAR S	
26	731223631029	MEGALA S	
27	731223631030	MEGAVANNAN R	
28	731223631031	MOHAMMED SANOOB	
29	731223631032	MOHANRAJ K	
30	731223631033	MYTHILI K	
31	731223631034	NAGAKARNAN M	Mr. B.Sivakumar AP/MBA 7095054451 sivakumarb@jkkmct.edu.in
32	731223631035	NAGARAJ S	
33	731223631036	NOUSHIBA	
34	731223631037	PARAMESH M	
35	731223631038	PRAVIN A	
36	731223631039	RAGUL A	
37	731223631040	RAHUL M	
38	731223631041	RAJ R	

39	731223631042	RAJALAKSHMI M	
40	731223631043	ROJASRI K	
41	731223631044	SAJIN RIYAS P K	Mr.G.Alagar AP/MBA 7598614661 alagargaps@gmail.com
42	731223631045	SARANYA G	
43	731223631046	SARATHI	
44	731223631047	SIVA R	
45	731223631048	SIVARAM P	
46	731223631049	SNEHA R	
47	731223631050	SOWMIYA S	
48	731223631051	SREE VIGNESH G	
49	731223631052	STEENA JENIFER J	
50	731223631053	SUGUMAR N	
51	731223631055	THAMIL SELVAN M	Mr.K.Avinash AP/MBA 9345379991 avinashk@jkkmct.edu.in
52	731223631056	VEENA R	
53	731223631057	VENKATESAN N	
54	731223631058	YOGARAJ.M	
55	731223631059	YOVANS S	

HOD/MBA

HEAD OF THE DEPARTMENT
Department of Management Studies
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GOBI. ERODE (DIST

PRINCIPAL

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DEPARTMENT OF MANAGEMENT STUDIES

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222631001	ARTHI.M	Mr.E.R.Vadivel HOD/MBA 9345379991 hodmba@jkkmct.edu.in
2	731222631002	ASHWINI.S	
3	731222631003	BHARATHI .A	
4	731222631004	BHUVANESWARI. R	
5	731222631005	DHARANI .R	
6	731222631006	DIVYA.S	
7	731222631007	HARIDHARANI.N	
8	731222631008	INDRA.S	
9	731222631009	KALAPSAMUVEL. M	
10	731222631010	MANIMARAN .M	
11	731222631011	MAYA. K	Mr. B.Sivakumar AP/MBA 7095054451 sivakumarb@jkkmct.edu.
12	731222631012	NANDHA KISHORE .S	
13	731222631013	NAVEENKUMAR .R	
14	731222631014	NISHANTH	

11	731222631015	PANNEERSELVAM.T	
16	731222631016	PRADEEP .B	
17	731222631017	PRAKASH.S	
18	731222631018	PRASILA.R	
19	731222631019	PRAVEENA. R	
20	731222631020	RAJKUMAR.V	
21	731222631021	RITHIGA.P	Mr.R.Prasanth AP/MBA 7094054451 prasanthr@jkkmct.edu.in
22	731222631022	SANTHIYA. P	
23	731222631023	SANTHOSH. S	
24	731222631024	SATHIYAABIRAMI.N	
25	731222631025	SATHIYA PRIYA. G	
26	731222631026	SOWNDARYA.S	
27	731222631027	SRIRAM.M	
28	731222631028	STENIN MESHAK.S.I	
29	731222631029	THILAGAVATHI.	
30	731222631030	THIYAGU.M	
31	731222631031	VIJAY. R	

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DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: II**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222622001	DURGA.K	Mrs.P.Archana AP/MCA 8610536046 archanapaneer@gmail.com
2	731222622003	INIYAA	
3	731222622005	JOSNA	
4	731222622006	LOGANATHAN.A	
5	731222622007	PRAKASH.A	
6	731222622008	RAMAMOORTHI.R	
7	731222622009	RAVIKUMAR.K	
8	731222622011	SURYA.K	

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DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR: I**

S. No.	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223622001	ARASUMANI S	Mr.M.Senthilkumar AP/MCA 8610536046 senthilkumarm@jkkmct.edu.in
2	731223622002	ASHOK.S	
3	731223622003	BOOPATHY P	
4	731223622004	DHARSHINI S	
5	731223622005	DINESH K	
6	731223622007	MOHAMMAD DANYAL M	
7	731223622008	NISHABIN BABY G	
8	731223622009	PRABHAKARAN M	
9	731223622011	SABARISH.M	
10	731223622012	VINOTHINI P	

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.E-APPLIED ELECTRONICS

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR : II**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222401001	BAKYALAKSHMI P	Dr.C.Murugesan HOD/ECE 9789456706 hodece@jkkmct.edu.in
2	731222401002	DEEPIKA M	

HOD/ECE

C. MURUGESAN
Head of the Department
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.E-APPLIED ELECTRONICS

Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR : I**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
Nil			

HOD/ECE

C. MURUGESAN
Head of the Department
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J.K.K. Munirajah College of Technology
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
M.E-POWER ELECTRONICS AND DRIVES
Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR : II**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222415001	PREJITHA S	Mr.T.S.Thambiran AP/EEE 9965583599 tsthambi77@gmail.com
2	731222415002	ROOPAN DURAI G	

HOD/EEE

Head of the Department,
Department of EEE,
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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
M.E-POWER ELECTRONICS AND DRIVES
Circular–Mentor and Mentee List

ACADEMIC YEAR 2023-2024 **YEAR : I**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223415001	AMASAVENI.M	Mr.T.S.Thambiran AP/EEE 9965583599 tsthambi77@gmail.com
2	731223415001	DHARANI.P	

HOD/EEE

Head of the Department,
Department of EEE,
J.K.K.Munirajah College of Technology,
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DEPARTMENT OF MECHANICAL ENGINEERING
M.E-MANUFACTURINGENGINEERING

ACADEMIC YEAR 2023-2024 **YEAR : I**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223410001	LOGU.P	Mr.E.Prabhuraj AP/MECH 9566385450 prabhuraje@jkkmct.edu.in
2	731223410002	VINOTHKUMAR.K	

HOD/MECH

HEAD OF THE DEPARTMENT
Department of Mechanical Engineering
J.K.K.Munirajah College of the Technology,
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DEPARTMENT OF MECHANICAL ENGINEERING
M.E-MANUFACTURINGENGINEERING

ACADEMIC YEAR 2023-2024 **YEAR : II**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222410001	JAGADEESH M	Dr.N.Sankar AP/MECH 9566385450 sankarn@jkkmct.edu.in
2	731222410002	MITTU S THAMPI	
3	731222410003	MUKILAN.S	
4	731222410004	THAMARAI SELVAN S	

HOD/MECH

HEAD OF THE DEPARTMENT
Department of Mechanical Engineering,
J.K.K.Munirajah College of the Technology,
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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

M.E-COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2023-2024 **YEAR : II**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731222405001	KIRUTHIKA S	Dr.N.Sathyabalaji HOD/CSE 9578191257 hodcse@jkkmct.edu.in
2	731222405002	THAMARAISELVI R	

HOD/CSE

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

M.E-COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2023-2024 **YEAR : I**

S. No	Register Number	Name of the Student	Name of the Mentee/Mentor
1	731223405001	ADHISESHAN N	Mrs.M.C.Savithri AP/CSE 9361537250 savithrimc@jkkmct.edu.in
2	731223405002	ASGARALL.K	
3	731223405003	MATHIYAZHAGAN M	
4	731223405004	POORNIMA K	
5	731223405005	PRIYADHARSHINI T	
6	731223405006	SATHYAPRIYA M	
7	731223405007	SNEHALAL T V	
8	731223405008	VIBIN BABY	

HOD/CSE

Head of the Department,
Department of CSE,
J.K.K. Munirajah College of Technology,
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J K K MUNIRAJAH COLLEGE OF TECHNOLOGY

T.N PALAYAM, GOBI – 638 506

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROCTOR DIARY & STUDENT PORTFOLIO

1.	Student Name	:	SUGUNADEVI.M
2.	Roll No	:	04
3.	University Register No.	:	7 3 1 2 2 0 1 0 6 0 0 7
4.	Course	:	B.E
5.	Department	:	ELELCTRONICS AND COMMUNICATION ENGINEERING
6.	Course duration	:	2020-2024
7.	Date of Birth(DD/MM/YEAR)	:	12-10-2002
8.	Religion	:	HINDU
9.	Caste name	:	SAKKILIYAR
10.	Community	:	(BC/MBC/OC/OBC/SC/ST/SCA) :SC
11.	E-mail ID	:	sugunadevimece20@jkkmct.edu.in
12.	Mobile NO	:	9894037554
13.	Student's signature	:	M. Sugu
14.	Name of the mentor	:	Mrs.U.Sasikala AP/ECE

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	EC8701	ANTENNAS AND MICROWAVE ENGINEERING	74		B			NOV/DEC 2023
2	EC8751	OPTICAL COMMUNICATION	91		B			2023
3	EC8791	EMBEDDED AND REAL TIME SYSTEMS	82		A			NOV/DEC 2023
4	EC8702	AD HOC AND WIRELESS SENSOR NETWORKS	81		U			
5	OCH752	ENERGY TECHNOLOGY	76		A			NOV/DEC 2023
6	SB8021	NETWORK ESSENTIALS	93		O			NOV/DEC 2023
PRACTICALS								
1	EC8711	EMBEDDED LABORATORY	95		O			NOV/DEC 2023
2	EC8761	ADVANCED COMMUNICATION LABORATORY	92		O			NOV/DEC 2023

Percentage of marks in ____semester:

Percentage of marks up to ___ semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	NIL	NIL
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED	—	—

COUNSELING INFORMATION
(TO BE FILLED BY PROCTOR)

DATE	PARTICULARS	STUDENT'S SIGNATURE
27/2/2023	General instructions are provided	M. Sudhi
16/8/2023	Discussed about Internals.	M. Sudhi
14/9/2023	Students Performance in extra events	M. Sudhi
16/10/2023	Discussed about Extra curricular events	M. Sudhi
17/11/2023	Performance in class room.	M. Sudhi
—	—	—
—	—	—

DETAILS OF INTERACTION WITH PARENTS

DATE	PARENT NAME	INTERACTION DETAILS	PARENT'S SIGNATURE
15/9/2023	MARIMUTHU R	General meet with parents	P. மாரிமுத்து
17/10/2023	MARIMUTHU R	Discussed about internal Exams	P. மாரிமுத்து
—	—	—	—

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	GE8076	PROFESSIONAL ETHICS	85		B+			AP/MAY 2024
2	EC8094	SATELLITE COMMUNICATION	85		A			AP/MAY 2024
PRACTICALS								
1	EC8811	PROJECT WORK	90		O			AP/MAY 2024

Percentage of marks in ____**semester:**

Percentage of marks up to ____**semester:**

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	–	–
ARREARS CLEARED IN THIS SEMESTER	–	–
ARREARS YET TO BE CLEARED	NIL	NIL

SIGNATURE OF HOD

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J K K MUNIRAJAH COLLEGE OF TECHNOLOGY

T.N PALAYAM, GOBI – 638 506

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PROCTOR DIARY & STUDENT PORTFOLIO

1 .Student Name	:	MUTHUKUMAR.M
2. Roll No	:	03
3 .University Register No.	:	7 3 1 2 2 0 1 0 6 0 0 5
4. Course	:	B.E
5. Department	:	ELELCTRONICS AND COMMUNICATION ENGINEERING
6. Course duration	:	2020-2024
7. Date of Birth(DD/MM/YEAR)	:	03-08-2002
8. Religion	:	HINDU
9. Caste name	:	PIRAMALAI KALLAR
10.Community	:	(BC/MBC/OC/OBC/SC/ST/SCA/DNC) :DNC
11.E-mail ID	:	muthukumarmece20@jkkmct.edu.in
12.Mobile NO	:	8524813169
13.Student's signature	:	M. Muthukumar
14.Name of the mentor	:	Mrs.U.Sasikala AP/ECE

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	EC8701	ANTENNAS AND MICROWAVE ENGINEERING	70		U			NOV/DE
2	EC8751	OPTICAL COMMUNICATION	76		U			
3	EC8791	EMBEDDED AND REAL TIME SYSTEMS	77		B+			NOV/DEC 2023
4	EC8702	AD HOC AND WIRELESS SENSOR NETWORKS	80		B			NOV/DEC 2022
5	OCH752	ENERGY TECHNOLOGY	65		B+			NOV/DEC 2022
6	SB8021	NETWORK ELEMENTALS	99		O			NOV/DEC 2022
PRACTICALS								
1	EC8711	EMBEDDED LABORATORY	95		O			NOV/DEC 2023
2	EC8761	ADVANCED COMMUNICATION LABORATORY	94		O			NOV/DEC 2023

Percentage of marks in __ semester:

Percentage of marks up to __ semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	NIL	NIL
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED	—	—

COUNSELING INFORMATION
(TO BE FILLED BY PROCTOR)

DATE	PARTICULARS	STUDENT'S SIGNATURE
27/2/2023	General Instructions are given	
16/8/2023	Discussed about Industrial Visit	
14/9/2023	class room Performance	
16/10/2023	Important questions discussion	
17/11/2023	discussed about Privious results	
—	—	—
—	—	—

DETAILS OF INTERACTION WITH PARENTS

DATE	PARENT NAME	INTERACTION DETAILS	PARENT'S SIGNATURE
15/9/2023	M. MANIKANDAN	General meeting	
17/10/2023	M. MANIKANDAN	Discussed about Internal Performance	
—	—	—	

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	GE8076	PROFESSIONAL ETHICS	82		B			APR/MAY 2024
2	EC8094	SATELLITE COMMUNICATION	78		B			APR/MAY 2024
PRACTICALS								
1	EC8811	PROJECT WORK	96		O			APR/MAY 2024

Percentage of marks in _____semester: –

Percentage of marks up to____semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	NIL	NIL
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED	–	–

SIGNATURE OF HOD

C. MURUGESAN
Head of the Department
Department of ECE
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J K K MUNIRAJAH COLLEGE OF TECHNOLOGY

T.N PALAYAM, GOBI – 638 506

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

PROCTOR DIARY & STUDENT PORTFOLIO

1. Student Name : RAMAMOORTHI.R
2. Roll No : 08
3. University Register No. : 7 3 1 2 2 2 6 2 2 0 0 8
4. Course : M.C.A.
5. Department : MASTER OF COMPUTER APPLICATIONS
6. Course duration : 2022-2024
7. Date of Birth(DD/MM/YEAR) : 05.01.2002
8. Religion : HINDU
9. Caste name : BOYAR
10. Community : (BC/MBC/OC/OBC/SC/ST/SCA) : MBC
11. E-mail ID : pasubathi7708@gmail.com
12. Mobile NO : 7339096880
13. Student's signature : Ramamoorthy
15. Name of the mentor : Mrs.P.Archana AP/MCA

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	MC4301	Machine learning	50		U	April 2024		April 2024
2	MC4302	Internet of things	93		A			April 2024
3	MC4012	Social network Analysis	75		B			April 2024
4	MC4020	Data mining & Data warehousing	49		U			April 2024
5	MC4026	Software quality & testing	83		B+			April 2024
6	DS4015	Big data analytics	82		B+			April 2024
PRACTICALS								
1	MC4311	Machine learning laboratory	95		O			
2	MC4312	Internet of things laboratory	94		O			

Percentage of marks in _____semester:

Percentage of marks up to_____semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	2	MC 4301, MC 4020
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED	NIL	NIL

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	MC4411	Project			U	April 2024		
2								
3								
4								
5								
6								
PRACTICALS								
1								
2								

Percentage of marks in _____semester:

Percentage of marks up to_____semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	1	MC 4411
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED	NIL	NIL

COUNSELING INFORMATION
(TO BE FILLED BY PROCTOR)

DATE	PARTICULARS	STUDENT'S SIGNATURE
3/3/2024	General instructions are provided	
5/3/2024	Discussed about Internals	
17/3/2024	students Performance in extra events	
19/3/2024	Discussed about extra curricular events	
24/3/2024	Performance in class rooms	

DETAILS OF INTERACTION WITH PARENTS

DATE	PARENT NAME	INTERACTION DETAILS	PARENT'S SIGNATURE
29/3/2024	RAJENDRAN.G	General meet with parents	
7/4/2024	RAJENDRAN.G	Discussed about Internal exams	

SIGNATURE OF PROCTOR

SIGNATURE OF HOD/ACADEMIC HEAD

HEAD OF THE DEPARTMENT
Department of MCA
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DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

PROCTOR DIARY & STUDENT PORTFOLIO

1. Student Name : DURGA K
2. Roll No : 01
3. University Register No. : 7 3 1 2 2 2 6 2 2 0 0 1
4. Course : M.C.A.
5. Department : MASTER OF COMPUTER APPLICATION
6. Course duration : 2022-2024
7. Date of Birth(DD/MM/YEAR) : 05.06.2002
8. Religion : HINDU
9. Caste name : AMBALAKARAR
10. Community : (BC/MBC/OC/OBC/SC/ST/SCA) : MBC
11. E-mail ID : dk1498344@gmail.com
12. Mobile NO : 6383809858
13. Student's signature :
14. Name of the mentor : Mrs.P.Archana AP/MCA

UNIVERSITY EXAMINATION MARKS

S.no	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	MC4301	Machine Learning	82		A			April 2024
2	MC4302	Internet of Things	96		A+			April 2024
3	MC4012	Social Network Analysis	91		O			April 2024
4	MC4020	Datamining & Datawarehouse	83		A			April 2024
5	MC4026	Software quality & Testing	81		A			April 2024
6	DS4015	Big Data Analytics	96		A+			April 2024
PRACTICALS								
1	MC4311	Machine Learning Laboratory	95		O			April 2024
2	MC4312	Internet of Things Laboratory	92		O			April 2024

Percentage of marks in ~~II~~ III semester: 7.0

Percentage of marks up to III semester: 7.12

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	NIL	NIL
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED		

UNIVERSITY EXAMINATION MARKS

S.No	Subject code	Name of the Subjects	Internal (100)	External	Total marks	Year of passing	Total marks	Year of passing
THEORY								
1	MC4411	Project	95		0			Aug 24
2								
3								
4								
5								
6								
PRACTICALS								
1								
2								

Percentage of marks in _____semester:

Percentage of marks up to_____semester:

ARREAR DETAILS (IF ANY):

DETAILS	NUMBERS	SUBJECT CODES
TOTAL ARREARS TILL LAST SEMESTER	NIL	NIL
ARREARS CLEARED IN THIS SEMESTER	NIL	NIL
ARREARS YET TO BE CLEARED		

(C) Orbital parameters

COUNSELING INFORMATION
(TO BE FILLED BY PROCTOR)

DATE	PARTICULARS	STUDENT'S SIGNATURE
3/3/2024	General Instructions are Provideel.	Dewy
5/3/2024	Discussed about Internals	Dewy
17/3/2024	Students Performance in extra events	Dewy
19/3/2024	Discussed about extra curricular events	Dewy
24/3/2024	Performance in class rooms.	Dewy

DETAILS OF INTERACTION WITH PARENTS

DATE	PARENT NAME	INTERACTION DETAILS	PARENT'S SIGNATURE
29/3/2024	KESAVAN.S	General mat write Parents	[illegible]
7/4/2024	KESAVAN.S	Discuss about Internal exam	[illegible]

SIGNATURE OF PROCTOR

SIGNATURE OF HOD/ACADEMIC HEAD

HEAD OF THE DEPARTMENT
Department of MCA
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T.N. Palayam - 638 506

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An ISO 9001-2015 Certified Institution)

T.N.Palayam(Po),Gobi(Tk),Erode(Dt)–638506

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MENTOR ISSUES DISCUSSUED AND ACTION TAKEN FORM

S.NO	MENTOR NAME	STUDENT NAME	STUDENT QURIES	ACTION TAKEN	REMARKS
1	Mr.S.GANESHKUMAR ,AP/AUTO	K.ELANGOVAN II-AUTO	Need subject important questions for AU3301-Thermodynamics and Heat Transfer	Printed copy of subject important questions are provided for the student	Resolved
		P.KAVIN II-AUTO	He asked soft copy of subject notes for ME8351, Manufacturing Technology - I	Soft copy of subject notes is provided for the student	Action to taken
2	Mr.K.S.VINOTHAB ,AP/CSE	P.ABINAYA II-CSE	He asked Questions Bank for CS3491-Theory of computation subject.	Soft copy of subject important questions are provided for the student.	Action taken
3	Mr.R.GNANASEKAR,,AP/CSE	K.DURGA III-CSE	Need important 2 marks and PART B questions for CS8691-Artificial intelligence subject	Soft copy of important 2 marks is provided to thestudent	Resolved

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S.NO	MENTOR NAME	STUDENT NAME	STUDENT QURIES	ACTION TAKEN	REMARKS
4	Mr.P.REENA,AP/CIVIL	B.ANANDHAN II-CIVIL	Requested for co-curricular activities like workshop in the even semester.	Concern programme organizer was asked to arrange the activities. And also co-curricular activities were conducted to enhance their knowledge.	Resolved
		S.SUSITHRA III-CIVIL	Feeling overwhelmed by the volume of assignments.	Student was advised to discuss about it to his concerns with the instructor to explore options, such as workload adjustments or time management strategies. According to that the due date were adjusted.	Resolved
		R.DIVAKAR IV-CIVIL	Problems in accessing the journals of research projects / thesis work.	Students were equipped with necessary E-Gate journals and instructions were provided to download the required thesis by providing usernames and passwords.	Resolved

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S.NO	MENTOR NAME	STUDENT NAME	STUDENT QURIES	ACTION TAKEN	REMARKS
5	Mr.K.SIVAKUMAR, AP/MECH	M.MATHANKUMAR III-MECH	Need subject important questions for ME8792 Power Plant Engineering	Printed copy of subject important questions are provided for the student	Resolved
		S.VIGNESH III-MECH	Need Previous year university questions soft copy for ME8501 Metrology and Measurements	Soft copy and hard copy of Previous year university questions is provided for the student	Issue Redfield
6	Mr.K.SRIRAM, AP/MECH	B.RAMESH IV-MECH	He Asked soft copy of subject notes for ME8791 Mechatronics	Soft copy of subject notes is provided for the student.	Action to taken
7	Mr.P.SURESH, AP/MECH	A.KAVIN IV-MECH	Need subject unit vice 2 and 16 Marks for ME8593 Design of Machine Elements	Soft copy of subject unit vice 2 and 16 Marks files is provided for the student	Resolved
8	Mrs.M.SIVARANJANI, AP/ECE	A.SUGUNADEVI IV-ECE	Need PPT Presentation for EC8094-Satellite Communication subjects	PPT Class for satellite communication provided to the students	Resolved

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S.NO	MENTOR NAME	STUDENT NAME	STUDENT QURIES	ACTION TAKEN	REMARKS
9	Mrs.U.SASIKALA ,AP/ECE	Y.SANTHIYA III-ECE	She asked question bank of EC8095-VLSI Design subject	Question bank of VLSI Design provided to the students	Action to taken
10	Mr.S.PRADEEPAN AP/IT	C.K.PANDEESWARAN III-IT	He asked Possible Questions for CS8091-BIGDATA ANALYTICS SUBJECT	Soft copy of possible questions for 5 units provided to the Student	Action taken
11	Mr.A.SAMBATH KUMAR,AP/IT	, G.LENA TAMILVANAN IV-IT	Need Possible Questions for MG8591-PRINCIPLES OF MANAGEMENT	Soft copy of possible questions for 5 units provided to the student	Resolved

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S.NO	MENTOR NAME	STUDENT NAME	STUDENT QURIES	ACTION TAKEN	REMARKS
12	Mrs.M.SENBAGAM, AP/S&H	K.DEEPAK I-CSE	Need possible questions in PSPP	Soft copy of possible questions for 5 units provided to the student	Resolved
		S.MOUNIKA I-CSE	Need basic concepts for Heritage of tamil	Concepts are given	Action Taken
13	Ms.P.MAHASAKTHI ,AP/S&H	R.AARTHI I-IT	Need previous year University question for Matrix and Calculus	Previous year questions are given to him	Resolved
14	Mr.S.ANBUTHANGAM	R.GOKULRAJ I-IT	Need important questions for Engineering Physics	Important questions are given	Action taken
15	Mr.P.SANGEETHKUMAR, AP/S&H	P.ARISH I-ECE	Need basic grammars in Professional English	Basic grammars given to him	Resolved
16	Mr.G.TAML SELVAN,AP/CSE	S.KARNA I-MECH	Need previous year University question for PSPP	Previous year question paper are given	Action to taken

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		V.TAMMMILARASAN I-MECH	Need important questions for Engineering Chemistry	Important questions are given to him	Action to Taken
17	Mrs.G.HARINI, AP/CIVIL	R.LISHA I-CIVIL	Need important formulas in Matrix and Calculus	Formulas are given to her.	Resolved

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EVIDENCES PROVIDED FOR ACTION TAKEN FOR MENTOR ISSUES

DEPARTMENT OF AUTOMOBILE ENGINEERING

IMPORTANT QUESTIONS AU3301- THERMODYNAMICS & HEAT TRANSFER

UNIT-1

1. Explain the state of equilibrium. Also discuss thermal, chemical and mechanical equilibrium with suitable examples.

2 . Explain the different types of systems with neat sketches and suitable examples.

3. Explain Zeroth law of Thermodynamics.

4. Define the temperature. Name the different temperature scales in common use and establish a relation between

Celsius and Fahrenheit scale.

5. Write short notes on following:

1) Equality of temperature
2) Law of perfect gases
3) Process and cycle
4) Point Function, Path Function

6. What is pure substance? Draw the phase equilibrium diagram for a pure substance on T-S plot with relevant constant property lines. Q

7. Draw the phase equilibrium diagram for a pure substance on h-s plot with relevant constant Property lines.

8. Pressure of the steam inside a boiler, as measured by pressure gauge, is 2 N/mm2 . The barometric pressure of the atmosphere is 765 mm of mercury. Find the absolute pressure of steam in N/m2 , kPa, bar and N/mm2 .

9. What is energy? Explain the different types of energy in detail.

UNIT-2

1. Explain First law of thermodynamics. B) Explain and derive Steady Flow Energy Equation.

2. What do you mean by the term ' Property'? Prove that Heat and Work is not a point function.

3. Derive the work done for following process: 1 Isochoric process 2 Isobaric process 3 Isothermal process

4 Adiabatic process 5 Polytrophic process

5. Derive amount of heat transfer for the above processes in previous question.

6. a) Explain Second Law of Thermodynamics.

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b) Prove that violation of Kelvin Plank statement leads to violation of Clausius statement.

7. Explain the difference between heat pump and refrigerator, also find the C.O.P

8. Define the term 'Entropy'. Derive an expression for change of entropy for following process.
   1. Isochoric process
   2 Isobaric process
   3 Isothermal process
   4 Adiabatic proce

9. Write short notes on following associated with S.F.E.E.
   (i) Nozzle
   (ii) Throttle Valve
   (iii) Turbine

UNIT-3

1 What do you understand by high grade energy and low grade energy? Deduce the expression or available energy from a finite energy source at temperature T When the environmental temperature is T.

2. Derive Maxwell's equation.

3. Give the Gibbs phase Rule for a non reactive system

4. Explain Joule Kelvin Effect. What is Inversion Temperature?

5. Derive the following expression $TdS=Cp\ dT - T(\partial V/\partial T)p\ dp$

6. Derive an expression for clausius clapeyron equation.

7. Derive an expression for Joule Thomson coefficient.

8. A mass of 1.5kg and volume of 0.14m3 of certain gas at 40 bar is expended isentropically such that temperature falls to 500 K. Determine

   1. Initial temperature of gas
   2. Work done during the process
   3. Pressure at end of expansion. Take R=0.287 kJ/kgK , and Cv=0.718 kJ/kgK

UNIT-4

1. With the help of p-v and T-s diagram, show that for the same maximum pressure and temperature of the cycle and the same heat rejection, $\eta Diesel > \eta Dual > \eta Otto$

2. Derive an expression for Efficiency in following cycles 1. Stirling Cycle 2. Air Standard Cycle 3. Bryaton Cycle 3. (a) Explain the working of four stroke and two stroke petrol engine with neat diagram. (b) List out the differences between S.I. engine and C.I. engine.

4. Determine the efficiency of diesel engine

5. Derive an expression for pressure ratio, temperature ratio and efficiency for otto cycle.

6. Derive an expression for pressure ratio, temperature ratio and entropy difference for dual cycle.

7.In an air standard otto cycle, the compression ratio is 7 and the compression begins at 1 bar and 313K. the heat added is 2510 kJ/kg. Find the (1). Maximum temp and pressure of the cycle (2) Work done per kg of air (3) Cycle efficiency and mean effective pressure. Take for air Cv=0.718kJ/kgK and R=287 J/kgK

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8.Derive an expression of efficiency of Atkinston cycle. Q9 Two engines are to operate on otto and diesel cycle with the following data: Maximum temperature=1500K; Exhaust temperature=700K; Ambient conditions= 1 bar and 300K Compare the compression ratios and maximum pressures and efficiencies of two engines.

9. An air engine, working on stirling cycle, has lower limit of temperature of 400oC. The maximum and minimum pressure limits are 12 bar and 2 bar. If the expansion ratio of the cycle is 3 then find the ideal efficien

UNIT-5

1. Explain the Rankine cycle with neat diagram.
2. Explain the vapour compression refrigeration cycle with neat diagram.
3. Explain following: (i) Avogadro's Law (ii) Bleeding process (iii) Enthalpy
4. Define Cp& Cv. Derive following expression: Cp-Cv =R
5. A cyclic steam power plant is to be designed for a steam temperature at turbine inlet of 3600C and an exhaust pressure of 0.08bar. After isentropic expansion of steam in the turbine, the moisture content at the turbine exhaust is not to exceed 15%. Determine the greatest allowable steam pressure at he turbine inlet, and calculate the Rankine efficiency.
6. One Kg steam at a pressure of 4 bar and a dryness fraction of 0.963 is compressed isentropically until it is dry saturated. Heat is then supplied at constant pressure until the initial volume is attained and the steam is finally restored to its initial state by constant volume cooling. Evaluate the work and heat transfer in each step and verify that the net work done is equal to the difference between the heat supplied and heat rejected over the cycle
7. In a regenerative cycle, having one feed water heater, the dry saturated steam is supplied from the boiler at a pressure of 30 bar and condenser pressure of 1 bar. The steam is bled at a pressure of 5 bar. Determine the amount of bled steam per kg of steam supplied and the efficiency of the cycle. What would be the efficiency without regenerative feed heating? Also determine the percentage increase in efficiency due to regeneration.
8. (a) Describe regenerative feed heating as use in thermal power plant and its advantages. (b) What is reheat factor? Explain heat with the h-s diagram.
9. A steam power plant uses the following cycle: Steam at boiler outlet—150 bar, 5500C, reheat at 40bar to 5500C, condenser at0.1 bar. Find the quality at turbine exhaust and cycle efficiency.
10. A refrigeration machine using R-12 as refrigerant operates between the pressures 2.5 bar and 9 bar. The compression is isentropic and there is no under cooling in the condenser.

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DEPARTMENT OF AUTOMOBILE ENGINEERING

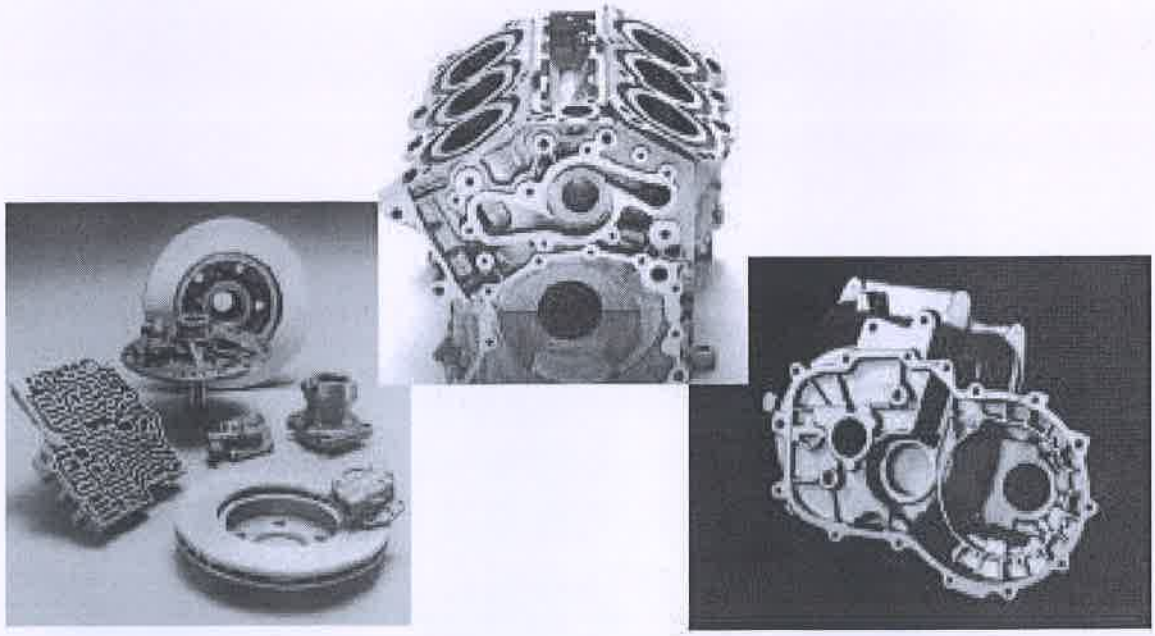
SOFT COPY NOTES-ME8351-MANUFACTURING TECHNOLOGY-I

UNIT I METAL CASTING PROCESSES

Virtually nothing moves, turns, rolls, or flies without the benefit of cast metal products. The metal casting industry plays a key role in all the major sectors of our economy. There are castings in locomotives, cars trucks, aircraft, office buildings, factories, schools, and homes. Figure some metal cast parts.

Metal Casting is one of the oldest materials shaping methods known. Casting means pouring molten metal into a mold with a cavity of the shape to be made, and allowing it to solidify. When solidified, the desired metal object is taken out from the mold either by breaking the mold or taking the mold apart. The solidified object is called the casting. By this process, intricate parts can be given strength and rigidity frequently not obtainable by any other manufacturing
process. The mold, into which the metal is poured, is made of some heat resisting material. Sand is most often used as it resists the high temperature of the molten metal. Permanent molds of metal can also be used to cast products.

Figure : Metal Cast parts



Advantages

The metal casting process is extensively used in manufacturing because of its many advantages.

1. Molten material can flow into very small sections so that intricate shapes can be made by this process. As a result, many other operations, such as machining, forging, and welding, can be minimized or eliminated.
2. It is possible to cast practically any material that is ferrous or non-ferrous.
3. As the metal can be placed exactly where it is required, large saving in weight can be achieved.
4. The necessary tools required for casting molds are very simple and inexpensive. As a result, for production of asmall lot, it is the ideal process.
5. There are certain parts made from metals and alloys that can only be processed this way.

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Pattern Allowances

Pattern allowance is a vital feature as it affects the dimensional characteristics of the casting. Thus, when the pattern is produced, certain allowances must be given on the sizes specified in the finished component drawing so that a casting with the particular specification can be made. The selection of correct allowances greatly helps to reduce machining costsand avoid rejections. The allowances usually considered on patterns and core boxes are as follows:

1. Shrinkage or contraction allowance
2. Draft or taper allowance
3. Machining or finish allowance
4. Distortion or camber allowance
5. Rapping allowance

Shrinkage or Contraction Allowance (click on Table 1 **to view various rate of contraction of various materials)**

All most all cast metals shrink or contract volumetrically on cooling. The metal shrinkage is of two types:

i. **Liquid Shrinkage**: it refers to the reduction in volume when the metal changes from liquid state to solid state atthe solidus temperature. To account for this shrinkage; riser, which feed the liquid metal to the casting,are provided in the mold.
ii. **Solid Shrinkage:** it refers to the reduction in volume caused when metal loses temperature in solid state. To account for this, shrinkage allowance is provided on the patterns.

The rate of contraction with temperature is dependent on the material. For example steel contracts to a higher degree compared to aluminum. To compensate the solid shrinkage, a shrink rule must be used in laying out the measurements forthe pattern. A shrink rule for cast iron is 1/8 inch longer per foot than a standard rule. If a gear blank of 4 inch in diameterwas planned to produce out of cast iron, the shrink rule in measuring it 4 inch would actually measure 4 -1/24 inch, thus compensating for the shrinkage. The various rate of contraction of various materials are given in Table

Material	Dimension	Shrinkage allowance(inch/ft)
Grey Cast Iron	Up to 2 feet	0.125
	2 feet to 4 feet	0.105
	over 4 feet	0.083
Cast Steel	Up to 2 feet	0.251
	2 feet to 6 feet	0.191
	over 6 feet	0.155
Aluminum	Up to 4 feet	0.155
	4 feet to 6 feet	0.143
	over 6 feet	0.125
Magnesium	Up to 4 feet	0.173
	Over 4 feet	0.155

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Gating System

The assembly of channels which facilitates the molten metal to enter into the mold cavity is called the gating system.. Alternatively, the gating system refers to all passage ways through which molten metal passes to enter into themold cavity. The nomenclature of gating system depends upon the function of different channels which they perform.

- Down gates or sprue

The metal flows down from the pouring basin or pouring cup into the down gate or sprue and passes

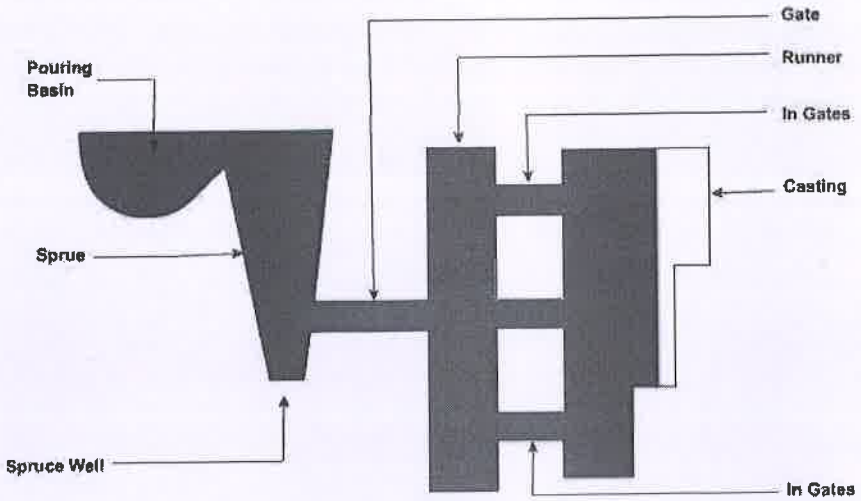

Figure 17: Schematic of Gating System

through the crossgate or channels and ingates or gates before entering into the mold cavity.

Classification of Welding Processes:

Welding processes can be classified based on following criteria;

1. Welding with or without filler material.
2. Source of energy of welding.
3. Arc and Non-arc welding.

Fusion and Pressure welding

1. Welding can be carried out with or without the application of filler material. Earlier only gas welding was the fusion process in which joining could be achieved with or without filler material. When welding was done without filler material it was called 'autogenous welding'. However, with the development of TIG, electron beam and other welding processes such classification created confusion as many processes shall be falling in both the categories.
2. Various sources of energies are used such as chemical, electrical, light, sound, mechanical energies, but except for chemical energy all other forms of energies are generated from electrical energy for welding. So this criterion does not justify proper classification.
3. Arc and Non-arc welding processes classification embraces all the arc welding processes in one class and all otherprocesses in other class. In such classification it is difficult to assign either of the class to processes such as electroslag welding and flash butt welding, as in electroslag welding the process starts with arcing and with the melting of sufficient flux the arc

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UNIT II BRAZING AND SOLDERING

Both brazing and soldering are the metal joining processes in which parent metal does not melt but only filler metal melts filling the joint with capillary action. If the filler metal is having melting temperature more than 450°C but lower than the melting temperature of components then it is termed as process of brazing or hard soldering. However, if the melting temperature of filler metal is lower than 450°C and also lower than the melting point of the material of components then it is know as soldering or soft soldering.

During brazing or soldering flux is also used which performs the following functions:

- Dissolve oxides from the surfaces to be joined.
- Reduce surface tension of molten filler metal i.e. increasing its wetting action or spreadability.
- Protect the surface from oxidation during joining operation.

The strength of brazed joint is higher than soldered joint but lower than welded joint. However, in between welding andbrazing there is another process termed as 'braze welding'.

Braze Welding:

Fig 3.1(a) Two Components to be joined with V Joint

Fig 3.1(b) Welded Joint

Fig 3.1(c) Braze Welded Joint

Unlike brazing, in braze welding capillary action plays no role but the filler metal which has liquidus above 450 ° C but below the melting point of parent metal, fills the joint like welding without the melting of edges of parent metal. During the operation, the edges of the parent metal are heated by oxy-acetylene flame or some other suitable heat source to that temperature so that parent metal may not melt but melting temperature of filler metal is reached. When filler rod is brought in contact with heated edges of parent metal, the filler rod starts melting, filling the joint. If edges temperature falls down then again heat source is brought for melting filler rod. The molten filler metal and parent metal edges produceadhesion on cooling resulting into strong braze weld

Manual Metal Arc Welding:

Manual metal arc welding (MMAW) or shielded metal arc welding (SMAW) is the oldest and most

4. extinguishes while in flash butt welding tiny arcs i.e. sparks are established during the process and then components are pressed against each other. Therefore, such classification is also not perfect.

5. Fusion welding and pressure welding is most widely used classification as it covers all processes in both the categories irrespective of heat source and welding with or without filler material. In fusion welding all those processes are included where molten metal solidifies freely while in pressure welding molten metal if any is retained in confined space under pressure (as may be in case of resistance spot welding or arc stud welding) solidifies under pressure or semisolid metal cools under pressure. This type of classification poses no problems soit is considered as the best crite

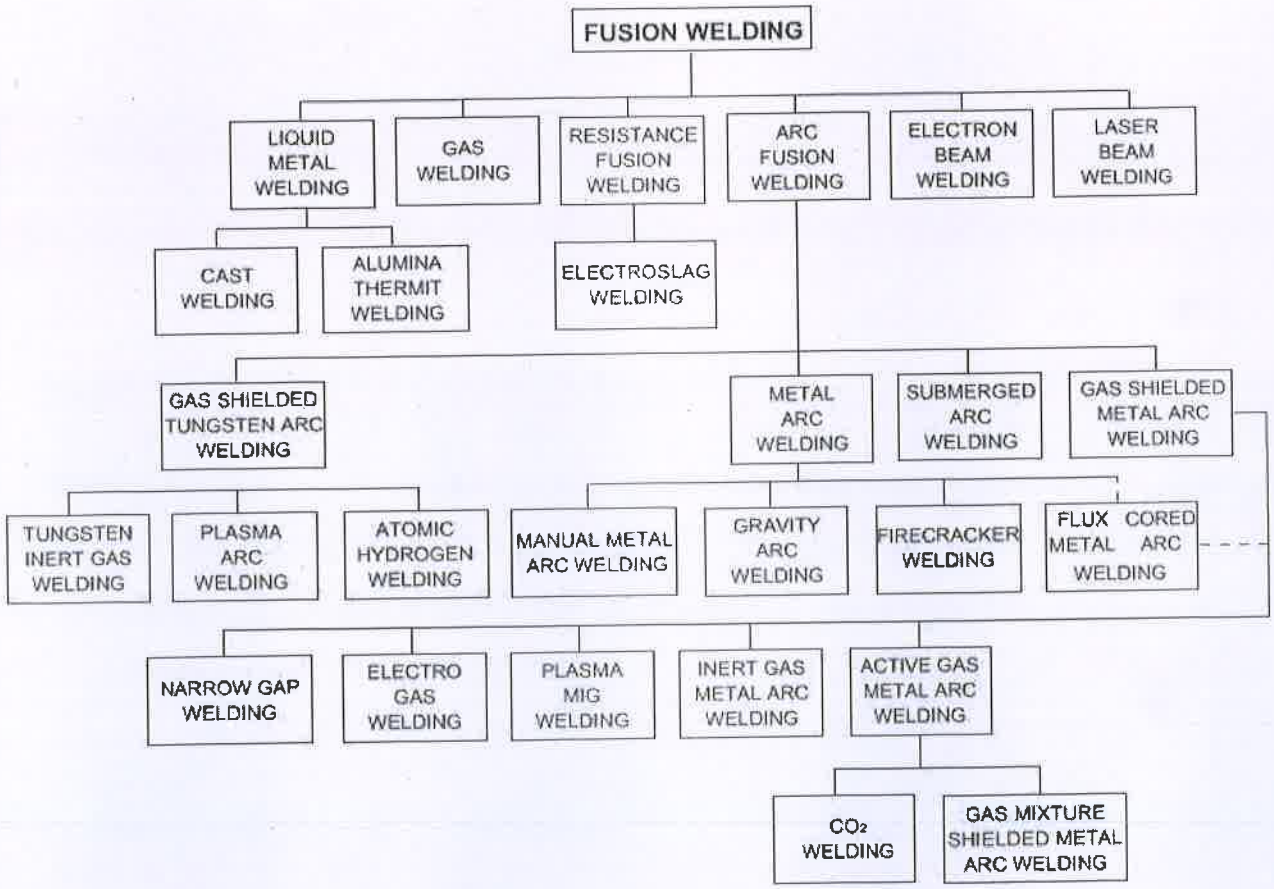

Fig.Classification of Fusion Welding Processes

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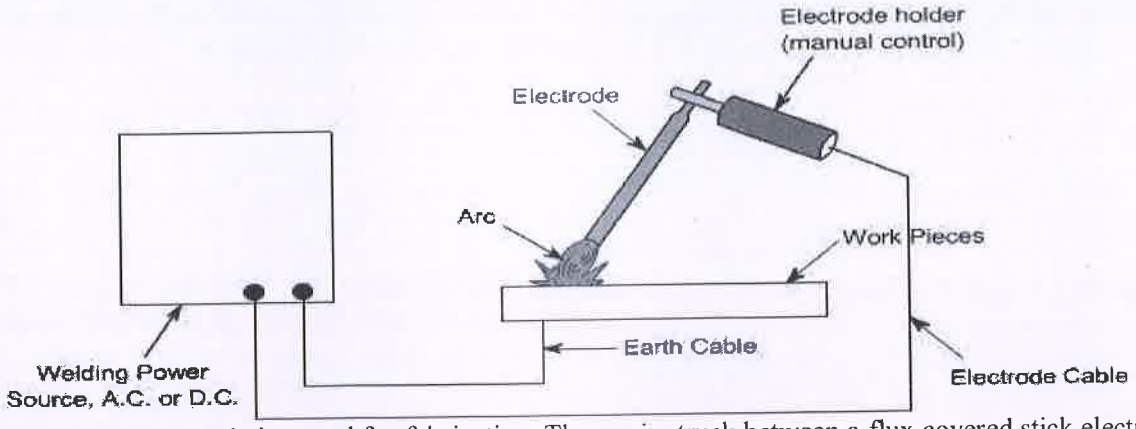


widely used process being used for fabrication. The arc is struck between a flux covered stick electrode and the workpieces. The workpieces are made part of an electric circuit, known as welding circuit. It includes welding power source, welding cables, electrode holder, earth clamp and the consumable coated electrode. Figure 5.1 Shows details of welding circuit.

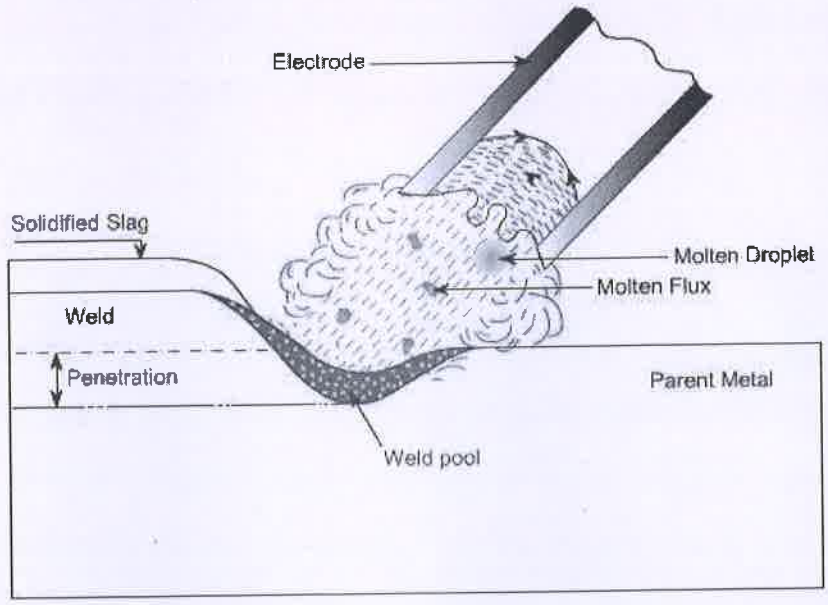
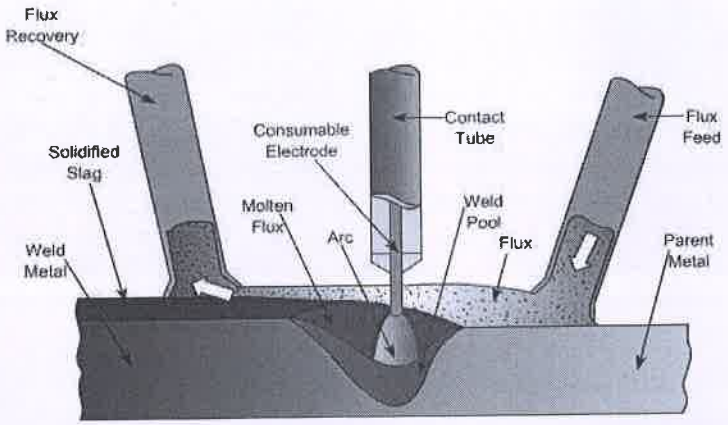


Figure shows the fine molten droplets of metal and molten flux coming from the tip of the coated electrode. The flux melts along with the metallic core wire and goes to weld pool where it reacts with molten metal forming slag which floatson the top of molten weld pool and solidifies after solidification of molten metal and can be removed by chipping and brushing.

bmerged Arc Welding:

Submerged arc welding is an arc welding process in which heat is generated by an arc which is produced between bareconsumable electrode wire and the workpiece. The arc and the weld zone are completely covered under a blanket of granular, fusible flux which melts and provides protection to the weld pool from the atmospheric gases.

The molten flux surrounds the arc thus protecting arc from the atmospheric gases. The molten flux flows down continuously and fresh flux melts around the arc. The molten flux reacts with the molten metal forming slag and improves its properties and later floats on the molten/solidifying metal to



protect it from

atmospheric gas contamination and retards cooling rate. Process of submerged arc welding is illustrated in

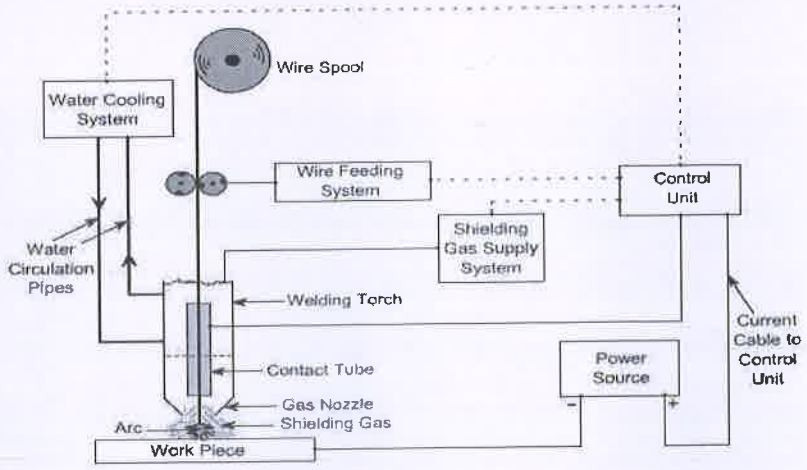


Figure.

Gas Metal Arc Welding

UNIT III FUNDAMENTALS OF METAL FORMING

There are four basic production processes for producing desired shape of a product. These are casting, machining, joining (welding, mechanical fastners, epoxy, etc.), and deformation processes. Casting process exploit the fluidity of a metal in liquid state as it takes shape and solidifies in a mold. Machining processes provide desired shape with good accuracy and precision but tend to waste material in the generation of removedportions. Joining processes permit complex shapes to be constructed from simpler components and have a widedomain of applications.

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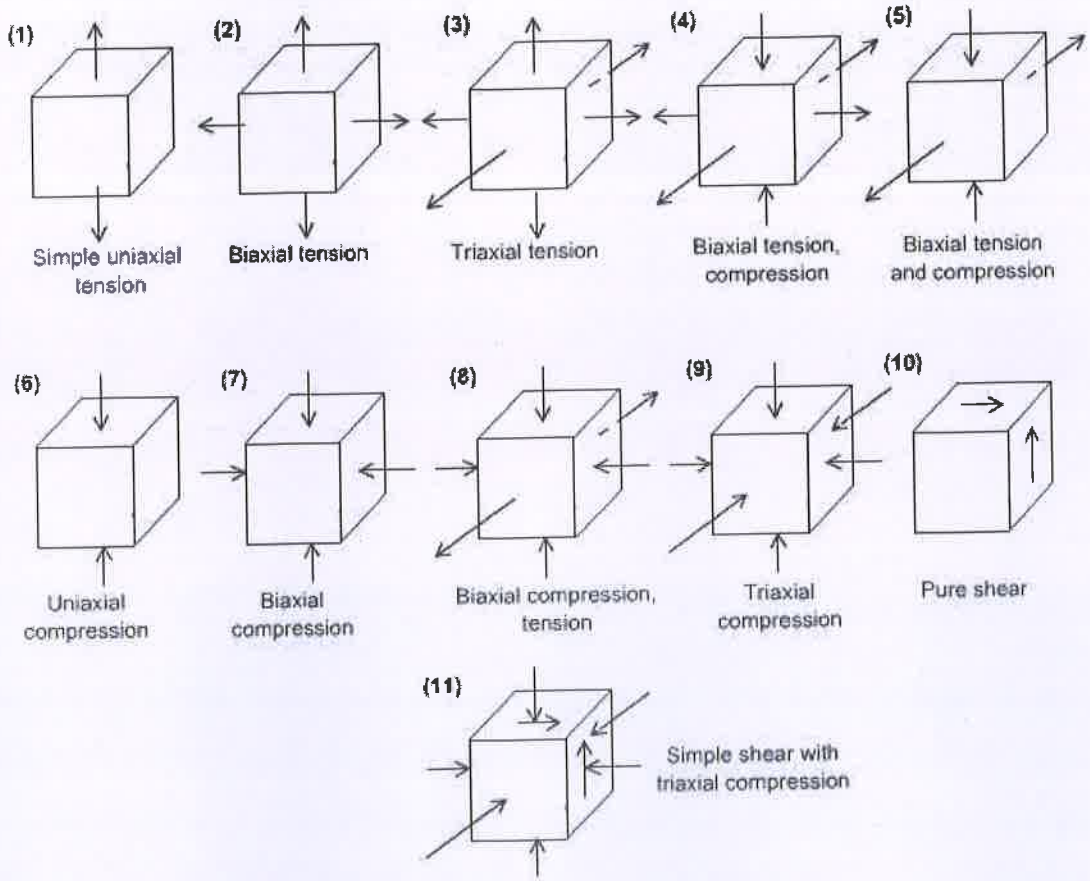
Deformation processes exploit a remarkable property of metals, which is their ability to flow plastically inthe solid state without deterioration of their properties. With the application of suitable pressures, the material is moved to obtain the desired shape with almost no wastage. The required pressures are generally high and the tools and equipment needed are quite expensive. Large production quantities are often necessary to justify the process.

State of the stresses metal undergo during deformation.



COLD AND HOT WORKING OF METALS

Cold Working:

Plastic deformation of metals below the recrystallization temperature is known as cold working. It is generally performed at room temperature. In some cases, slightly elevated temperatures may be used to provide increasedductility and reduced strength. Cold working offers a number of distinct advantages, and for this reason various cold-working processes have become extremely important. Significant advances in recent years have extended the use of cold forming, and the trend appears likely to continue.

In comparison with hot working, the advantages of cold working are

1. No heating is required
2. Bettter surface finish is obtained
3. Better dimensional control is achieved; therefore no secondary machining is generally needed.
4. Products possess better reproducibility and interchangeablity.

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5. Better strength, fatigue, and wear properties of material.

6. Directional properties can be imparted.
7. Contamination problems are almost negligible.

Some disadvantages associated with cold-working processes are:

1. Higher forces are required for deformation.

2. Heavier and more powerful equipment is required.

3. Less ductility is available.

4. Metal surfaces must be clean and scale-free.

5. Strain hardening occurs (may require intermediate annealing).

6. Undesirable residual stresses may be produced

Warm Working:

Metal deformation carried out at temperatures intermediate to hot and cold forming is called *Warm Forming* . Compared to cold forming, warm forming offers several advantages. These include:

- Lesser loads on tooling and equipment
- Greater metal ductility

Hot Working:

Plastic deformation of metal carried out at temperature above the recrystallization temperature, is called hot working. Under the action of heat and force, when the atoms of metal reach a certain higher energy level, the new crystals start forming. This is called recrystallization. When this happens, the old grain structure deformed by previously carried out mechanical working no longer exist, instead new crystals which are strain-free are formed.

In hot working, the temperature at which the working is completed is critical since any extra heat left in the material after working will promote grain growth, leading to poor mechanical properties of material.

In comparison with cold working, the advantages of hot working are

1. No strain hardening
2. Lesser forces are required for deformation
3. Greater ductility of material is available, and therefore more deformation is possible.
4. Favorable grain size is obtained leading to better mechanical properties of material
5. Equipment of lesser power is needed
6. No residual stresses in the material.

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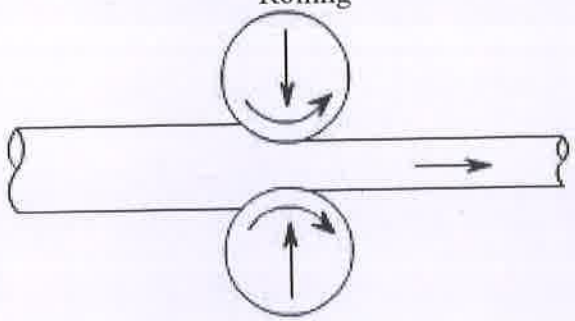
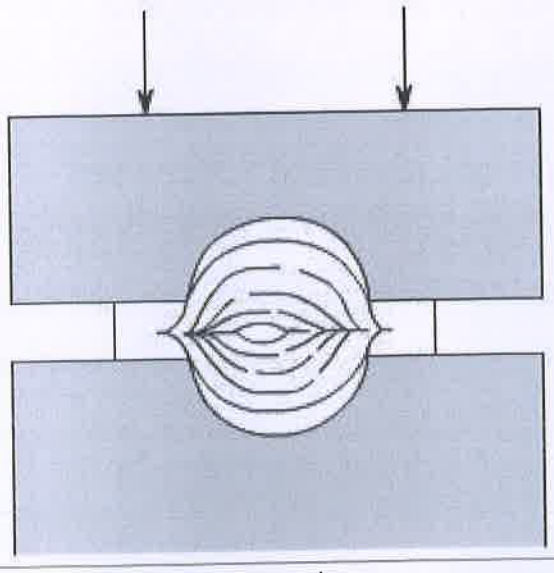
Some disadvantages associated in the hot-working of metals are:

1. Heat energy is needed
2. Poor surface finish of material due to scaling of surface
3. Poor accuracy and dimensional control of parts
4. Poor reproducibility and interchangeability of parts
5. Handling and maintaining of hot metal is difficult and troublesome
6. Lower life of tooling and equipment.

Number	Process	State of Stressin Main Part During Forming
1	Rolling 	Bi-axial compression
2	Forging 	Tri-axial compression
3	Extrusion	Tri-axial compression

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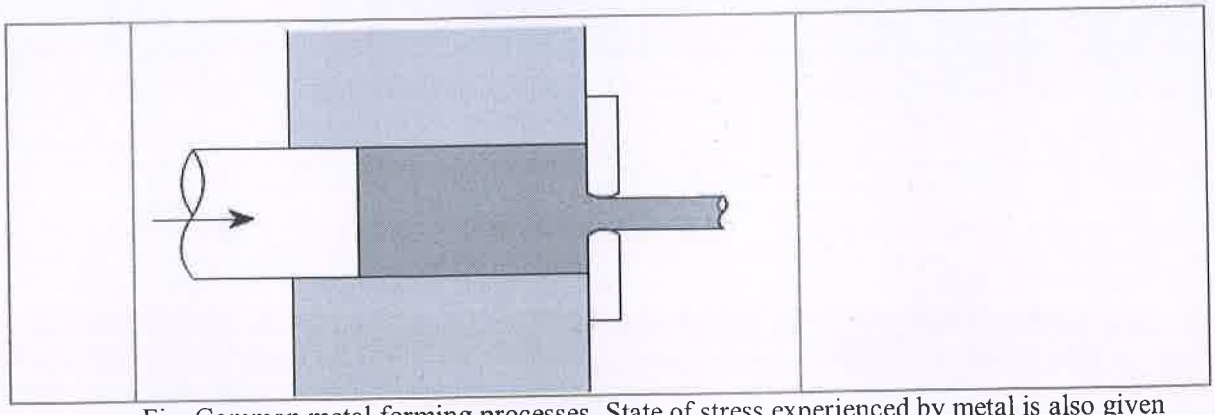


Fig .Common metal forming processes. State of stress experienced by metal is also given

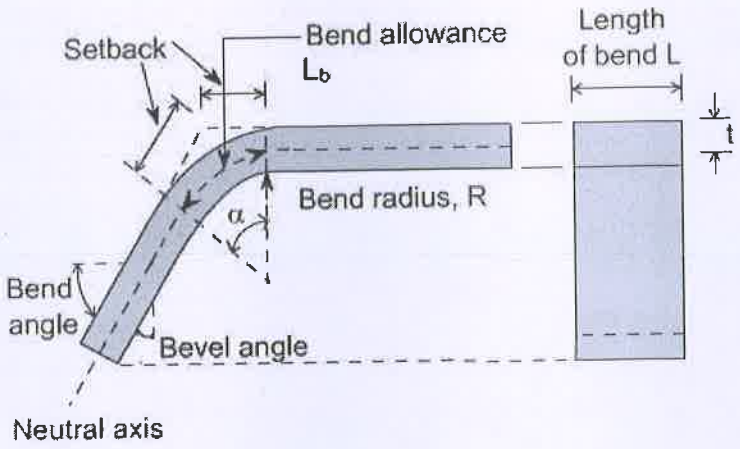
UNIT IV SHEET METAL PROCESSES

BENDING

Bending is one very common sheet metal forming operation used not only to form shapes like seams, corrugations, and flanges but also to provide stiffness to the part (by increasing its moment of inertia).

As a sheet metal is bent its fibres experience a distortion such that those nearer its outside, convex surface are forced to stretch and come in tension, while the inner fibres come in compression.

Somewhere, in the cross section, there is a plane which separates the tension and compression zones. This plane is parallel to the surface around which the sheet is bending, and is called neutral axis. The position of neutral axis depends on the radius and angle of bend. Further, because of the Poisson's ratio, the width of the part L in the outer region is smaller, and in the inner region it is larger, than the initial original width.



BEND ALLOWANCE

It is the length of the neutral axis in the bend, This determines the blank length needed for a bentpart. It can be approximately estimated from the relation

Lb = a (R + kt)
where, Lb = bend allowance (mm)a = bend angle (radian)
R = bend radius (mm)
t = thickness of sheet (mm), and
k = constant, whose value may be taken as 1/3 when R < 2t, and as 1/2 w

INIMUM BEND RADIUS

As the ratio of the bend radius to the thickness of sheet (R / t) decreases, the tensile strain on the outerfibres of sheet increases. If R / t decreases beyond a certain limit, cracks start appearing on the surface of material. This limit is called *Minimum Bend Radius* for the material.

Minimum bend radius is generally expressed in terms of the thickness of material, such as 2t, 3t, 4t, etc.Table gives the minimum bend radius allowed for different materials.

Material	Condition	
	Soft	Hard
Aluminum alloys	0	6t
Beryllium copper	0	4t
Brass,low-leaded	0	2t
Magnesium	5t	13t
Steels		
Austenitic stainless	0.5t	6t
Low-carbon,low-alloy	0.5t	4t
Titanium	0.7t	3t
Titanium alloys	2.5t	4t

Table Minimum Bend radius for Various Materials at Room Temperatur

Bending Force :

There are two general types of die bending : V – die bending and wiping die bending. V – die bending is used expensively in brake die operations and stamping die operations. The bending

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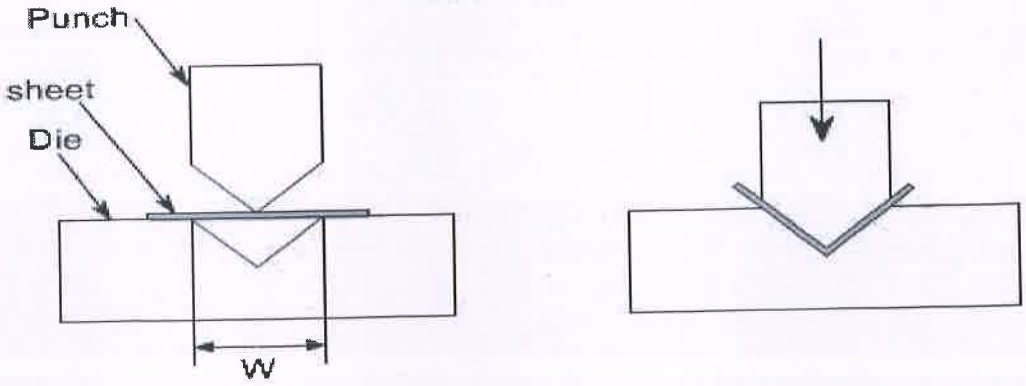
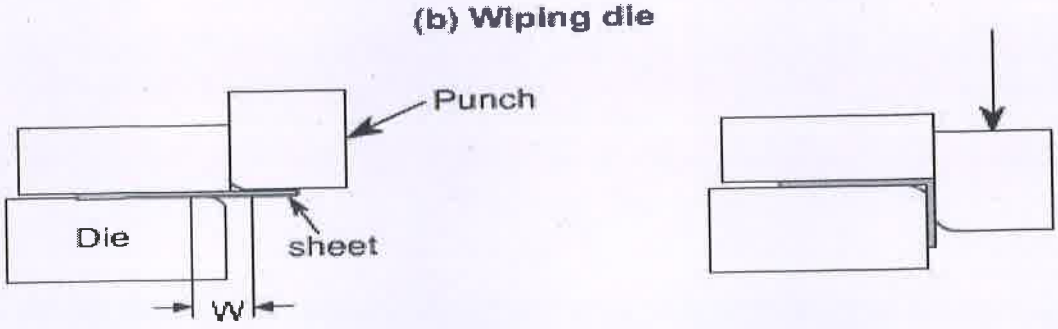
force can be estimated fromthe following simple relation.

(a) V die



(b) Wiping die

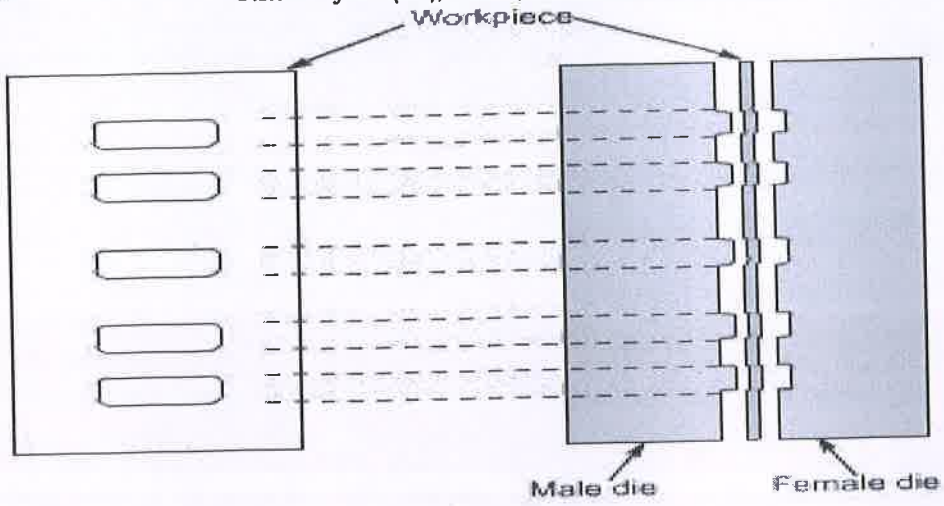


$P = k.Y.L.t^2 / D$

where P is bending force, g is the yield stress of the material, L is the bend length (bend allowance), t is the sheet thickness, D is the die opening and k is a constant whose value can be taken as 1.3 for a V-die and 0.3 fora wiping die. Fig 6.2 shows various types of bending dies

EMBOSSING

Embossing is an operation in which sheet metal is drawn to shallow depths with male and female matching dies, The operation is carried out mostly for the purpose of stiffening flat panels.The operation is also sometimes used for making decoration items like number plates or name plates, jewelry, etc.



Embossing operation with two dies. Letters, numbers and designs on sheet-metal part

COINING

Coining is a severe metal squeezing operation in which the flow of metal occurs only at the top layers of the material and not throughout the values. The operation is carried out in closed dies mainly for the purpose ofproducing fine details such as needed in minting coins, and medal or jewelry making. The blank is kept in the die cavity and pressures as high as five to six times the strength of material are applied. Depending upon the details required to be coined on the part, more than one coining operations may be used.

The difference between coining and embossing is that the same design is created on both sides of the work piece in embossing (one side depressed and the other raised), whereas in coining operation, a differentdesign is created on each side of work piece.

Drawing Force.

For drawing cylindrical shells having circular cross section, the maximum drawing force P can bedetermined from the relation

$P = k.t.d.t.Y$

UNIT V POWDER METALLURGY

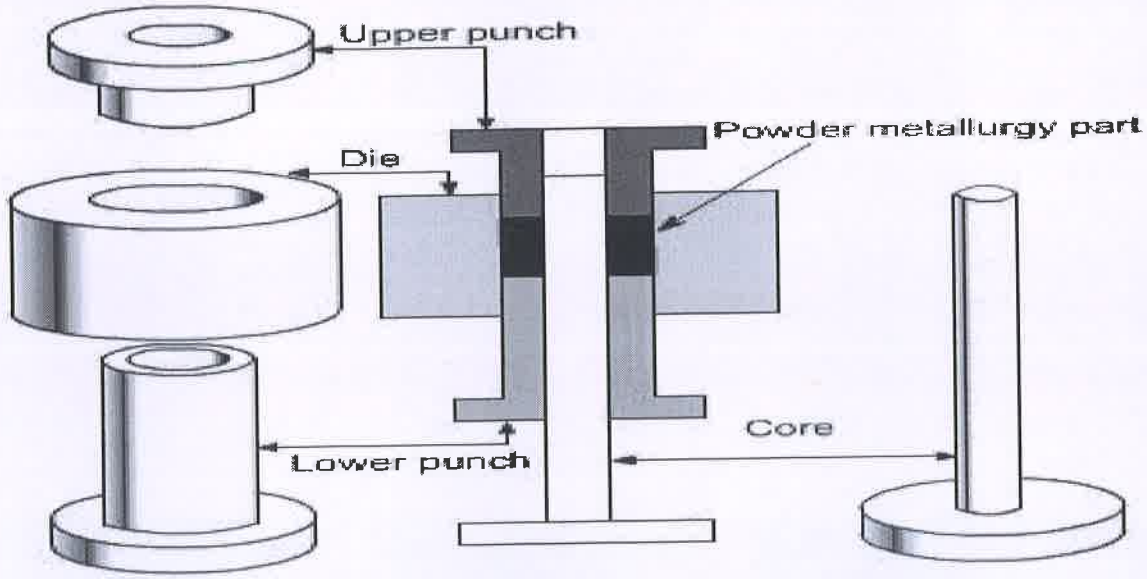
Powder metallurgy (PM) is a metal working process for forming precision metal components from metalpowders. The metal powder is first pressed into product shape at room temperature. This is followed by heating(sintering) that causes the powder particles to fuse together without melting.

The parts produced by PM have adequate physical and mechanical properties while completely meeting the functional performance characteristics. The cost of producing a component of given shape and the required dimensional tolerances by PM is generally lower than the cost of casting or making it as a wrought product, because of extremely low scrap and the fewer processing steps. The cost advantage is the main reason for selecting PM as a process of production for high – volume component

which needs to be produced exactly to, or close to, final dimensions. Parts can be produced which are impregnated with oil or plastic, or infiltrated with lower melting point metal. They can be electroplated, heat treated, and machined if necessary.

The rate of production of parts is quite high, a few hundreds to several thousands per hour.

Industrial applications of PM parts are several. These include self – lubricating bearings, porous metalfilters and a wide range of engineered shapes, such as gears, cams, brackets, sprockets, etc.

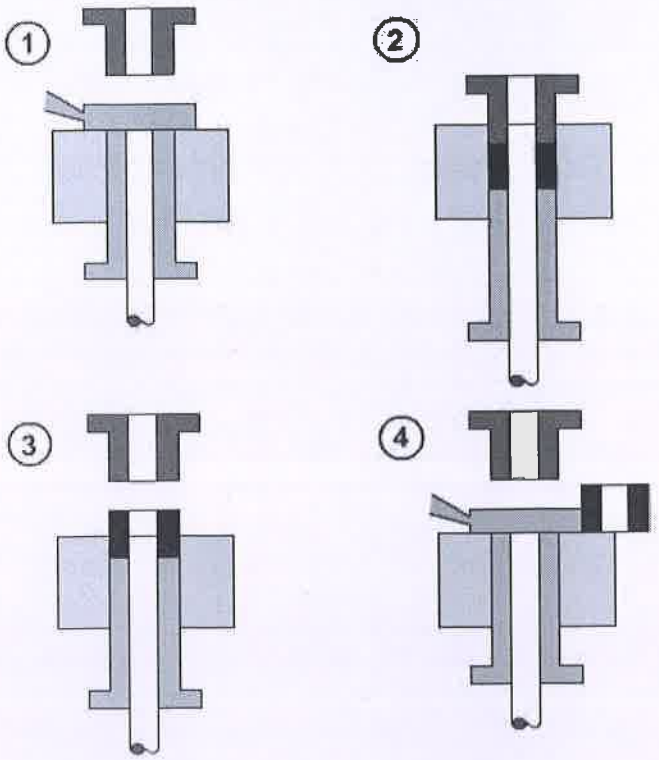


Typical set of powder metallurgy tools.

1. With the upper punch in the withdrawn position, the empty die cavity is filled with mixed powder.
2. The metal powder in the die is pressed by simultaneous movement of upper and lower punches.
3. The upper punch is withdrawn, and the green compact is ejected from the die by the lower punch.
4. The green compact is pushed out of the pressing area so that the next operating cycle can start.

This compacting cycle is almost the same for all parts.

Sintering: During this step, the green compact is heated in a protective atmosphere furnace to a suitable temperature, which is below the melting point of the metal. Typical sintering atmospheres are endothermic gas, exothermic gas, dissociated ammonia, hydrogen, and nitrogen. Sintering temperature varies from metal to metal; typically these are within 70 to 90% of the melting point of the metal or alloy



Sintering temperature and time for various metal powders

Material	Temperature (^{0}C)	Time
Copper, brass, bronze	1000-1150	10-40
Nickel	1100-1290	30-40
Stainless steels	1200-1500	30-60
Ferrites	1430-1500	10-600
Tungsten carbide	2050	20-30
Molybdenum	2350	120
Tungsten	2400	480
Tantalum		480

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SECONDARY AND FINISHING OPERATIONS

Sometimes additional operations are carried out on sintered PM parts in order to further improve their properties or to impart special characteristics. Some important operations are as under.

1. Coining and sizing. These are high pressure compacting operations. Their main function is to impart (a)greater dimensional accuracy to the sintered part, and (b) greater strength and better surface finish by further densification.

Forging. The sintered PM parts may be hot or cold forged to obtain exact shape, good surface finish, good dimensional tolerances, and a uniform and fine grain size. Forged PM parts are being increasingly used for such applications as highly stressed automotive, jet – engine and turbine components

1. Impregnation. The inherent porosity of PM parts is utilized by impregnating them with a fluid like oil or grease. A typical application of this operation is for sintered bearings and bushings that are internally lubricated with upto 30% oil by volume by simply immersing them in heated oil. Such components havea continuous supply of lubricant by capillary action, during their use. Universal joint is a typical grease –impregnated PM part.
2. Infiltration. The pores of sintered part are filled with some low melting point metal with the result that part's hardness and tensile strength are improved. A slug of metal to be impregnated is kept in close contact with the sintered component and together they are heated to the melting point of the slug. The molten metal infiltrates the pores by capillary action. When the process is complete, the component has greater density, hardness, and strength. Copper is often used for the infiltration of iron – base PM components. Lead has also been used for infiltration of components like bushes for which lower frictional characteristics are needed.
3. Heat Treatment. Sintered PM components may be heat treated for obtaining greater hardness or strengthin them.
4. Machining. The sintered component may be machined by turning, milling, drilling, threading, grinding,etc. to obtain various geometric features.
5. Finishing. Almost all the commonly used finishing method are applicable to PM parts. Some of suchmethods are plating, burnishing, coating, and colouring.

Plating. For improved appearance and resistance to wear and corrosion, the sintered compacts may be plated by electroplating or other plating processes. To avoid penetration and entrapment of plating solution in the pores ofthe part, an impregnation or infiltration treatment is often necessary before plating. Copper, zinc, nickel, chromium, and cadmium plating can be applied.

Burnishing. To work harden the surface or to improve the surface finish and dimensional accuracy, burnishing may be done on PM parts. It is relatively easy to displace metal on PM parts than on wrought parts because ofsurface porosity in PM parts.

Coating. PM sintered parts are more susceptible to environmental degradation than cast and machined parts. This is because of inter – connected porosity in PM parts. Coatings fill in the pores and seal the entire reactivesurface.

Colouring. Ferrous PM parts can be applied colour for protection against corrosion. Several methods are in usefor colouring. One common method to blacken ferrous PM parts is to do it chemically, using a salt bath.

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POWDER METALLURGY

Advantages: Metal in powder form is costlier than in solid form. Further, expensive dies and equipment neededto adapt this process implies that the process is justified by the unusual properties obtained in the products.
Powder metallurgy offers the following specific advantages.

Parts can be produced from high melting point refractory metals with respectively less difficulty and atless cost.

2. Production rates are high even for complex parts. This is primarily because of the use of automatedequipment in the process.

iii. Near net shape components are produced. The dimensional tolerances on components are mostly suchthat no further machining is needed. Scrap is almost negligible.

iv. Parts can be made from a great variety of compositions. It is therefore much easy to have parts of desired mechanical and physical properties like density, hardness toughness, stiffness, damping, andspecific electrical or magnetic properties.

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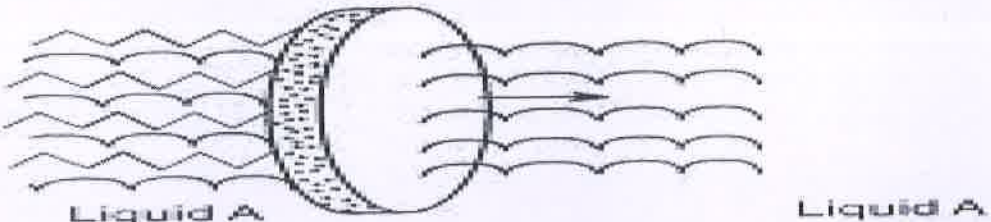
v. Parts can be produced with impregnation and infiltration of other materials to obtain specialcharacteristics needed for specific applications.

Electrical Parts. The possibility of combining several metal powders and maintaining some characteristics of

Diffusing



Separating

each has promoted PM for production of electric contact parts. These parts are required to have excellent electrical conductively, be wear resistant, and somewhat refractory. Several combinations such as copper – tungsten, cobalt – tungsten, silver – tungsten, copper-nickel, and silver – molybdenum have been used for production of these parts

Economics of Powder Metallurgy:

Since it is possible to produce near net shape parts by PM, there is usually very little scrap and also no need for secondary manufacturing and assembly operations. PM is therefore becoming increasingly competitive with conventional manufacturing processes like forging, casting, and machining. The high initial cost of dies, punches, and equipment for PM processing, however, requires sufficiently high production volume to make thisprocess cost – effective

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

CS3491-THEORY OF COMPUTATION QUESTION BANK

UNIT I AUTOMATA AND REGULAR EXPRESSIONS

Need for automata theory – Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

PART–A

Q.No	Questions	BT Level	Competence
1.	Differentiate between DFA and NFA.	BTL-2	Understand
2.	Define DFA	BTL-1	Remember
3.	Define inductive proof.	BTL-1	Remember
4.	Identify NFA-εto represent a*b|c	BTL-1	Remember
5.	Consider the String X=110andy=0110find i)XY ii)X^2 iii)YX iv)Y^2	BTL-4	Analyze
6.	Describe the following language over the the input set A={a,b}L={ a^nb^n|n>=1}	BTL-4	Analyze
7.	Describe what is non deterministic finite automata and the application so fautomata theory.	BTL-1	Remember
8.	Illustrate the induction principle?	BTL-3	Apply
9.	What is proof by contradiction?	BTL-1	Remember
10.	Describe an identifier with a transition diagram(automata).	BTL-2	Understand

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11.	Define ε-NFA	BTL-1	Remember
12.	Summarize minimization of DFA	BTL-5	Evaluate
13.	Give the non deterministic automata to accept strings containing the substring0101	BTL-2	Understand
14.	Illustrate if Lbe a set accepted by an NFA then there exists a DFA that accepts L.	BTL-3	Apply
15.	Define the termepsil on transition.	BTL-2	Understand
16.	Summarize the extended transition function for aε-NFA	BTL-5	Evaluate
17.	CreateaFAwhichacceptstheonlyinput101overtheinputset Z={0,1}	BTL-6	Create
18.	Describe a Finite automata and give its types.	BTL-4	Analyze
19.	Illustrate deductive proof.	BTL-3	Apply
	PART-B		
1.	(i) Explain if L is accepted by an NFA with ε-transition then show that L is accepted by an NFA without ε-transition.(6) (ii) Construct a DF A equivalent to the NFA.M=({p,q,r},{0,1},δ,p,{q,s}) Where δ is defined in the following table.(7)	BTL-5	Evaluate
2.	Prove for every n>=1 by mathematical induction ∑(i)={n(n+1)/2}.	BTL-3	Apply
3.	Let L be a set accepted by a NFA then show that there exists a DFA that accepts L.(13)	BTL-1	Remember

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4.	Give the NFA that accepts all strings that end in 01.Giveitstransitiontableandtheextendedtransitionfunctionfortheinputstring 00101.Also construct a DFA for the above NFA using subset construction method.(13)	BTL-2	Understand
5.	Construct DF A equivalent to the NFA given below:(13)	BTL-2	Understand

UNIT II REGULAR EXPRESSIONS AND LANGUAGES

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions – Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

PART-A

Q.No	Questions	BT Level	Competence
1.	List the operators of Regular Expressions	BTL-1	Remember
2.	Differentiate between regular expression and regular	BTL-1	Remember
3.	Tabulate the regular expression for the following L1=set of strings0 and1 ending in 00	BTL-4	Analyze
4.	What are the closure properties of regular languages?	BTL-2	Understand
5.	Explainafiniteautomatonfortheregularexpression0*1*.	BTL-1	Remember
6.	Illustrate are regular expression for the set of all the strings	BTL-1	Remember
7.	Illustrate are regular expression for the set of all the strings have oddnumberof1'sR.E=1(0+11)*	BTL-3	Apply
8.	Compose the difference between the+ closure and*closure	BTL-4	Analyze
9.	Illustrate are regular expression for the set of all strings of 0's	BTL-2	Understand

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10.	What is the Closure property of regular set S.?	BTL-2	Understand
11.	Find out the language generated by the regular expression(0+1)*.	BTL-2	Understand
12.	Name the four closure properties of RE.	BTL-5	Evaluate
13.	IsittruethelanguageacceptedbyanyNFAisdifferentfromthere gularlanguage?Justify your answer.	BTL-1	Remember
14.	Show the complement to faregular language is also regular.	BTL-4	Analyze
15.	Construct a DFA for the regular expression aa*bb*.	BTL-3	Apply
16.	State the precedence of RE operator.	BTL-3	Apply
17.	Construct RE for the language over the set z={a,b}in which Total number of a's are divisible by3.	BTL-5	Evaluate
18.	Define RE.	BTL-6	Create
19.	Create RE to describe an identifier and positive integer.	BTL-1	Remember
20.	Create REto describe an identifier and positive integer.	BTL-6	Create

PART-B

1.	Demonstrate how the set L={ab^n/n>=1}is not ar regular.(13)	BTL5	Evaluate
2.	Express that the regular languages are closed under:(13)(a)union(b)intersection(c)KleeneClosure (d)Complement(e)Difference	BTL-1	Remember
3.	Examine whether the language L=(0^n1^n|n>=1)is regular or not? Justify your answer(13)	BTL-2	Understand

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4.	(i) Describe a Regular Expression. Write a Regular Expression for the set of strings that consists of alternating0'sand1's.(6) (ii) ConstructFiniteAutomataequivalenttotheregu larexpression(ab+a)*(7).	BTL1	Remember
5.	(i) Describe the closure properties of regular languages.(6) (ii) Describe NFA with epsil on for the RE=(a/b)*ab and convert it into DFA and further find the minimized DFA.	BTL1	Remember
6.	Demonstrate how the set L= $\{a^n b^n / n>=0\}$ is not are regular.(13)	BTL-3	Apply
7.	Verify the whether L={a2n|n>=1}regular(13)	BTL-3	Apply
8.	i) Prove There verse of are gular language is regular(6) ii) Ahomomorph is mof regular language is regular(7)	BTL-4	Analyze
9.	Discuss on regular expressions(13)	BTL-2	Understand
10	Construct NDFA for given RE using Thomson rule.(13) i) a.(a+b)*ab ii) (a.b)* iii) (a+b)	BTL-6	Create
11	Explain the DFA Minimization algorithm with an example.(13)	BTL-1	Remember

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12	Demonstrate how the set $L=\{a^n b^m \mid m,n>=1\}$ is not are regular.(13)	BTL2	Understand
13	i) ProvetheL1andL2aretwolanguagesthenL1-L2isregular(7) ii) ProvetheL1andL2aretwolanguagesthenL1.L2isregular(6)	BTL4	Analyze
14	i) ProvetheL1andL2aretwolanguagesthenL1UL2isregular(7) ii) ProvetheL1andL2aretwolanguagesthen L1intersectionL2isregular(6)	BTL-4	Analyze

UNIT III CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA

Types of Grammar – Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves – Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata.

PART-A

Q.No	Questions	BT Level	Competence
1.	Express the way so languages accepted by PDA and define them?	BTL2	Understand
2.	Summarize PDA .Convert the following CFG to PDAS -->aAA,A-->a S|bS|a.	BTL2	Understand
3.	Define ambiguous grammar and CFG	BTL1	Remember
4.	Define parse tree an derivation.	BTL1	Remember

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5.	Examine the context free Grammar representing these to Palindrome over(0+1)*	BTL2	Understand
6.	Compare Deterministic and Non deterministic PDA. Is it true that nondeterministic PDA is more powerful than that of deterministic PDA? Justify your answer.	BTL2	Understand
7.	When is PDA said to be deterministic?	BTL1	Remember
8.	Design equivalence of PDA and CFG.	BTL1	Remember
9.	PointoutthelanguagesgeneratedbyaPDAusingfinalstateofthePDAandemptystackofthat PDA	BTL6	Create
10.	Illustrate the rule for construction of CFG from given PDA.	BTL4	Analyze
11.	Give a CFG for the language of palindrome string over {a,b}.Write the CFG for the language, $L=(a^n b^n \mid n)$.	BTL3	Apply
12.	What is Instantaneous Descriptions(ID)	BTL5	Evaluate
13.	Show that $L=\{a^{p/p}$ is prime$\}$ is not context free.	BTL1	Remember
14.	Infer the CFG for the set of strings that contains equal number of a's and b's over $\sum=\{a,b\}$	BTL3	Apply
15.	Point out the various types of grammar with example	BTL4	Analyze
16.	Illustrate the rightmost derivation (a+b)*c for using the grammar and also state whether a given grammar is ambiguous one or not.E-->E+E/E*E/(E)/id	BTL1	Remember
17.	Point out the additional features a PDA has when compared with NFA.	BTL3	Apply
18.	Convince your answer of a context free grammar for the given expression (a+b) (a+b+0+1)*	BTL4	Analyze

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19.	Convince your answer of a context free grammar for the given expression (a+b) (a+b+0+1)*	BTL6	Create

PART-B

1.	(i) Discuss about PDA and CFL Prove the equivalence of PDA and CFL.(6) (ii) If L is Context free language then prove that there exists PDAM such that L=N(M).(7)	BTL2	Understand
2.	(i) Describe the different types of acceptance of a PDA.Aretheyequivalentinsenseoflanguageacceptance?Just ifyyouranswer.(7) (ii) Design a PDA to accept $\{0^n1^n \mid n>1\}$.Draw the transition diagram for the PDA andidentifytheinstantaneousdescription(ID)ofthePDAwhic hacceptsthestring'0011.(6)	BTL1	Remember

UNIT IV NORMAL FORMS AND TURING MACHINES

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages –Turing Machine : Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines).

PART-A

Q.No	Questions	BT Level	Competence
1.	Conclude the procedure for converting CNF to GNF with an example	BTL2	Understand
2.	Illustrate the Basic Turing Machine model and explain in one move. What are the action stake place in TM?	BTL3	Apply

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3.	Define the two normal forms of CFG	BTL1	Remember
4.	Point out the hierarchy summarized in the Chom sky hierarchy..	BTL4	Analyze
5.	Define the pumping Lemma for CFLs	BTL1	Remember
6.	Define Turing Machine.	BTL1	Remember
7.	Discuss the applications of Turing machine.	BTL2	Understand
8.	Define Chom skian hierarchy of language.	BTL1	Remember
9.	What is the class of language for which the TM has both accepting and rejecting configuration?	BTL2	Understand
10.	Explain the special features of TM? Define universal TM. Define Instantaneous description of TM	BTL5	Evaluate
11.	Define GNF.	BTL1	Remember
12.	Prepare the difference between finite automata and turing machine.	BTL6	Create
13.	List the three ways to simplify a context free grammar. What are the properties of the CFL generated by a CFG?	BTL5	Evaluate
14.	Draw a transition diagram for aTuring machine to identifynmod2.	BTL1	Remember
15.	Express the techniques forTM construction.	BTL2	Understand
16.	Develop the short notes on two-way infinite tape TM.	BTL6	Create
17.	Differentiate TM and PDA.	BTL4	Analyze
18.	Point out the role of checking off symbolsina Turing Machine	BTL4	Analyze

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19.	Illustrate Halting Problem.	BTL3	Apply
	PART-B		
1.	Use the CFL pumping lemma to show how each of these languages not to be context-free$\{a^ib^jc^k \mid i<j<k\}$	BTL2	Understand
2.	(i) Discuss a TM to accept the language LE=$\{1^n 2^n 3^n \mid n >= 1\}$ (ii) Construct a turing machine that estimate unary multiplication(Say111X11=11111)	BTL2	Understand
3.	(i) Illustrate the Turing machine for computing f(m, n)=m-n(proper subtraction). (ii) Demonstrate aTuring Machine to compute f(m+n)=m+n,m,n>=0 and simulate the iraction on the input0100.	BTL3	Apply
4.	(i) Examine the role of checking off symbols in a Turing Machine. (ii) Describe aTuring Machine Mto implement the function"multiplication" using the subroutine copy	BTL1	Remember
5.	(i) Demonstrate the implications of halting problem. (ii) Show that if a language is accepted by a multit apeturing machine, it is accepted by a single-tapeTM.	BTL3	Apply
6.	(i) Summarize in detail about multihead and multitape TM with an example. (ii) ConstructaTuringMachinetoacceptpalindromesi nanalphabetset$\sum$={a,b}.Tracethestrings"abab"and" baab".	BTL5	Evaluate
7.	(i) Explain the TM as computer of integer function with an example.(7)	BTL4	Analyze

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	(ii) Design aTMto implement the function f(x)=x+1.(6)		
8.	(i) Design a TM to accept the set of all strings{0,1}with010assubstring. (ii) Write shot notes on Two–way infinite tape TM.	BTL6	Created
9.	(i)Describe computing a partial function with a TM.(6)(ii)Design a TM to accept the language LE={$a^nb^nc^n$|n>1}.	BTL1	Remember
10.	(i) Define Turing machine for computing f(m,n)=m*n,n€N. (ii) Write notes on Partial solvability	BTL-1	Remember
11.	(i) Construct a TMtore verse the given string{abb}.(6) (ii) Explain Multitape and Multihead Turing machine with suitable example.(7)	BTL2	Understand
12.	(iii) Construct a TM tor everse the given string{abb} (iv) Explain Multitape and Multihead Turing machine with suitable example.	BTL2	Understand

UNIT V UNDECIDABILITY

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties – Universal Turing machine -Tractable and Intractable problems – P and NP completeness – Kruskal s algorithm – Travelling Salesman Problem- 3-CNF SAT problems.

PART-A

Q.No	Questions	BT Level	Competence

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1.	Distinguish between PCP and MPCP? What are the concepts used in UTMs?	BTL2	Understand
2.	List out the features of universal turing machine.	BTL1	Remember
3.	When are cursively enumerable language is said to be recursive? Discuss on it.	BTL2	Understand
4.	Compare and contrast recursive and recursively enumerable languages	BTL4	Analyze
5.	State when a problem is said to be decidable and give an example of an undecidable problem.	BTL1	Remember
6.	Define NP hard and NP completeness problem.	BTL1	Remember
7.	Define a universal language Lu?	BTL1	Remember
8.	Is it true that the language accepted by a non-deterministic Turing Machine is different from recursively enumerable language? Judgey our answer.	BTL5	Evaluate
9.	Formulate the two properties of recursively enumerable sets which are undecidable	BTL6	Create
10.	Whenaproblemissaidtobedecidable?Giveanexampleofun decidableproblem.Analyzeit.	BTL4	Analyze
11.	Whatis(a)recursivelyenumerablelanguages(b)recursives ets?Generalizeyouranswer.	BTL6	Create
12.	Define the classes of Pand NP.	BTL1	Remember

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13.	Is it true that complement of are recursive language is recursive?Discuss your answer	BTL2	Understand
14.	Describe an example of an undecidable problem	BTL1	Remember
15.	Point out the properties of recursive and recursive enumerablelanguage.	BTL4	Analyze
16.	Illustrate on Primitive Recursive Function.	BTL3	Apply
17.	Show the Properties of Recursive Languages	BTL3	Apply
18.	Explain about tractable problem.	BTL5	Evaluate
19.	Describe post correspondence problem.	BTL2	Understand
20.	Illustrate about Time and space complexity of TM.	BTL3	Apply

PART-B

1.	(i)Describe about the tractable and intractable problems.(7)(ii)Identify that" MPC Preduce to PCP".(6)	BTL1	Remember
2.	(i) DescribeaboutRecursiveandRecursiveEnumerablelanguageswithexample.(7) (ii) State and describe RICE theorem.(6)	BTL1	Remember
3.	(i) Summarize diagonalization language.(6) (ii) Discuss the significance of universal turing machine and also construct a turing machine to add two numbers and encode it	BTL2	Understand
5.	(i)Explain computable functions with suitable example.(6)(ii)Explain in detail notes on Unsolvable Problems.(7)	BTL4	Apply

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6.	(i) Describe in detail notes on universal Turing machines with example.(7 (ii) Collect and write the short notes onNP-completeproblems.(6)	BTL1	Remember
7.	(i) Show that the diagonalization language is not are cursively enumerable.(7) (ii) Illustrate about unsolvability.(6)	BTL3	Apply
8.	(i)Compare the difference between recursive and recursively renumerable languages.(7) (ii)Explain about PCP.(6)	BTL5	Evaluate
9.	(i) Explain about Universal Turing machine and show that the universal language (Lu) is recursively enumerable but not recursive. Generalize your answer (ii) Design and explain how to measure and classify complexity	BTL6	Create
10.	(i) Explain about there cursively Enumerable Language with example.(6) (ii) Point out that the following problem is undecidable. Given two CFGs G1andG2is L(G1)□L(G2)=Ø .(7)	BTL4	Analyze
11.	(i) Show that the characteristic function of the set of all even number is recursive.(7) (ii) Illustrate in detail notes on primitive recursive. (iii)Give functions with examples.(6)	BTL-3	Apply

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CS8691-ARTIFICIAL INTELLIGENCE QUESTION BANK

UNIT I - INTRODUCTION

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

PART A

Q.NO	QUESTIONS	BTL	COMPETENCE
1.	Define Artificial Intelligence.	BTL-1	Remember
2.	Differentiate Natural Intelligence from Artificial Intelligence.	BTL-2	Understand
3.	Access what is meant by s Turing Test?	BTL-5	Evaluate
4.	Identify the capabilities, computer should possess to pass Turing test?	BTL- I	Remember
5.	Show what is meant by Total Turing Test?	BTL-3	Apply
6.	What arc the capabilities computers need to pass total Turing test?	BTL-5	Evaluate
7.	Summarize about software agents?	BTL-3	Apply
8.	Why are condition-action rules important in the design of an agent?	BTL -1	Remember
9.	Infer the structure of an agent in an environment.	BTL-4	Analyze
10.	Generalize what is s rational agent?	BTL-6	Create

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11.	State and Express the concept of rationality.	BTL-2	Understand
12.	Analyze how to measure the performance of an agent?	BTL-4	Analyze
13.	Generalize and define Omniscience and information Gathering.	BTL-6	Create
14.	What is important for task environment'?	BTL -1	Remember
15.	List the properties of environments.	BTL -1	Remember
16.	Express the ways to formulate a problem?	BTL-2	Remember
17.	Order the different type of agents.	BTL-4	Analyze
18.	Give Structure of Simple Reflex Agent	BTL-2	Understand
19.	How can the performance of an agent are improved.	BTL-2	Understand
20.	Show what are the three classes of problem?	BTL-3	Apply
PART B			
1.	Consider the given problem. Describe the operator involved in it. Consider the water jug problem: You are given two jugs, a 4-gallon one and 3-gallon one .Neither has any measuring marker on it. There is a pump that canbe used to fill the jugs with water. How can you getexactly.	BTL-5	Evaluate
2.	Develop your own multi – agent systems with the help of anillustration.(15)	BTL-6	Create

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QUESTION BANK

UNIT II-PROBLEMSOLVING METHODS

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - LocalSearchAlgorithmsandOptimizationProblems-SearchingwithPartialObservations-ConstraintSatisfactionProblems–ConstraintPropagation-BacktrackingSearch-GamePlaying-Optimal Decisionsin Games–Alpha -Beta Pruning- Stochastic Games.

PART A

Q.NO	QUESTIONS	BTL	COMPETENCE
1.	DefineProblemFormulation.	BTL-1	Remember
2.	Whatarethefourcomponentstodefineaproblem? Definethem.	BTL-1	Remember
3.	Definea graph and a path.	BTL-1	Remember
4.	Discoverwhatisoptimalsolution?	BTL-3	Apply
5.	Defineabstraction.	BTL-1	Remember
6.	Rankandlist thecriteriatomeasurethe performanceof searchstrategies.	BTL-5	Evaluate
7.	Defineheuristics.Whyareheuristicscrucialforthe efficientdesign of an expertsystem?	BTL-1	Remember
8.	Showthesignificanceofusing heuristicfunctions.	BTL-3	Appl
9.	Generalizeand definethe effectof heuristicaccuracy performance.	BTL-6	Create
10.	Differentiateuninformed searchandinformedsearch.	BTL-2	Understand

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11.	Examinethe breadthfirstsearch.	BTL-3	Apply
12.	Summarize Simulatedannealing.	BTL-2	Understand
13.	Summarize stochasticbeamsearch.	BTL-2	Understand
15.	PointoutwhatisGeneticalgorithm.	BTL-4	Analyze
16.	Givethe definitionofgame.	BTL-2	Understand
17.	Composewhatis best-firstsearch.	BTL-6	Create
18.	Analyze the definitionofgreedybest-first search.	BTL-4	Analyze
19.	Telltheclassification ofCSP withrespecttoconstraints.	BTL-1	Remember
20.	Point outand definenodeconsistency,arc consistency andpath consistency.	BTL-4	Analyze

PART B

1.	**Compose**the process of simulated annealing withexample.(15)	BTL-6	Create
2.	(i) **Develop**thealgorithmforsteepesta scenthillclimbing. (ii) Statethecharacteristicsof anAIproblem.(7)	BTL-6	Create
3.	ExplaintheBacktrackingSearchwithalgorithms.-GamePlaying - Optimal Decisions in Games – Alpha - BetaPruning- Stochastic Games	BTL-4	Analyze

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DEPARTMENT OF CIVIL ENGINEERING

CO-CURRICULAR ACTIVITIES:- WORKSHOP DETAILS

S.NO	DATE	TITLE	RESOURCE PERSON	VENUE
1.	21.09.2022	"Optimizing Hydraulic System Advanced Fluid Dynamics Analysis"	DR.L.VIGNESHKUMAR, VIT UNIVERSITY,VELLORE	JKKMCT SEMINAR HALL

WORKSHOP INVITATION

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INVITATION

DEPARTMENT OF CIVIL ENGINEERING

Cordially invites you for the Workshop on

Optimizing hydraulic system efficiency through advanced fluid dynamics analysis

On

21st SEPTEMBER 2022

Resource person

Dr. L. Vignesh Rajkumar, PH.D.,

Assistant Professor,

VIT University, Vellore

Venue: Seminar Hall

Welcome Address

Dr. K.SridharanM.E,M.B.A., P.H.D.,

Principal – JKKMCT

Secretary Address

Mrs. Kasthuripriya Krupakarmurali., M.B.A.,

Secretary – JKKMCT

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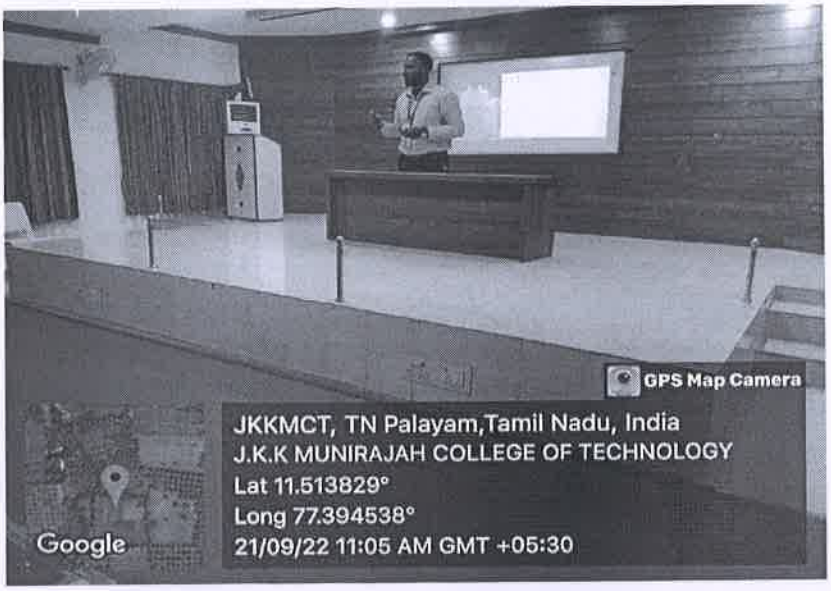
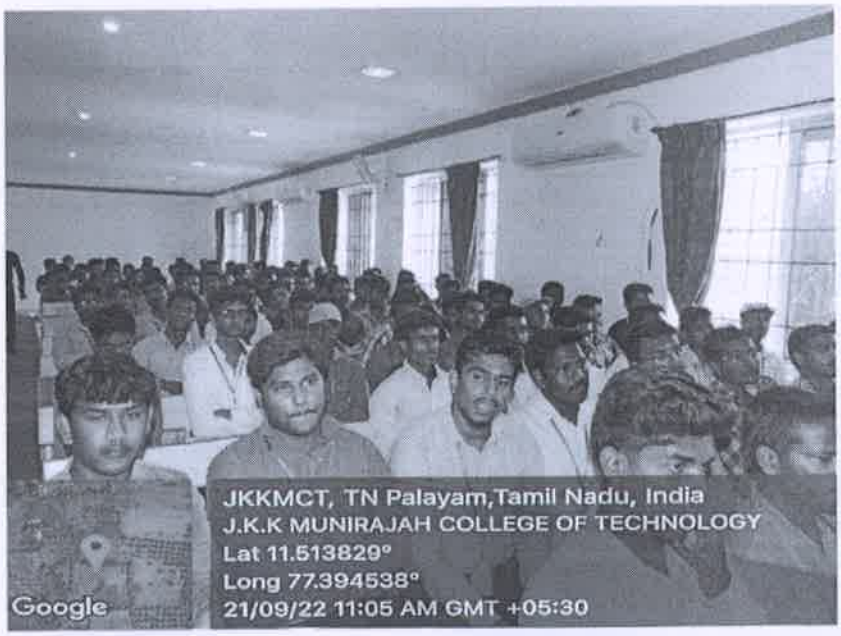
DEPARTMENT OF CIVIL ENGINEERING
WORKSHOP EVENTS PHOTOS





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ASSIGNMENT SUBMISSION DATE SCHEDULE:

S.No	SUBJECT CODE & SUBJECT NAME	DUE DATE FOR ASSIGNMENT SUBMISSION	RESCHEDULED DUE DATE
1	CE8601 – DESIGN OF STEEL STRUCTURAL ELEMENTS	10.03.2023	13.03.2023
2	CE8602 - STRUCTURAL ANALYSIS-II	13.03.2023	15.03.2023
3	CE8603 – IRRIGATION ENGINEERING	14.03.2023	17.03.2023
4	CE8604 – HIGHWAY ENGINEERING	15.03.2023	20.03.2023
5	EN8592- WASTE WATER ENGINEERING	16.03.2023	13.03.2023

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LINKS FOR ACCESSING E-JOURNALS

S.No	E-Resources	Link –Accessibility
1	DELNET-Developing library network	http://delnet.nic.in
2	NDL-National Digital Library	https://ndl.iitkgp.ac.in/
3	SWAYAM NPTEL LOCAL CHAPTER	https://nptel.ac.in/LocalChapter/spoc_login/
4	Remote Access	https://www.k-hub.in/
5	E-books & E-Journals	https://www.k-hub.in/ and https://jgateplus.com/
6	LINKEDIN LEARNING	https://www.linkedin.com/learning/me/my-plan

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DEPARTMENT OF MECHNICAL ENGINEERING

IMPORTANT QUESTIONS

ME8792-POWER PLANT ENGINEERING

1. Illustrate the function of boiler and turbine.
2. What are the two basic parameters to decide while planning a power plant?
3. What do you understand by the term FBC?
4. On what factors does the unit size of a power plant depend?
5. What is boiler efficiency?
6. Define supercritical steam cycle.
7. What is a back pressure turbine? Write any two applications.
8. What is pass-out turbine and when is it used?
9. What are the functions of draught system?
10. What do you understand by the term boiler draught?
11. Classify power plants on the basis of traditional use.
12. Draw the P-V, H-S, and T-S diagram for Rankine cycle.
13. What are the processes of Binary cycle?
14. Why is hydrazine injected at the suction of the boiler feed pump?
15. Reason out why cogeneration is quite viable in sugar industries compare to that in other industries?
16. What are the requirements of a modern surface condenser?

PART-B

1.Draw the Reheat Regenerative Rankine cycle of a thermalpower plant with P-V and T-S diagram. Write its various formulas

2. Explain with a neat sketch the working of a thermal electric power plant station and discuss the function of major components in it

3. Explain the working principle of super critical boilers and FBC with a neat sketcth.

4.Steam enters the high pressure turbine at 11 MPa and 610°Cand is condensed in the condenser at a pressure of 9 kPa. If the moisture content of steam at the exit of low pressure turbine is not to exceed 12 %. Determine pressure at which the steam should be reheated and thermal efficiency of the cycle

5.Explain a modern ash handling system with neat block diagram.

6.Explain the principle involved in preparation of coal and what are the methods of preparation.

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7.Explain fuel handling system in coal based thermal power plant with neat sketch.

8.(i) Explain any one draught systems with a neat sketch.

(i) List out the unique features that make circulating fluidizedbed boilers more attractive than other solid fuel fired boilers.

9. Explain cogeneration plant with neat sketch and also its efficiency.

10. What do you understand by cogeneration of power and process heat? and Explain its thermodynamic advantage.

11.Explain briefly various steps involved in water treatment.

12. Define binary cycle? Explain the layout and operation of the mercury-steam binary cycle power plant?

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DEPARTMENT OF MECHNICAL ENGINEERING
SOFT COPY OF SUBJECT NOTES-ME8791 MECHATRONICS
UNIT-I INTRODUCTION TO MECHATRONIC SYSTEMS

Introduction:

An automation and control method adopting integrated approach to technology has become relevant to industries, machinery and consumer engineering products. Most of the domestic equipment like automatic washing machines, automatic cameras, digital cameras, DVD players, hard disc drives are examples of Mechatronic system which we use without bothering to know the technology adopted in it.

Definition of Mechatronics:

Definition 1:

Mechatronics may be defined as" the complete integration of mechanical system with electronics, electrical and computer system into a single system".

Definition 2:

Mechatronics is "the synergistic (Together) combination of mechanical engineering, electronic engineering, control engineering and systems thinking in the design of products and manufacturing processes"

Example: automatic washing machine, digital fuel injection system, engine managementsystem. Etc.,

Multi-disciplinary scenario:

- Mechatronics is the synergistic (Together) combination of mechanical engineering, electronic engineering, control engineering and systems thinking in the design of products and manufacturing processes".
- Multi-disciplinary products are not new; they have been successfully designed and used for many years. Most common is the electromechanical system.
- It employs a sequential design-by-discipline approach. For example in the design of electromechanical system three stages of design are adopted.
- They are design of mechanical system, design of microelectronic system and control system.
- Each design application follows the completion of the previous one. to overcome drawbacks Mechatronics uses concurrent engineering

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Origin of Mechatronic system:

- The word Mechatronics was coined by Japanese in the late 1970"s to describe thephilosophy adopted in the design of subsystem of electromechanical systems.
- The field of Mechatronics received the international recognitions only in the last few years.
- The field has been derived by rapid progress in the field of microelectronics.
- At R&D level the following areas have been recognized under Mechatronics discipline.

a) Motion control actuators and sensors
b) Micro devices and optoelectronics
c) Robotics
d) Automotive systems
e) Modeling and design
f) System integration
g) Manufacturing
h) Vibration and noise control.

Evaluation of Mechatronics:

The technology has evolved through several stages that are termed as levels. The evolution levels of Mechatronics are:

a. Primary level Mechatronics (first)
b. Secondary level Mechatronics (second)
c. Tertiary level Mechatronics (third)
d. Quaternary level Mechatronics (fourth)

a. Primary level Mechatronics (first):

- In the early days Mechatronics products were at primary level containing I/O devices suchas sensors, and actuators that integrated electrical signals with mechanical action at the basic control level.

Examples: electrically controlled fluid valves and relays

b. Secondary level Mechatronics (second):

- This level integrates microelectronics into electrically controlled devices.

Examples: cassette player.

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c. Tertiary level Mechatronics (third):

- This incorporates advances feedback functions into control strategy, thereby enhancing the quality in terms of sophistication.
- Mechatronics system at this level is called 'smart system'.
- The control strategy includes microelectronics, microprocessor and other „applicationspecific integrated circuits" (ASIC).

Examples: DVD player, CD drives, automatic washing machine, CD drives, etc.

d. Quaternary level Mechatronics (fourth):

This level includes intelligent control in Mechatronics system.

The level attempts to improve smartness a step ahead by introducing intelligence and faultdetection and isolation (FDI) capability system.

Examples: artificial neural network and fuzzy logic technologies

Advantages and disadvantages of Mechatronics:

Advantages:

1. The products produced are cost effective and very good quality.
2. High degree of flexibility
3. Greater extent of machine utilization
4. Greater productivity
5. High life expected by proper maintenance.
6. The integration of sensor and control system in a complex system reduces capital expenses.

Disadvantages:

1. Higher initial cost of the system.
2. Imperative to have Knowledge of different engineering fields for design and implementation.
3. It is expenses to incorporate Mechatronics approaches to existing/old systems.
4. Specific problem of various systems will have to be addressed separately and properly.

Characteristics of Mechatronic system:

1. High quality product.
2. Safe.

Applications of Mechatronic systems:

The areas are:

1. Automotive machines.
2. Fax and photocopier mechanics

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3. Dishwashers.
4. Automatic washing machine
5. Air conditioners, elevator controls.
6. Documents scanners

7. IC manufacturing systems.
8. Robotics employed in welding, nuclear inspection, painting etc.,
9. VCRs and CD Players.

Measurement system: a group of device/element arranged in rational manner to achieve the act of measurement.

Measurand: is a numerical quantity of physical phenomenon such as force, quantity, displacement, time, velocity, etc,

Measurement: is a represent of physical phenomenon in numerical values.

Generalized measurement system:

Generally a measurement system consists of 3 basic elements.

1. Sensor/transducer.
2. Signal conditioner.
3. Display/read out devices.

In addition to the above, electrical power is also required.

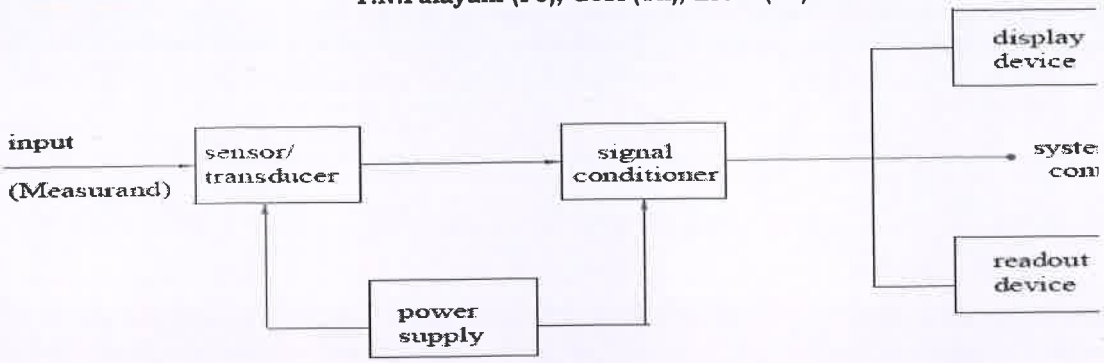

figure: block diagram of generalised measurement system

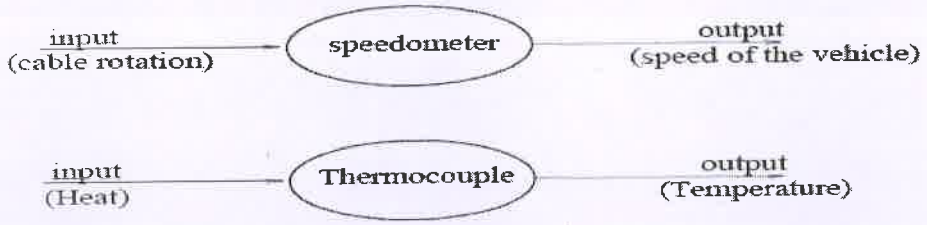

figure: concept of measurement

Functions of each elements of measurement system:

Sensor/transducer unit:

- The heart of any measurement or control system is sensor/transducer.
- Sensor/transducer is a device it converts the one form of energy to another form.
- Sensor/transducer it senses the physical phenomenon to be measure and transform it from one form to another form (generally electrical form).
- The output of this unit is input to the signal conditioner which is next element

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UNIT VICE 2 AND 16 MARKS- ME8593 DESIGN OF MACHINE ELEMENTS

UNIT-I STEADY STRESSES AND VARIABLESTRESSES IN MACHINE MEMBERS

PART-A (2 marks)

1. Define: "Design" 2. What is 'Adaptive design '? Where is it used? Give examples.
3. What are the various phase of design process?
4. List some factors that influence machine design.
5. Define: "Optimization"
6. Define Principal plane, principal stress
7. Give examples for curved beams
8. Why normal stress theory is not suitable for ductile materials?
9. Define stress concentration and stress concentration factor. , 10 Define: "Factor of safety" 11. How is factor of safety defined for brittle and ductile materials?
12. What are the various factors to be considered in deciding the factor of safety?

UNIT-II (STEADY STRESSES AND VARIABLESTRESSES IN MACHINEMEMBERS)

PART -B

1. (a) A piston of a reciprocating compressor has a diameter of 60mm. The maximum pressure on the piston fall is 1.25MN/m

2 .Assuming the gudgeon pin passing through the small end of the connecting rod can be safely loaded in shear up to 10MN/m (a) Explain with mathematical expressions. Maximum principal stress theory and Von-Mises-Henky theory

2. (a) Determine the diameter of the steel bar, which is a ductile in a nature subjected to an axial load of 60KN and torsional moment of 1600N-m.Use the factor of safety 2.5.E=200GPa.

(b) Explain with mathematical expressions. Maximum shear theory and Venant's theory

3. A steel member is subjected to a 3-D stress system and resulting principal stress are 120N/mm, tension, 80N/mm2and 40N/mm2 compression. If the proportional limit of the material in simple tension is 280N/mm 2 and its poison'sratio is O.

4. A bolt is subjected to a tensile load of 25KN and a shear load of 10KN. Determine the diameter of the bolt according to (a) Maximum principal stress theory (b) Maximum principal strain theory (c)

Maximum shear stress theory. Assume factor of safety 2.5, Yield point stress in simple tension 300N/m

5.Taking stress concentration in to account find the maximum stress induced when a tensile load of 20KN is applied to (i) A rectangular plate 80mm wide and 12mm thick with a transverse hole of 16mm diameter.(ii)A stepped shaft of diameters 60mm and 30mm width a fillet radius of 6mm.

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6. A circular bar is simply supported with a span of 0.5mand is subjected to a concentrated cyclic load at its midspan. The load varies from a minimum value of20KN to maximum value of 45 KN.

UNIT -III (DESIGN OF SHAFTS, KEYS AND COUPLINGS)

PART-A (2 marks)

1. What is a shaft?
2. Write down the formula for finding
3. What is a key?
4. What are the types of keys?
5. Differentiate between keys and splines.
6. What is the function of a coupling between two shafts?
7. What are flexible couplings used?
8. What is the material used for flange or flange coupling?

UNIT -II (DESIGN OF SHAFTS, KEYS AND COUPLINGS)

PART-B

1. A line shaft rotating at 200rpm is to transmit 20KW power. the allowable shear stress for the shaft material is 42N/mm2.Ifthe shaft carries a central load of 900N and is simply supported between bearing 3meters apart determine the diameter of the shaft. The maximum tensile or compressive stress is not to exceed 56N/mm
2. An electric generator rotates at 200rpm and receives 300KW from the driving engine. The armature of the generator is 60cm long and located between bearing 120cm center to center. Owing to the combined weight of armature and magnetic pull, the shaft is subjected to 9000kg acting at right angles to the shaft. The ultimate stress for the shaft is 4480kg/cm2 and shear stress is 3920kg/cm2.Find the diameter of the shaft for a FOS.
3. A shaft to transmit 50KW at 1200rpm.It is also subjected to a bending moment of 275NNm.Allowable shear stress is 60N/mm^2. The shaft is not to twist more than 20 in a length of 2 m. G=80XI03N/mm^2

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ME8501-METROLOGY AND MEASUREMENTS

Reg. No. :

Question Paper Code : 40831

B.E./B.Tech DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth Semester Mechanical Engineering

ME 8501 – METROLOGY AND MEASUREMENTS

(Regulations 2017)

Time : Three hou **Maximum Marks : 100**

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How does 'person' as a factor influence the results of a measurement?
2. Discuss the basis of selecting a standard for a particular type of measurement?
3. Write short notes on 'Ring guages'.
4. What is selective assembly?
5. What is the advantage of using polarized beam splitter over ordinary glassbased beam splitter?
6. Mention about the uses of various types of probes used in CMMs.
7. List out the difficulties witnessed in the measurement of flatness of a surface.
8. Brief on the effect of stylus and skid in measurement of surface roughness.
9. What are the uses of a force transducer?
10. Define 'Reliability'.

PART B — (5 × 13 = 65 marks)

11. (a) Briefly explain the elements of a measurement system (13)

Or

(b) Explain various types of errors that occur in engineering measurements. (13)

12. Explain the concept of interchangeability applied to industries. (13)

Or

13. (a)Explain various cases of application of sine bars with neat diagrams. (13)

(b)Explain with case studies the use of laser interferometers for linear and angular measurements. (13)

14. a) Describe various Industrial applications of CMMs with sketcheswherever needed. (13)

Or

(b) Explain the procedure for finding the chordal thickness of a gear using agear tooth vernier caliper (13)

15. (a) Describe various comparison methods of surface assessment. (13)

Or

(b) Explain any two types of flow meters with neat diagrams stating theiradvantages and disadvantages. (13)

PART C — (1 × 15 = 15 marks)

16.(a) Elaborate on the importance of roughness and waviness in context tovarious engineering applications. (15)

Or

(b) Explain the scope of machine vision in a blotting plant with suitablesketches (15)

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B.E./B.Tech. DEGREE

EXAMINATIONS,NOVEMBER/DECEMBER 2020

Fifth Semester Mechanical Engineering
ME8501 – METROLOGY AND MEASUREMENTS
(Regulations 2017)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions

PART – A (10×2=20 Marks)

1. Distinguish Precision and Accuracy.
2. Define grass error.
3. Give the various types of linear measuring instruments.
4. Write any four precautions to be followed when using slip gauges.
5. What is meant by alignment test on Machine tools?
6. Why the laser is used in alignment testing?
7. What are the applications of toolmakers microscope?
8. Define Constant Chord.
9. Write the working principle of Orifice meter.
10. List various types of temperature sensors.

PART – B (5×13=65 Marks)

11. a) Explain the classification of various measuring methods. (13)

(OR)

b) Explain the various systematic and random errors in measurements. (13)

12 a) With neat sketch explain the working principle of micro optic auto collimator. (13)

(OR)

b) Explain the following with neat sketch.

i) Sine bar ii) Bevel Protractor. (7+6)

13. a) Explain the working principle of AC LASER interferometer and how the straightness is measured. (13)

(OR)

b) With neat sketch explain the various types of CMM based on its construction. Also write the advantages of computer aided inspection

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14 a) Describe a gear tooth Vernier Caliper and explain its use for checking tooth thicknes and depth of tooth. (13)

(OR)

b)Derive the formula for measuring the effective diameter of thread by 3-wire method with neat sketch. (13)

15. a) With neat diagram explain the construction and working principle of thefollowing :
i) Pitot Tube ii) Venturi meter (6+7)

(OR)

b)With neat diagram explain the construction and working principle of the following :
i)Thermo couple ii) Bi-Metallic strip. (7+6)

PART – C(1×15=15 Marks)

16 a) Design general type GO and NO GO gauges for a 40H7/d8 fit. 40 mm lies in the diameter 30 to 50. Show graphically the disposition of gauge tolerance zones relative to tolerance zones. Standard tolerance for IT 7 is 16i and IT8 is 5i, where 'I' is the tolerance unit. The upper deviation for 'd' shaft is-$16D^{0.44}$. (15)

(OR)

b) An electronic caliper was used to measure the length of an object. Five measurements were made. The results of the five measurements are : 21.53 mm 21.51 mm, 20.52 mm, 21.48 mm and 21.42 mm. The workshop temperature during measurement was 21°C. The calibration certificate of the electroniccaliper says that the device will read within ± 0.02mm of the correct answer if it is used correctly and when the temperature is within 0 to 40°C. Estimate the xpanded uncertainty at a coverage factor of 2 providing coverage probability of approximately 95%. (15)

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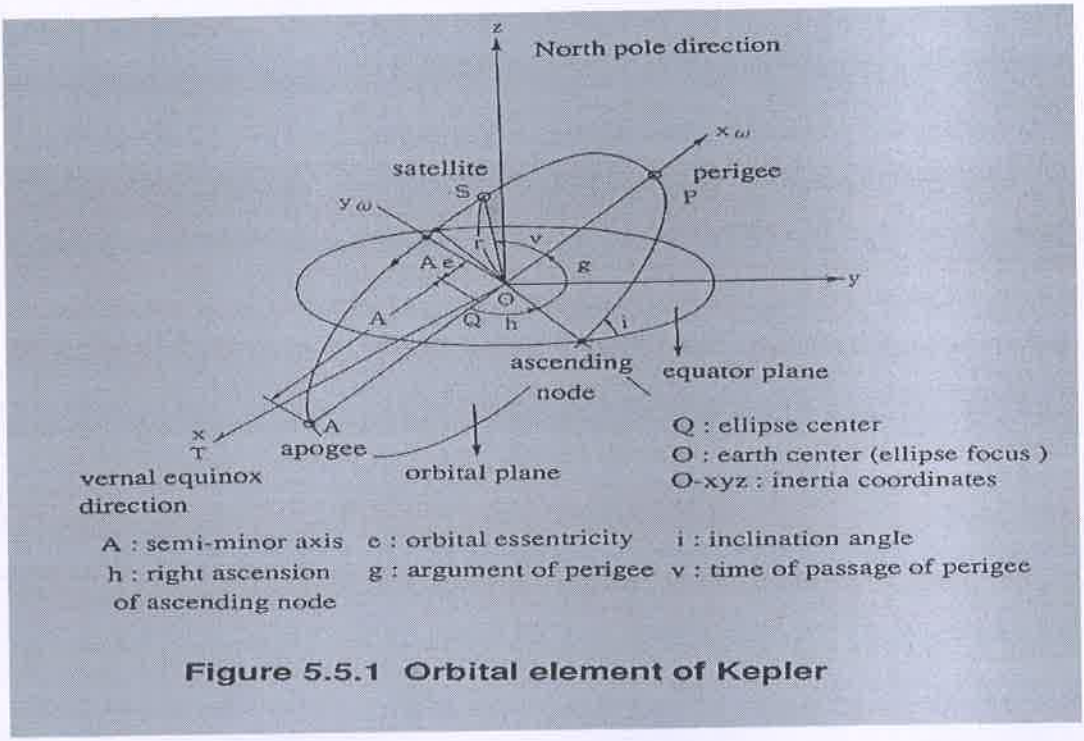

Figure 5.5.1 Orbital element of Kepler

Newton's Second Law

An unbalanced force causes an object to accelerate. The acceleration of the object is equal to the net force acting on it divided by the object's mass.

Unbalanced Forces in the Same Direction
When two forces act in the same direction, the net force is the sum of the two individual forces. The box moves to the right.

Unbalanced Forces in the Opposite Direction
When two forces act in opposite directions, the net force is the difference between the two individual forces. The box moves to the right.

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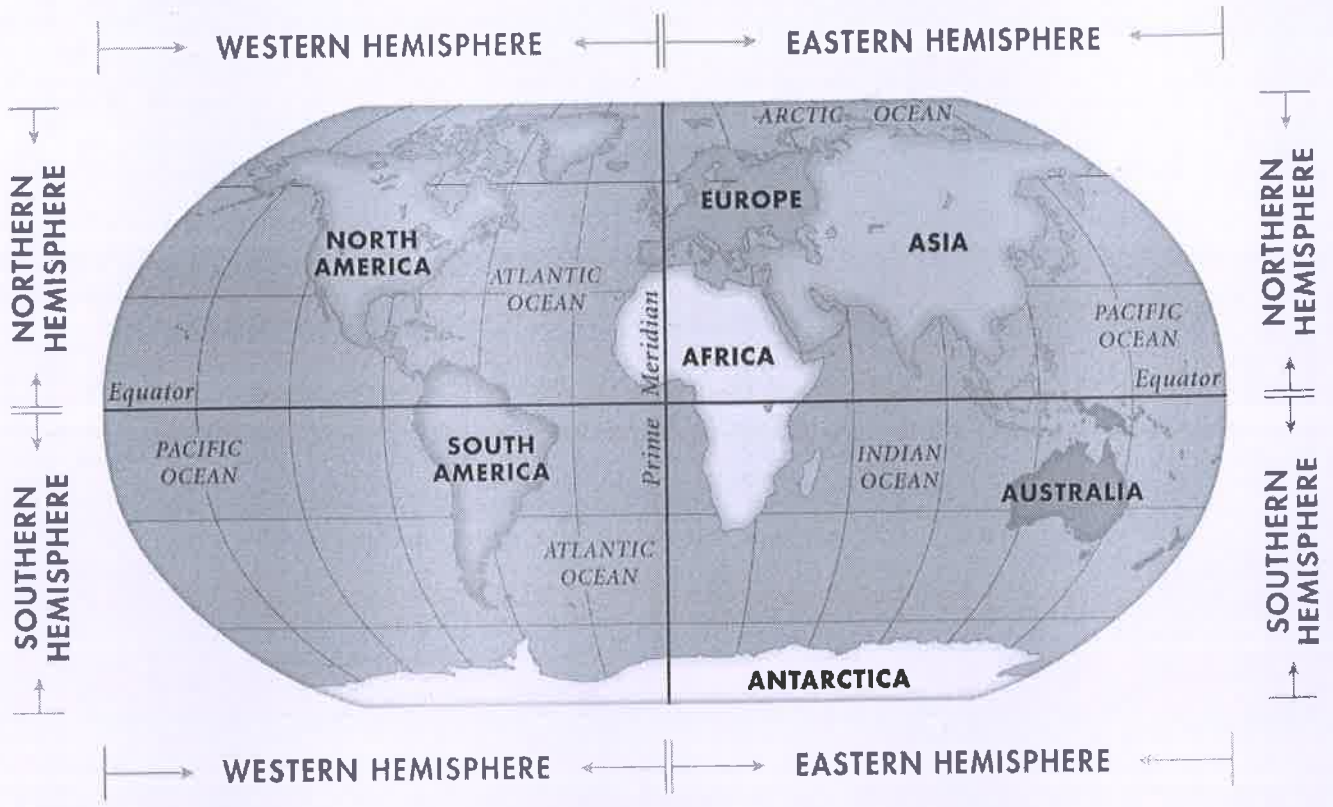
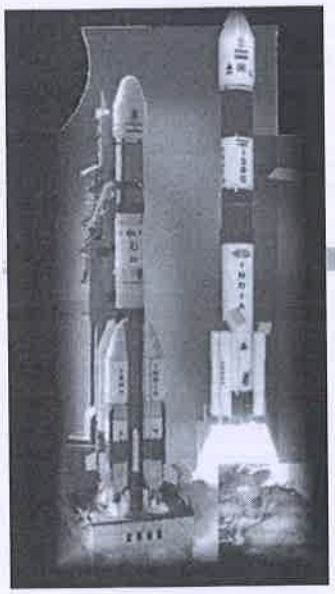
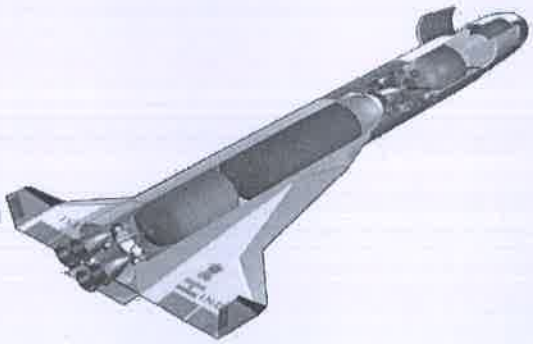
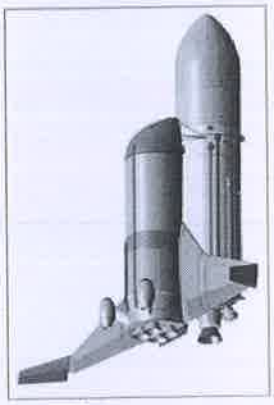
LookAngleDeterminations



REUSABLE LAUNCH VEHICLE







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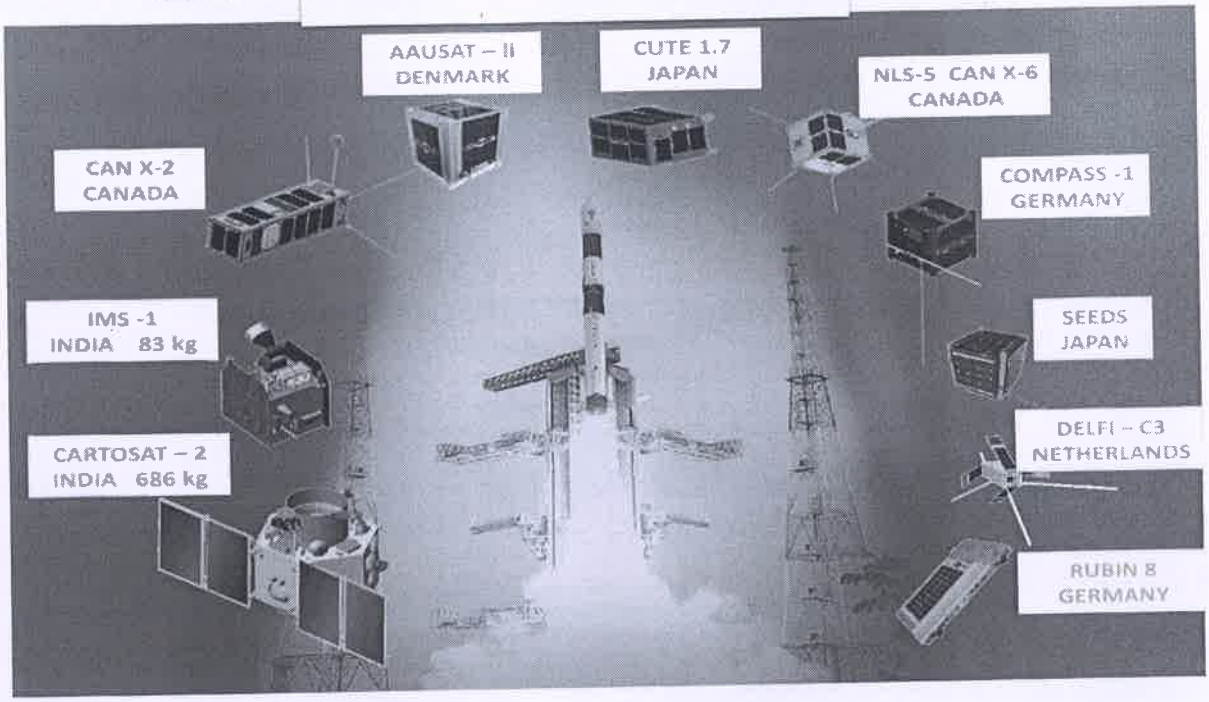
TECHNOLOGY PROGRESSIONIN LAUNCH VEHICLE DEVELOPMENT



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC8095-VLSI DESIGN QUESTION BANK

UNIT–I MOS TRANSISTOR PRINCIPLE

Define threshold voltage of a MOSFET.

The threshold voltage of a MOSFET is usually defined as the gate voltage where an inversion layer forms the interface between the insulating layer (oxide) and the substrate (body) of the transistor.

1. What is enhancement mode FET?

A type of FET in which there are no charge carriers present in the channel, when the gate voltage is in zero. In these devices, the increasing the gate voltage will increases the current flow from source to drain.

2. What specifications you will consider for selecting a MOSFET?
   1. Breakdown voltages
   2. Forward transconductance
   3. Drain source on resistance (R_{ds})
   4. Switching characteristics
   5. Zero gate voltage drain current (I_{dss})
   6. Input capacitance (C_i)

3. What are the steps performed to achieve lithography friendly design?
   1. Checking the layout confirming the design rules (spacing, trace width, shorts).
   2. Check for the less congested areas and increasing the spacing of the nets.

4. State different types of oxidation.
   1. Dry oxidation
   2. Wet oxidation
5. Give the major advantages of IC.
   1. Size is less
   2. High speed
   3. Less power dissipation.
6. What are different generations of integration circuits?
   1. SSI (Small Scale Integration)
   2. MSI (Medium Scale Integration)
   3. LSI (Large Scale Integration)
   4. VLSI (Very Large Scale Integration).

7. Give the variety of integrated circuits (ICs).
   1. More Specialized Circuits (MSC).
   2. Application Specific Integrated Circuits (ASICs).
   3. Systems on Chips (SOC).

hat are the various silicon wafer preparations?
   4. Crystal growth and doping
   5. Ingot trimming and grinding
   6. Ingot slicing
   7. Wafer polishing and etching

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8. Wafer cleaningat are the different terminals in MOS transistors?
   1. Drain
   2. Source
   3. Gate.
9. What is depletion mode operation MOS?

   If the channel is initially doped lightly with p-type impurity a conducting channelexists at zero gate voltage and the device is said to operate in depletion mode.

10. What is enhancement mode operation of MOS?

    If the gate field must induce a channel before current can flow and the gate voltageenhances the channel current and such a device is said to the enhancement mode MOS.

11. State the different types of CMOS processes.
    1. p-well process
    2. n-well process
    3. Silicon on insulator process
    4. Twin tub process.
12. What are the steps involved in twin tub process?
    1. Tub formation
    2. Thin oxide construction
    3. Source and drain implantation
    4. Contact cut definition
    5. Metallization.
13. What is latch up?

    Latch up is a condition in which the parasitic components give rise to the establishment of low resistance conducting paths between VDD and VSS with disastrous results. Careful control during fabrication is necessary to avoid this problem.
14. What is stick diagram?

    It is used to convey information through the use of color code. Also it is the cartoon of a chip layout.
15. What are the uses of stick diagram?
    1. It can be drawn much easier and faster than a complex layout.
    2. These are especially important tools for layout built from large cells.
16. Give the various color coding used in stick diagram.

    Green - n-diffusion
    Red - Polysilicon
    Blue - Metal Yellow-Implant Black- Contact areas.
17. What are the advantages of silicon on insulator (SOI) process?
    1. No latch-up
18. Due to absence of bulks transistor structures are denser than bulk silicon.State the advantages of CMOS process.
    1. Low power dissipation
    2. High packing density
    3. Bidirectional capability
    4. Low input impedance
    5. Low delay sensitivity to load.
19. What are short channel devices?

    Transistors with channel length less than 3 - 5 microns are termed as short channel devices. With short channel devices the ratio between the lateral and vertical dimensions are reduced.

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20. State the different operating regions for an MOS transistor.
    1. Cut-off region
    2. Non-saturated region
    3. Saturated region.

21. Define threshold voltage of CMOS.

    The threshold voltage, V_t for a MOS transistor can be defined as the voltage applied between the gate and the source of the MOS transistor below which the drain to source current, I_{DS} effectively drops to zero.

22. What is body effect?

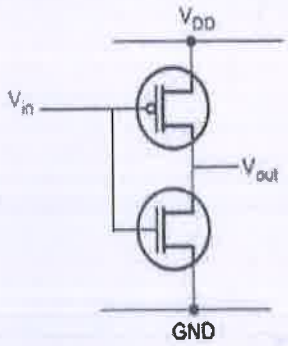
    The threshold voltage V_T is not a constant with respect to the voltage difference between the substrate and the source of MOS transistor. This effect is called substrate - bias effect or body effect.

23. What is channel length modulation?

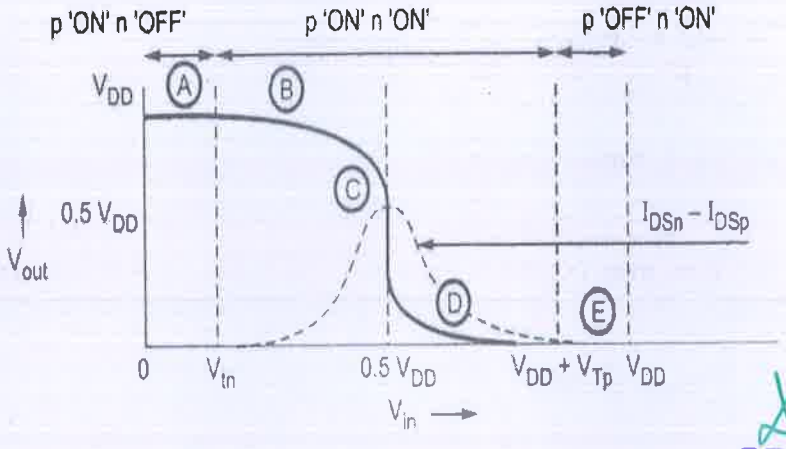
    The current between drain and source terminals is constant and independent of the applied voltage over the terminals. The effective length of the conductive channel is actually modulated by the applied voltage V_{DS}, increasing V_{DS} causes the depletion region at the drain junction to grow, reducing the length of the effective channel.

24. Why NMOS technology is preferred than PMOS technology?

    N channel transistors have greater switching speed when compared to PMOS transistors.**Draw the basic CMOS inverter circuit.**



25. Give the CMOS inverter D.C. transfer characteristics and operating regions.



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26. Compare PMOS and NMOS

PMOS	NMOS
Current conduction is due to the Holes	Current conduction is due to the electrons
Less switching speed due to lower mobility of holes	Higher switching speed due to greater mobility of electrons
Transistor width is higher	Transistor width is lower
PMOS transistors have greater resistance generally in the range of 2R-3R.	It has lower resistance because of its reduced transistor width.

UNIT II COMBINATIONAL LOGIC CIRCUITS

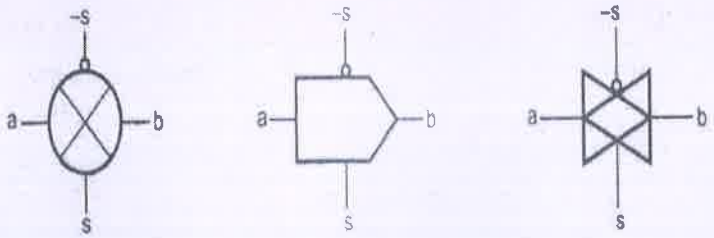
1.What is a pull down device?

A device connected so as to pull the output voltage to the lower supply voltage usually 0 V is called pull down device.

2.What is pull up device?

A device connected so as to pull the output voltage to the upper supply voltage usually VDD is called pull up device.

3.Give the different symbols for transmission gate.



4.What is mean by power and power dissipation?

Power is the rate at which energy is delivered or exchanged; power dissipation is the rate at which energy is taken from the source (VDD) and converted into heat (electrical energy is converted into heat energy during operation).

5. What is mean by PDP?

Power delay product (PDP) = $P_{av} * t_p = (C_L V_{DD}^2)/2$
PDP is the average energy consumed per switching event (watts * sec = joule).

6. What is EDP?

Energy delay product (EDP) = PDP* $t_p = P_{av} * t_p^2$
EDP is the average energy consumed multiplied by the computation time required.

7. What are two types of power dissipation?

- Static dissipation due to leakage current or other current drawn continuously from thepower supply.
- Dynamic dissipation due to
  - Switching transient current.
  - Charging and discharging of load capacitances.

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8. Define elmore delay model.

It is an analytical method used to estimate the RC delay in a network. Elmore delay model estimates the delay of a RC ladder as the sum over each node in the ladder of the resistance R_{n-1} between that node and a supply multiplied by the capacitor on the nodes.

9. What are the general properties of elmore delay model?

General property of Elmore delay model network has

Single input node

All the capacitors are between a node and ground

Network does not contain any resistive loop

10. What is static power dissipation?

The power dissipation due to leakage current when the MOS transistor is in idle stateis called the static power dissipation. Static power due to Sub threshold conduction through OFF transistors Tunneling current through gate oxide Leakage through reverse biased diodes Contention current in radioed circuits.

11. What is dynamic power dissipation?

Power dissipation is due to circuit switching to charge and discharge the output load capacitance at a particular node at operating frequency is called dynamic power dissipation.

The Dynamic power dissipation at a particular output node is given by $P_d = C_L V_{dd}^2 F_{clk} . A$

Where, C_L = Load capacitance

A = Activity factor

V_{dd} = Power supply

F_{clk}= Operating frequency

12. What are the methods available to reduce dynamic power dissipation?

1. Reducing the product of capacitance and its switching frequency.
2. Eliminate logic switching that is not necessary for computation.
3. Reduce activity factor Reduce supply voltage

13. What are the methods to reduce static power dissipation?

1. By selecting multi threshold voltages on circuit paths with low-V_t transistors while leakage on other paths with high-V_t transistors.
2. By using two operating modes, active and standby for each function blocks.
3. By adjusting the body bias (i.e) adjusting FBB (Forward Body Bias) in active mode to increase performance and RBB (Reverse Body Bias) in standby mode to reduce leakage.
4. By using sleep transistors to isolate the supply from the block to achieve significant leakage power savings.

14. What is short circuit power dissipation?

During switching, both NMOS and PMOS transistors will conduct simultaneously and provide a direct path between VDD to ground resulting in short circuit power dissipation.

15. Define design margin.

The additional performance capability above required standard basic system parameters that may be specified by a system designer to compensate for uncertainties is called design margin. Design margin required as there are three sources of variation two environmental and one manufacturing.

16. Write the applications of transmission gate?
    Multiplexing element of path selector
    A latch element an unlock switch
    Act as a voltage controlled resistor connecting the input and output.

17. What is pass transistor?

    It is a MOS transistor, in which gate is driven by a control signal, when the control signal is high, input is passed to the output and when the control signal is low, the output is floating topology such topology circuits is called pass transistor.

18. List the advantages of pass transistor logic.

    Pass transistor logic circuits are often superior to standard CMOS circuits in terms of layout density, circuit delay and power consumption.

    They do not have path VDD to GND and do not dissipate standby power (static power dissipation).

19. What is transmission gate?

    The circuit constructed with the parallel connection of PMOS and NMOS with shorted drain and source terminals. The gate terminal uses two select signals s and , when s is high than the transmission gate passes the signal on the input. The main advantage of transmission gate is that it eliminates the threshold voltage drop.

20. Why low power has become an important issue in the VLSI circuit realization? Increasing transistor count:

    The number of transistor is getting doubled in every 18 months based on moore's law Higher speed of operation:

    The power dissipation is proportional to clock frequency Greater device leakage current:

    In nanometer technology the leakage component become a significant percentage of the total power and the leakage current increases at a faster rate than dynamic power in technology generations.

21. What are the various ways to reduce the delay time of a CMOS inverter?
    1. The width of the MOS transistor can be increased to reduce delay this is known as gate sizing, which will be discussed later in more details.
    2. The load capacitance can be reduced to reduce delay this is achieved by using transistor of smaller and smaller dimension by feature generation technology.
    3. Delay can also be reduced by increasing the supply voltage VDD and reducing the threshold voltage V_t of the MOS transistors

22. Explain the basic operation of a 2- phase dynamic circuit.
    The operation of the circuit can be explained using pre-charge logic in which the output is pre-charged to HIGH level during $\Phi 2$ clock and the output is evaluated during $\Phi 1$ clock.

23. What makes dynamic CMOS circuits faster than static CMOS circuits?
    As MOS dynamic circuits require lesser number of transistors and capacitance is tobe driven by it. This makes MOS dynamic circuits faster.

24. What is glitch power dissipation?
    Because of finite delay of the gates used to realize the Boolean functions, different signals cannot reach the inputs of a gate simultaneously this leads to spurious transition at the output before it settles down to its final value, the spurious transitions leads to charging and discharging of the outputs causing glitch power dissipation

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.UNIT III SEQUENTIAL LOGIC CIRCUITS

1. What is metastability and list the steps to prevent it?

Metastability is an unknown state it is neither zero nor one. Metastability happens for the design systems violating setup or hold time requirements. Setup time is a requirement that the data has to be stable before the clock edge and hold time is a requirement that the data has to be stable after the clock edge. The potential violation ofthe setup and hold violation can happen when the data is purely asynchronous and clocked synchronously. Steps to prevent metastability:

1. Using proper synchronizers (two stage or three stage), as soon as the data is coming from the asynchronous domain. Using synchronizers, recovers from themetastable event.
2. Use synchronizers between cross-clocking domains to reduce the possibility from metastability.
3. Using faster flip flops (which has narrower metastable window).

2. Define local-skew, global-skew, and useful-skew. Local skew:

The difference between the clock reaching at the launching flip-flop vs the clock reaching the destination flip-flop of a timing-path.

Global skew:

The difference between the earliest reaching flip-flop and latest reaching flip-flop fora same clock-domain.

Useful skew:

Useful skew is a concept of delaying the capturing flip-flop clock path, this approach helps in meeting setup requirement within the launch and capture timing path. But the hold requirement has to be met for the design.

3. What is meant by virtual clock definition and why it is needed?

Virtual clock is mainly used to model the I/O timing specification. Based on what clock the output/input pads are passing the data.

4. What is the difference between mealy and moore state machines?

In the mealy state machine we can calculate the next state and output both from the input and state. But in the moore state machine we can calculate only next state but not output from the input and state and the output is issued according to next state.

5. What is the difference between latches and flip-flops based designs?

Latches are level-sensitive and flip-flops are edge sensitive. Latch based design and flop based design is that latch allows time borrowing which a tradition flip-flop does not: That makes latch based design more efficient. But at the same time, latch based design is more complicated and has more issues in min timing (races).

6. What are the classifications of CMOS circuit families? Static CMOS circuits.

Dynamic CMOS circuits.

Ratioed circuits. Pass-transistor circuits.

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7. What are the characteristics of Static CMOS design?

A static CMOS circuit is a combination of two networks, one is pull-up network (PUN) and the other is pull-down network (PDN) in which at every point in time, each gate output is connected to either VDD or VSS via pull-up or pull down network.

8. List the important properties of Static CMOS design.
   1. At any instant of time, the output of the gate is directly connected to VDD and VSS.
   2. The function of the PUN is providing a connection between the output and VDD.
   3. The function of the PDN is providing a connection between the output and VSS.
   4. Both PDN and PUN are constructed in mutually exclusive way such that one andonly one of the networks is conduct in steady state. That is, the output node is always a low-impedance node in steady state.

9. What is Dynamic CMOS logic?

Dynamic circuits rely on the temporary storage of signal values on the capacitance of high impedance node. It requires only N+2 transistors. It takes a sequence of precharge and conditional evaluation phases to realize the logic functions.

10. What are the properties of dynamic logic?
    1. Logic function is implemented by pull-down network only.
    2. Full swing outputs (V_{OL}= GND and V_{OH} = VDD).
    3. Non-ratioed.
    4. Faster switching speeds.
    5. Needs a precharge clock.

11. What are the disadvantages of dynamic CMOS technology?

A fundamental difficulty with dynamic circuits is a loss of noise immunity and a serious timing restriction on the inputs of the gate. Violate monotonicity during evaluation phase.

12. What is CMOS Domino logic?

A static CMOS inverter placed between dynamic gates which eliminate the monotonicity problem in dynamic circuits are called CMOS Domino logic.

13. What is called static and dynamic sequencing element?

A sequencing element with static storage employs some sort of feedback to retain its output value indefinitely. A sequencing element with dynamic storage generally maintains its value as charge on a capacitor that will leak away if not refreshed for a long period of time.

14. What is clock skew?

In reality clocks have some uncertainty in their arrival times that can cut into thetime available for useful computation. It is called clock skew.

15. What are synchronizers?

Synchronizers are used to reduce metastability. The synchronizers ensure synchronization between asynchronous input and synchronous system.

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16. Difference between latches and Flip-Flop.

S.No	Latch	Flip-Flop
1.	A Latch is Level Sensitive	A flip-flop is edge triggered.
2.	A latch stores when the clock level is low and is transparent when the level is high.	A flip-flop stores when the clock rises and is mostly never transparent.

17. Define Pipelining.

Pipelining is a popular design technique often used to accelerate the operation of the data path in digital processors. The major advantages of pipelining are to reduce glitch in complex logic networks and getting lower energy due to operand isolation.

18. How the limitations of a ROM based realization is overcome in a PLA based realization. In a ROM, the encoder part is only programmable and use of ROMs to realize

Boolean functions is wasteful in many situations because there is no cross-connect for a significant part. This wastage can be overcome by using Programmable Logic Array (PLA), which requires much lesser chip area.

19. Define Latch/flip-flop clock-to-Q propagation delay.

TPLH: 50% triggering edge point of the clock pulse to 50% transition of the output from low to high.
tPHL: 50% triggering edge of the clock pulse to the high to low transition of the output.

20. Define Latch/flip-flop clock-to-Q contamination delay.

Output signal start to change after its input change and settles to the final value within propagation delay.

21. What is static 0 hazard?

Output goes momentarily 1 when it should remain at 0 is called static 0 hazard.

22. What is dynamic hazard?

Output changes 3 or more times when it changes from 1 to 0 or 0 to 1

23. What is non critical race?

Final stable state does not depend on the order in which the state variable changes then that race is called non critical race and it is not harmful

24. What is critical race?

Final stable state depends on the order in which the state variable changes then that race condition is called critical race and it is harmful.

25. Define propagation delay and contamination delay?

Propagation delay: The amount of time needed for a change in a logic input to result in a permanent change at an output that is the combinational logic will not show any further

output changeContamination delay: The amount of time needed for a change in a logic input to result in an initial change at an output, that is the combinational logic is guaranteed not to show any output change in response to an input change before ted time units have passed.

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26. Define Setup time and Hold time.

Setup time (t_{setup}): The amount of time before the clock edge that data input D must bestable the rising clock edge arrives.

Hold time (t_{hold}): This indicates the amount of time after the clock edge, the data inputD must be held stable in order for Flip Flop to latch the correct value. Hold time is always measured from the rising clock edge to a point after the clock edge.

27. Differentiate DRAMs from SRAMs.

Both SRAMs and DRAMs are volatile in nature, ie. Information is lost if power line is removed. However SRAMs provide high switching speed, good noise margin but require large chip area than DRAMs.

28. Explain the read and write operations for a one transistor DRAM cell.

A significant improvement in the DRAM evolution was to realize 1-T DRAM cell. One additional capacitor is explicitly fabricated for storage purpose. To store '1', it is charged and to store '0' it is discharged to '0' volt. Read operation is destructive. Sense amplifier is needed for reading. Read operation is followed by restoration operation.

UNIT IV DESIGNING ARITHMETIC BUILDING BLOCKS

1. How data path can be implemented in VLSI system?

A data path is best implemented in a bit-sliced fashion. A single layout is used repetitively for every bit in the data word. This regular approach eases the design effort and results in fast and dense layouts

2. Write short note on the performance of ripple carry adder.

A ripple carry adder has a performance that is linearly proportional to the number of bits. Circuit optimizations concentrate on reducing the delay of the carry path. A number of circuit topologies exist proving that careful optimization of the circuit topology and the transistor sizes helps to reduce the capacitance on the carry bit

3. What are the advantages of ripple carry adder? Circuit realization is very simple
Consumes less power
Compact layout giving smaller chip area

4. What is carry skip adder?

A carry skip adder consists of a simple ripple carry adder with a special speed up carry chain called a skip chain. The carry skip circuitry consists of two logic gates. The AND gate accepts the carry in bit and compares it to the group propagate signal.

5. What is mirror adder?

In this circuit realization the PMOS network is identical to the NMOS networkrather than being the conduction complement, so the topology is called a mirror adder.

6. What are the advantages of carry skip adder?

The propagation delay is smaller compare to ripple carry adder when optimal stages are used.

The carry skip adder is shown to be superior to constant width carry skip module the advantages being greater at high precisions.

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7. What is the logic of adder for increasing its performance?

Other adder structures use logic optimizations to increase the performance (carry- bypass, carry select, carry look ahead). Performance increase comes at the cost of area.

8. What is a multiplier circuit?

A multiplier is nothing more than a collection of cascaded adders. Critical path is far more complex and optimizations are different compared to adders.

9. Define input ordering.

For PMOS and NMOS the inner inputs encounters the body effect and requires high threshold voltage to turn on. By input ordering the rare changing inputs are moved to inner inputs. This provides sufficient power saving.

10. Which factors dominates the performance of a programmable shifter?

The performance and the area of a programmable shifter are dominated by the wiring.

11. Write down the expression to obtain delay for N-bit carry bypass adder.

tadder = tsetup +M*tcarry +(N/M-1)*tbypass +(M-1)*tcarry + tsum

12. Define braun multiplier.

The simplest multiplier is the Braun multiplier. All the partial products are computed in parallel, and then collected through a cascade of Carry Save Adders. The completion time is limited by the depth of the carry save array, and by the carry propagation in the adder. This multiplier is suitable for positive operands.

13. Why we go for booth's algorithm?

Booth algorithm is a method that will reduce the number of multiplicand multiples. For a given number of ranges to be represented, a higher representation radix leads to fewer digits.

14. List the different types of shifter. Array shifter
Barrel shifter
Logarithm shifter

15. What are the various shift operations available?
Logical left shift
Logical right shift
Arithmetic left shift
,Arithmetic right hift

16. What is the output after two arithmetic right shift for A=1001?

Input = 1001
After second arithmetic right shift = 1110

17. What is a Manjestor carry chain adder?

It uses a cascade of pass transistors to implement the carry chain. Propogate & generate signals are generated using pass transistor logic. The capacitance per node on the carry chain is very small & equals only 4 diffusion capacitances.

18. Why is carry bypass Adder called so?

When the bypass control signal is set to '1', the incoming carry is forwarded immediately to the next block through a bypass transistor.

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19. What is the importance of linear carry select Adder?

The linear dependencies present in a ripple carry adder is avoided in linear carryselect adder, by anticipating both possible values of the carry i/p and evaluate the result for both possibilities in advance.

20. Why is the propagation delay in a carry select Adder is linearly proportional to N? It is because the block select signal that selects between 0&1 solutions still has to ripple through all stages in worst case.

21. hat is a bit serial multiplier?

When area is of prime concern, it is possible to reduce the cost of the multiplier by using a time multiplexed approach .Here, a combination of a single adder & a storage element is used to iteratively compute the summation of the partial products.

22. Draw the full adder diagram using CPL.

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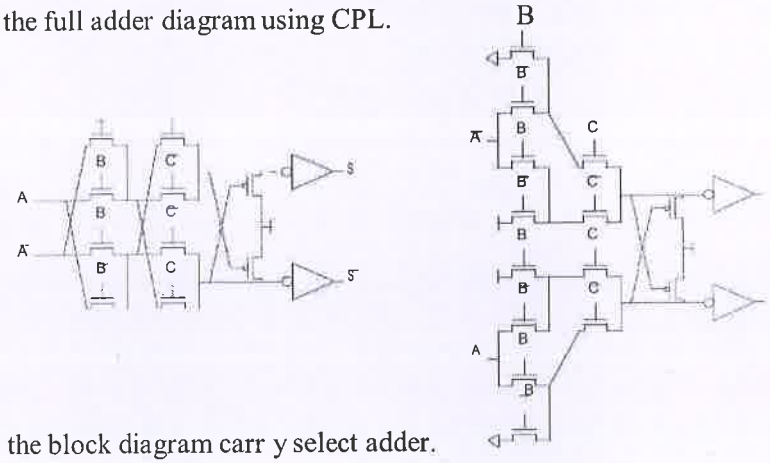
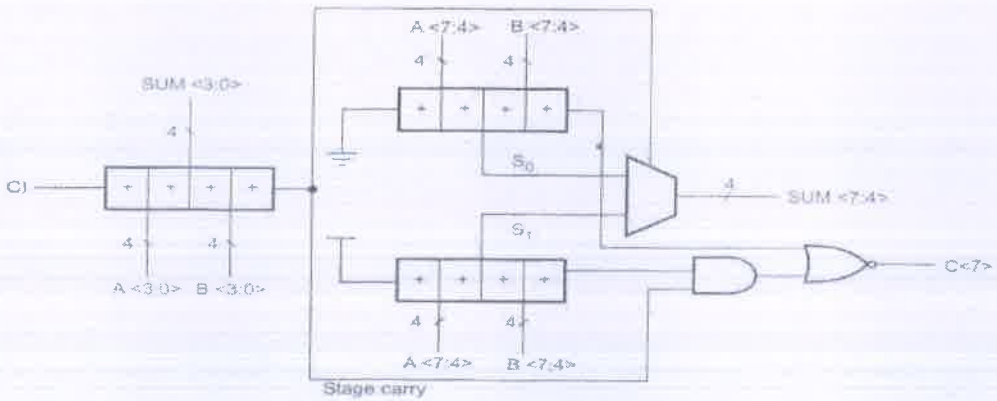
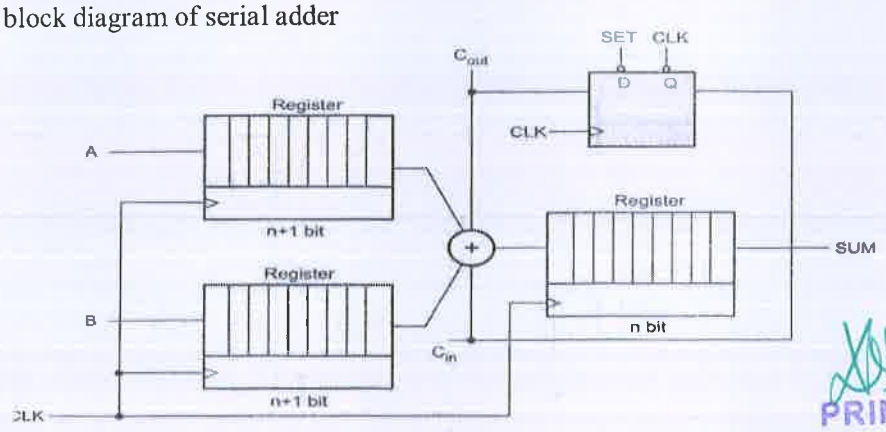


23. Draw the block diagram carr y select adder.



24. Draw the block diagram of serial adder



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UNIT V IMPLEMENTATION STRATEGIES

1. What is the standard cell based ASIC design?

   A cell based ASIC (CHIC) uses predesigned logic cells known as standard cells. The standard cell areas also called flexible blocks in a CHIC are built of rows of standard cells. The ASIC designer defines only the placement of standard cells and interconnection in a CHIC. All the mask layers of a CHIC are customized and areunique to a particular customer.

2. What is a FPGA?

   A Field Programmable Gate Array (FPGA) is a programmable logic device that supports implementation of relatively large logic circuits. FPGAs can be used to implement a logic circuit with more than 20,000 gates whereas a CPLD can implement circuits of up to about 20,000 equivalent gates.

3. What are the different methods of programming of PALS?
   1) Fusible links
   2) UV - Erasable EPROM
   3) EEPROM (E^2PROM) - Electrically Erasable Programmable ROM.

4. What is an antifuse?

   An antifuse is normally high resistance (>100 MW). On application of appropriate programming voltages, the antifuse is changed permanently to a low resistance structure (200-500 W).

5. Differentiate between channeled and channel less gate array.

Channeled gate array	Channel less gate array
Only the interconnect is customized	Only the top few mask layers are customized
The interconnect uses predefined spaces between rows of base cells	No predefined areas are set aside for routing between cells.
Routing is done using spaces	Routing is done using the area of transistors unused
Logic density is less	Logic density is higher

6. What are the different levels of design abstraction at physical design?
   Architectural or functional unit
   Register Transfer level (RTL) Logic level Circuit level

7. What are macros?
   The logic cells in a gate array are often called as macros.

8. What are programmable Interconnects?

   In a PAL, the device is programmed by changing the characteristics if the switching element. An alternative would be to program the routingWhat are the types of ASICs?Full custom ASICs Semi custom ASICs

9. What are the types of programmable devices?
   Programmable logic structureProgrammable Interconnect Reprogrammable Gate Array

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10. What are the features of standard celled ASICs?
    All mask layers are customized-transistors and interconnect. Custom blocks can be embedded
    Manufacturing lead time is about eight weeks.

11. What are the characteristics of FPGA? None of the mask layers are customized
    A method of programming the basic logic cells and the interconnect. The core is a array of programmable basic logic cells that can implement combinational as well as sequential logic (flip flops).
    A matrix of programmable interconnect surrounds the basic logic cells. Design turnaround is a few hours.

12. What is programmable logic array?
    A programmable logic array (PLA) is a programmable device used to implement combinational logic circuits. The PLA has a set of programmable AND planes, which link to a programmable OR planes, which can then be conditionally complemented to produce an output. This layout allows for a large number of logic functions to be synthesized in the sum of products canonical forms.

13. What is meant by programmable logic plane?
    The programmable logic plane is programmable read only memory (PROM) array that allows the signals present on the devices pins to be routed to an output logic macro cell.

14. Define ROM
    A read only memory (ROM) is a device that includes both the decoder and the OR gates within a single IC package. It consists of n input lines and m output lines. Each bit combination of the input variables is called an address. Each bit combination that comes out of the output lines is called a word. The number of distinct addresses possible with n input variables is 2n.

15. What is the full custom ASIC design?
    In a Full custom ASIC, an engineer designs some or all of the logic cells, circuitsand layout specifically for one ASIC. It makes sense to take this approach only if there are no suitable existing cell libraries available that can be used for the entire design.

16. Why was PAL developed?
    It was developed to overcome certain disadvantages of PLA, such as longer delays due to additional fusible links that result from using two programmable arrays and more circuit complexity.

17. State the types of ROMMasked ROM.
    Programmable Read only Memory Erasable Programmable
    Read only memory.
    Electrically Erasable Programmable Read only Memory.

18. Give the different types of ASIC.
    1.) Full custom ASICs 2). Semicustom ASICs
    3)programmable ASICs ProgrammableLogic Device .
    4.)Field Programmable Gate Array (FPGA).

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DEPARTMENT OF INFORMATION TECHNOLOGY

CS8091-BIGDATAANALYTICS

POSSIBLE QUESTION

UNIT I- INTRODUCTION TO BIG DATA

1. What is Bigdata? Describe the main features of a big data in detail.
2. List the main characteristics of Big Data.
3. Explain in detail about Nature of Data and its applications.
4. Explain in detail about Storage Considerations in Big Data.
5. Explain in detail about HDFS.
6. Briefly discuss about MapReduce and YARN.

UNIT II CLUSTERING AND CLASSIFICATION

1. Explain about k-means Clustering in detail.
2. Explain about Classification of Decision trees in detail.
3. Explain in detail about Naïve Bayes Classification.
4. How evaluation is performed on decision trees?

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM

1. Explain about the basics of Recommendation Systems
2. Explain content-based filtering in detail.
3. Explain about Collaborative Filtering in detail.
4. Explain in detail about Apriori Algorithm.
5. Explain Association Rules in detail.

UNIT – IV STREAM MEMORY

1. Explain the Data streaming concept in detail.
2. Explain with a neat diagram about Stream data model and its Architecture.

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3. Explain Filtering a stream in detail.
4. Explain the concept of Estimating Moments
5. Explain in detail on Counting ones in a Window.
6. Explain the following: i. Decaying Windows ii. RTAP Applications

UNIT V NO SQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION

1. Explain in detail about HIVE.
2. Give a Survey on Analyzing Big data with Twitter.
3. List the classification of NoSQL database and explain about key value stores.
4. Describe the system architecture and components of HIVE and HADOOP.
5. What is NoSQL? What are the advantages of NoSQL? Explain the types of NoSQL databases.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MG8591 – PRINCIPLES OF MANAGEMENT POSSIBLE QUESTIONS

UNIT I INTRODUCTION TOMANAGEMENTANDORGANIZATIONS

1. Discuss about Management an art or science?
2. Discuss the principles and techniques of scientific management.
3. Examine the four teen principle sofar management advocated by Henry Fayol
4. Classify the different roles and functions of managers and explain them in detail.
5. Explain the various functions of management.
6. Explain the evolution of management in detail.
7. Describetherelativeimportanceofeachtypeofskillstolower,middleandupperlevelmanagers

UNIT II PLANNING

1. What is planning? Explain the steps involved in planning
2. Define MBO. Describe the benefits and weakness of MBO and ways to overcome them
3. Definedecisionmaking.Explaintheprocessofdecisionmakingthataffectstheefficiencyof the business decisions.
4. .Define forecasting.Explainthevariousforecastingtechniquesusedfordecisionmakingprocess.
5. . Identify the various types of Policies with examples also explain how will you frame policies.

UNIT III ORGANISING

1. Examine the different types of organizational structures followed by the companies
2. What do you understand by organization chart? Explain the basis of the departmentalization.
3. Relate the concept of centralization and decentralization in an Organization?
4. Distinguish between formal and informal organization.
5. Analyze the Human Resource Management activities in a business organization.
6. How could you determine various performance appraisal techniques? Invent the need for performance appraisal.
7. What is Span of Control? Write down the different factors influencing span of Control?

UNIT IV DIRECTING

1. Define motivation. Explain the theories of motivation in detail.
2. What doyouunderstandby"leadershipstyle"?Describethedifferentstylesofleadership.
3. Explain the term motivation. Compare and contrast early theories of Motivation
4. Express the process of communication.
5. Examine the theories of Leadership.
6. (i)Identify barriers to effective interpersonal communication.

UNIT V CONTROLLING

1. What is control? Explain the phases in control.
2. Discuss in detail about budgetary control and non budgetary control.
3. Illustrate and explain the three steps involved in the control process.
4. Analyze the factors affecting productivity.

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DEPARTMENT OF SCIENCE AND HUMANITIES
PH3151-ENGINEERING PHYSICS

1. Define centre of mass of the system.

Consider the motion of a system consisting of a large number of particles. There is one point in it which behaves as though the entire mass of the system were concentrated there and all the external forces were acting at this point. This point is called the centre of mass of the system.

2. Define rigid body.

A rigid body is defined as that body which does not undergo any change in shape or volume when external forces are applied on it.

3. Define moment of inertia of a particle

- The moment of inertia of a particle about an axis is defined as the product of the mass of the particle and square of the distance of the particle from the axis of rotation.
- If 'm' is the mass of the particle and 'r' is the distance of the particle from the axis of rotation, then
- The moment of inertia of the particle

$$I = mr^2$$

4. What are the factors the moment of inertia depends on?

Moment of inertia depends on mass, distribution of mass and on the position of axis of rotation.

5. What are the physical significance of moment of inertia?

- The property which opposes the change in rotational motion of the body is called the moment of inertia. Greater is moment of inertia of the body about the axis of rotation, greater is the torque required to rotate the body.
- Thus it is clear that the moment of inertia of a body has the same role in rotational motion as that of mass (or inertia) is linear motion.

6. State parallel axis theorem.

The moment of inertia of a body about any axis is equal to the sum of its moment of inertia about a parallel axis passing through its centre of gravity of the body and the product of its mass of the body with the square of the istance between the two axes.t

7.State perpendicular axis theorem.

It states that the moment of inertia of a plane lamina about an axis perpendicular to its plane is equal to the sum of the moments of inertia of the plane lamina about any two mutually perpendicular axes in its own plane and intersecting each other at the point where the perpendicular axis passes through it.

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8. **Define angular momentum.**

Angular momentum of a particle is defined as its moment of linear momentum it is given by the product of linear momentum and perpendicular distance of its line of action from the axis of rotation. It is denoted by $\vec{L}$.

9. Define torque.

- The moment of the applied force is called torque. It is represented by the symbol 'τ'.
- If F is the force acting on a body at a distance r then,
- Torque = Force × distance

i.e., $\vec{\tau} = \vec{F} \times \vec{r}$

The rotational motion is due to only when the torque acts on the body.

10. State conversation of angular momentum.

The law of conservation of angular momentum states that in the absence of an external torque, the angular momentum of a body or a system of bodies remains conserved.

11. What is gyroscope?

A gyroscope is a device used for measuring or maintaining orientation and angular velocity. It is a spinning wheel or disc in which the axis of rotation (spin axis) is free to assume any orientation by itself.

12. What are the uses of gyroscope?

1. In view of the property of stability, the gyroscope are used as stabilizers in ships, boats and aeroplanes.

2. Due to the inherent stability of the gyroscope, it is used as a compass, and a gyro-compass is preferable to the magnetic compass in many respects.

3. Another important application of the directional stability of a rapidly spinning (rotating) body is the rifling of the barrels of the rifles.

UNIT II: ELECTROMAGNETIC WAVES

1. Give the Maxwell's equations in differential form.

$$\vec{\nabla} \cdot \vec{D} = \rho$$

$$\vec{\nabla} \cdot \vec{B} = 0$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\vec{\nabla} \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$$

2.

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$$\oint_S \vec{D} \cdot \vec{ds} = \iiint_V \rho \, dV$$

$$\oint_S \vec{B} \cdot \vec{ds} = 0$$

$$\oint \vec{E} \cdot \vec{dl} = -\iint_S \frac{\partial \vec{B}}{\partial t} \cdot \vec{ds}$$

$$\oint \vec{H} \cdot \vec{dl} = \iint_S \left(\vec{J} + \frac{\partial \vec{D}}{\partial t} \right) \vec{ds}$$

2. Give the Maxwell's equations in integral form.

3. What is intrinsic or characteristic impedance of free space?

- The ratio $\frac{\vec{E}}{\vec{H}}$ is having the unit of impedance (Resistance)
- ie., ohm, Therefore, the quantity $\sqrt{\frac{\mu_0}{\varepsilon_0}}$ has the dimensions of impedance.
- It is known as **intrinsic or characteristic impedance of free space, denoted by Z_0**. It is a constant quantity for free space and having value = 377Ω.

4. What is poynting vector?

The cross product of electric field vector $\vec{E}$ and the magnetic field vector $\vec{H}$ is called poynting vector. It is denoted by $\vec{S} = \vec{E} \times \vec{H}$.

5. Give the Properties of Electromagnetic Waves.

(i) Electromagnetic waves are produced by accelerated charges.

(ii) They do not require any material medium for propagation.

(iii) In an electromagnetic wave, the electric $(\vec{E})$ and magnetic $(\vec{B})$ field vectors are at right angles to each other and to the direction of propagation. Hence, electromagnetic waves are transverse in nature.

(iv) Variation of maxima and minima in both $\vec{E}$ and $\vec{B}$ occur simultaneously (in phase).

(v) They travel in vacuum or free space with a speed 3×10^8 ms^{-1} given by the relation

(μ_0 - permeability of free space and ε_0 - permittivity of free space)

(vi) The energy in an electromagnetic **wave** is equally divided between electric and magnetic field vectors.

(vii) The electromagnetic waves being chargeless, they are not deflected by electric and magnetic fields.

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UNIT III:OSCILLATIONS,OPTICS AND LASERS

1. Define simple harmonic motion.

When the acceleration of particle is directly proportional to its displacement from its equilibrium position and it is always directed towards equilibrium position, then the motion of the particle is said to be simple harmonic motion.

2. What are the characteristics of simple harmonic motion?

- The motion must be periodic.
- The motion is oscillatory ie., to and fro along a straight line or along a curved path about a mean position.
- The body executing simple harmonic motion is acted upon by a restoring force whose magnitude is proportional to the displacement and its direction is always towards the mean position.
- If there is no air resistance or friction, the motion once · started will continue indefinitely.

3. State Doppler effect.

The phenomenon of the apparent change in the frequency of the sound due to relative motion between the source of sound and the observer is called Doppler effect.

4. Give conditions of total internal reflection.

(a) The light should be incident from denser medium to rarer medium.

(b) The angle of incidence i in denser medium should be greater than critical angle θ_c.

5. Write the differences between spontaneous emission and stimulated emission

	Spontaneous emission	Stimulated emission
1.	Emission of light radiation is not triggered by external influence	Induced emissions of light radiations caused by incident photons
2.	Emitted photon travels in random direction	Emitted photon travels in particular direction
3.	Emitted photons cannot be controlled	Emitted photons can be controlled.
4.	This process is a key factor for ordinary light.	This process is a key factor for laser operation

6. What is meant by population inversion and how is it achieved?

The establishment of a situation in which the number of atoms in higher energy level is more than that in lower energy level is called population inversion. It is an essential requirement for producing a laser beam. It is achieved by pumping action.

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7. What are the characteristics of the laser? (or) What are the properties of the laser beam?

- Laser light is highly coherent
- It is highly powerful and intense.
- It is directional and monochromatic.
- It is capable of travelling over long distance without any energy loss.
- It is extremely bright.
- Laser beam is not easily absorbed by the water.

8. What is the principle of laser action?

Stimulated emission process is a key factor for the laser action. This can be multiplied through chain reaction. This multiplication of photons through stimulated emission leads to coherent, powerful, monochromatic, collimated beam of light-emission.

9. Mention the applications of lasers in industry.

Nd:YAG and CO_2 lasers are very much used in industries for the laser welding, cutting, drilling and soldering.

UNIT IV: BASIC QUANTUM MECHANICS

1. State the properties of the matter waves.

(i) Lighter is the particle, greater is the wavelength ... associated with it.

(ii) Smaller is the velocity of the particle, greater is wavelength associated with it.

(iii) These waves are not electromagnetic waves.

(iv) The velocity of de Broglie wave is equal to the velocity of the material particle.

2. Write down Schroedinger time independent and dependent wave equations.

Schroedinger time independent wave equation is

$$\nabla^2 \psi + \frac{2m}{\hbar^2}(E - V)\psi = 0$$

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Schroedinger time dependent wave equation

$$\left(-\frac{\hbar^2}{2m}\nabla^2 + V\right)\psi = i\hbar\frac{\partial\psi}{\partial t}$$

where $\nabla^2 = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$ is Laplacian operator.

3. Mention some of the physical significances of the wave function.

(i) The wave function (Ψ) relates the particle and wave nature of matter statistically.

(ii) It is a complex quantity and hence we cannot measure it.

(iii) If the particle is certainly to be found somewhere in a space of dimensions dx, dy, dz, then the probability value is equal to one.

$$\text{i.e., } P = \int_V \int \int |\psi|^2 \, dx\, dy\, dz = 1$$

4.Define Correspondance principle

.Any new theory in Physics must reduce to well-established corresponding classical theory when the new theory is applied to the special situation in which the less general theory is known to be valid.

5. What is the significance of zero point energy in a harmonic oscillator?

- For lowest (ground) state, n = 0

$$E_o = \frac{1}{2}h\nu$$

- This is the lowest value of energy, called **zero point energy**. Even it the temperature reduces to absolute zero, the oscillator would still have an amount of energy 1/2 hv.
- In old quantum mechanics, the energy of n^{th} level.

  En = nhv

  whereas in wave mechanics

$$E_n = \left(n + \frac{1}{2}\right)h\nu$$

6. What are the significance of tunneling effect?

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1. Tunneling is a very important physical phenomena which occurs in certain semiconductor diodes. In such diodes electrons pass through potential barriers even though their kinetic energies are smaller than the barrier heights.

2. The tunneling effect also occurs in the case of the alpha particles. The kinetic energy of alpha particle is only a few MeV but it is able to escape from a nucleus whose potential wall is perhaps 25 MeV high.

3. The ability of electrons to tunnel through a potential barrier is used in the Scanning Tunneling Microscope (STM) to study surfaces on an atomic scale of size.

7. Define resonant tunneling.

- The transmission probability of the double symmetric barrier is maximum. The tunneling current reaches peak value when energy of electron wave is equal to quantised energy state of the well.
- This phenomenon is known as resonance tunneling.

8. State Block Theorem.

- If an electron in a linear lattice of lattice constant 'a' characterised by potential function V (x) = V (x + a) satisfies the Schoredinger equation

$$\frac{d^2\psi(x)}{dx^2} + \frac{2m}{\hbar^2}[E - V(x)]\psi(x) = 0$$

- Then the wave functions Ψ (x) of electron (with energy E) obtained as a solution of Schrodinger equation are of the form

$$\psi(x) = u_k(x)\, e^{\pm ika}$$

with $u_k(x) = u_k(x + a)$

PART - B
16 MARKS QUESTIONS
UNIT I UNIT I: MECHANICS

1. State and prove the theorem of perpendicular axis for the moment of inertia of a plane lamina.
2. Discuss the moment of inertia and rotational energy states of a rigid diatomic molecule.
3. Describe principle, construction and working of gyroscope. Mention its application in various fields.
4. Derive an expression for time period of torsion pendulum. Explain how it is used to find rigidity modulas of a wire.
5. Write notes on double pendulum.

UNIT II: ELECTROMAGNETIC WAVES

1. Derive Maxwell's equations in differential and integral form.
2. Deduce Maxwell's equations for free space.
3. Explain reflection and transmission of electromagnetic waves.

UNIT III: OSCILLATIONS,OPTICS AND LASERS

1. Explain the formation of interference fringes in an air-wedge shaped film. How is the thickness of the wire determined by this method?

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2. Describe Michelson interferometer and explain how the fringes form in it. How can this be used for measuring the wavelength of monochromatic light. Derive the formula.
3. For atomic transitions, derive Einstein relations and hence deduce the expressions for the ratio of spontaneous emission rate to be stimulated emission rate.
4. Explain the construction and working of Nd - YAG laser with neat diagram.
5. Explain the modes of vibrations of CO_2, molecule. Describe the construction and working of CO_2 laser with necessary diagrams.
6. Explain the principle, construction and working of a semiconductor diode laser with necessary diagrams.

UNIT IV: BASIC QUANTUM MECHANICS

1. Explain Compton effect and derive an expression for the wavelength of scattered photon. Also briefly explain its experimental verification.
2.Derive Schroedinger's time independent and time dependent wave equation.
3. Solve Schrodinger wave equation of a particle in box (one dimensional) and obtain the energy eigen values.

UNIT V: APPLIED QUANTUM MECHANICS

1. Discuss barrier penetration and quantum tunneling.
2. What is the principle of scanning tunneling microscope. Explain the construction and working of scanning tunneling microscope with a suitable diagram.
3. Write a note on resonant diode.
4. Explain Bloch's theorem for particles in a periodic potential.
5. Discuss Kraning penney mode

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DEPARTMENT OF SCIENCE AND HUMANITIES

BASIC GRAMMER RULES -HS3152- PROFESSIONAL ENGLISH -I

Tenses:

1) Use the correct tense forms of the verbs given in brackets to fill up the blanks:

A decade ago the most vehement opposition to computerization came(come) from people who believed (believe) that it led (lead) to unemployment. There were (be) a hue and cry over this.

2) Fill in the blanks in the following sentences with the appropriate tense forms of the verbs given in brackets:

a) They ------built--- (build) this castle in 1765.
b) Liz ---has not finished--- (not finish) her homework yet.
c) Look! Jane and Joseph ---are playing- (play) tennis.
d) A heavy wind --blowed--- (blow) when the helicopter laed.

3) Fill in the blanks with suitable tense forms of the verbs given in brackets:

Stephen Hawking is one of the most brilliant theoretical physicists. He --was--- (be) also a popular writer. His first book, "A Brief History of Time" -------published--- (publish) in 1988 and ---became--- (become) an international best seller. In it, he ----explained--- (explain) about the birth and death of the universe to the lay person.

WH Questions

4) Frame 'Wh' questions for the responses given.

(a) Spain won the FIFA World Cup in the finals in the year 2010.(Which)
Which country won FIFA world cup?
(b) Brazil shall host the 2014 World Cup in June-July. (When)
When shall Brazil host the world cup ?
(c) Brazil has won the World Cup five times. (How many)
How many times Brazil won the world cup
(d) MARADONA of Argentina was the great player in 1986. (Who)
Who is Maradona ?

a. Frame Yes / No question from the given sentences:

a) She learns music. Does she learns music ?
b) You can speak French. Can you speak French?
c) She is an Engineer Is she an Engineer?
d) They drives the car Do they drive a car ?

b. Change the statements to questions using the question word in parenthesis.

a) My friend told me that he would come to my house at 8o'clock. But he came only at 10 o'clock. (When)
When did your friend came ?
b) I would like to stay in the hotel for five days. (How long)
How long would you like to stay?
c) I didn't attend the class on Friday since I was ill for two days. (Why)
why he didn't attend the class?
d) Yesterday I went to the post office. I had to send a letter to the Manager of the company. (Where)
Where did you went yesterday?

c. Change the statements to questions using the question word in parenthesis

a) The children are very sincere and they do their homework at night. (when)
When do the children do their homework?
b) I feel so tired since I have been waiting here for two hours. (how long)
How long you have been waiting?
c) I didn't inform her about his arrival because she kept her mobile phone in the switch off mode. (why)
Why you didn't inform her about his arrival?
d) My friend, Sam, is a rich man and he is a Software engineer in HCL. (what)
What is your friend Sam?

Synonyms

5) Match the words in the column A with their synonyms in column a) Abundance - i) enormous
b) Gigantic - ii) plenty

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c) Drawback - iii) variety
d) Diversity - iv) disadvantage
a- I, b –I, c-iv, d-iii

A} Choose the best word from the four options that can be used for the meaning given: a)
a) One who has the ability to think and plan
(i) Philosopher (ii) fortune teller (iii) Visionary (iv) Prophet
b) The speech sounds of a language are called as
(i) Alphabet (ii) Phonology (iii)Sound cord (iv) Phoneme
c) Murder of a whole race or group of people
(i) Massacre (ii) Fumigate (iii) Fungicide (iv) Genocide
d) The origin of something
(i) Start (ii) Open (iii) Genesis (iv) Genius

6) Give one word substitutes for the following:
a) A traveler in space. – astronaut
b) One who can neither read nor write. Illiterate
c) Life history written by himself Autobiography
d) One who have belief in God Theist

Prepositions

7)Write suitable prepositions in blanks:
The only language that can rival English--in--sheer strength---of---numbers is Chinese. Chinese is the mothertongue-
---
of---1000 million people, nearly three times the number--of ----- mother-tongue speakers of English.

8) Fill in the blanks with suitable prepositions:
a. Kanchipuram is famous ---for---- silksarees b. Kerala abounds ---in --- coconut trees
c. The meeting started --in-- time d. Smoking is injurious ----to -- health
a. She drove the car with a speed of 80 miles an hour
b. The factory has been closed for two years
c. The room measures 60 feet to 40 feet
d. Yesterday the Chairperson left in New Delhi

9) Fill in the blanks with suitable prepositions:
Steve Jobs co-founded Apple Computer with Steve Wozniak
garage venture _into a technology giant.
in 1976. It soared___from its start as a

Prefix & Suffix

10) . Give antonyms of the following words by adding suitable negative prefixes
a) unfamiliar b) insignificant c) inefficient d)disapprove

11. Fill in the blanks with suitable prefixes to get the meaning given against each word.
(a) --thermonuclear - nuclear reactions at very high temperatures
(b ----bio --- medical - relating to how biology affects medicine
(c) ---Self---reliant - able to decide things by oneself
d) ---Nano--technology -relating to very small structures

12. Make antonyms of the following words by adding suitable prefixes.
a) Discourteousb) inhabited c) imperceptible d) injustice
a) abNormal b) impurec) dislike d)dishonest

a) Complete the word in the blank using the correct suffix:
a) His exemplary service in the army proves his patriotism (-ness,-ism,-cy,-ward)
b) I found a new booklet _ on dental health in the library. (-let,-ish,-worm,-ing)
c) Sugar crystalizes very quickly. (-ism, -ing, -izes, -ed)
d) The stranger had a strange appearance . (-ing, -ance, -less,-dis

6) Phrasal Verbs

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13. Form sentences using any two of the following phrasal verbs
a) put off - Please put off your shoes before entering this holy building
b) put out - The cattle were put out to pasture
c) call off - The meeting was called off
d) call out - I tried to call out to him through the window
a) get over - it get over a year to recover from the loss of my father
b) back off - The soldiers backed off from the war
c) breakdown- She breaks down when she heard the bad news.
d) look up – she looks up for the new word in the dictionary.

14. Supply suitable Phrasal verbs in the blanks provided:
(came across, look at, coming back, get on, look after)
(a) There was traffic jam. We couldn't ----- **look at**
(b) My friend is leaving today and --**coming back** -- on Wednesday.
(c) I ----**look after** ---- this book in the old book stall.
(a) They -----**get on**---- carefully --------**came across** ----- a problem.

15Fill in the blanks with suitable phrasal verbs.
(tied him up, looks up, move out, washed away)
a) He ---**looks up** ----the word in the dictionary.
b) You must -----**move out** ---- of the town.
c) Rough sea -----**washed away** --- 100 houses in Dhaka.
d) The police -------**tied him up**-- with chains.

Homonyms:

16. Read the homonyms given below and give an example each.
a) Bank/Bank I have an account in Axis Bank
The breeze in the river bank is enjoyable
b) lead/lead – Lead is a metal
The manager leads the team
c) Act – act She acts well
The new act is appreciable
d) Bark -bark The dog barks
The bark of the tree is old.

17. The underlined words in the following sentences are homonyms. Use any two of them in sentences of your own, each with a meaning different from the meaning given.
Names in the **right** hand column of the register, please! And place your bags under the **light** please!
a) The answer is Right
b) The new bag is light weight

Complete the following sentences using homophones
a) Education plays an important ---------- in man's life. (Roll, role)
b) She is too ---------- to walk. (Week, weak)
c) Although he walked 2 kilometers a day, he could not (lose, loose) his weight
d) The lady of the house faced many difficulties in the absence her (maid/made)
e) The child (threw/though) the ball into the tank.
f) They met the (their/there) friends in the park
g) The chief guest has accepted to come on any day in this (week/weak)
h) I couldn't get (birth/berth) reservation in the train.
i) The chair is made of (steal/steel)
j) I don't know why he (stairs / stares) at me for a long time.
k) No one can ---------- my opinion. (alter, altar)
l) He was standing ---------- me. (besides, beside)

Concord (Subject verb agreement):

(18)_Check the following sentences for the subject-verb agreement:

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(a) Time and tide wait for no man.
Time and tide waits for no man.
(b) Neither the King nor the Queen were worried about the poor people.
Neither the King nor the Queen was worried about the poor people.
(c)The tallest of the girls stay in the hostel.
The tallest of the girls stays in the hostel.

(19) Check the following sentences for subject-verb agreement:

a. The captain as well as his soldiers were killed in the battle.
The captain as well as his soldiers was killed in the battle.
b. One of my books are missing.
One of my books is missing
c. None of them speak Tamil.
None of them speaks Tamil.
d. The president and the secretary is present.
The president and the secretary are present.

(20) Check whether the following sentences have subject verb agreement and rewrite them correctly:

(a) Society are knit together by some commonly held beliefs.
Society is knit together by some commonly held beliefs.
(b) Each of the girls have won a prize.
Each of the girls has won a prize.

21) Choose the correct form of verb that agrees with the subject:

a) The Minister, together with his wife, -------- (greets, greet) the press cordially.
b) The players, as well as the captain, ---------- (want, wants) to win.
c) Neither the teacher nor the students ---------- (seem, seems) to understand this assignment.
d) One of my teachers --------- (have, has) written a letter of recommendation for me.

Discourse Markers:

23) Use suitable discourse markers to link the sentences.

(a) Glass breaks easily. Glass has many properties.
Glass breaks easily because it has many properties.
(b) The pressure inside the boiler increased. The safety valve has not opened.
The pressure inside the boiler increased so the safety valve has not opened.

24. Choose the correct relative pronoun to fill the blank.
(that, which, who, whom)

a) The tallest child, **who** was also oldest, was also most outstanding.
b) I don't recognize the song **which** __is playing.
c) I rode my bike, **that**has a headlight home in the dark.
d) I heard someone at the door but wasn't sure whom it was.

25. Choose the right Pronoun and complete the sentences:

1. This is not pen. (mine/my)
2. Selvi is going out with friends this evening. (her/ hers)
3. Whose bag is this? or his? (your/yours)
4. Can we use your iron box? is not working. (our/ours)

Collocations:

26.Fill in the blanks with right options to complete the collocations:

(a) Let's consult with the elders before we ------a decision
(i) Do (ii) make (iii) Create (iv) construct
(b) The students always ----- attention in his class
(i) Give (ii) pay (iii) Keep (iv) make
(c) It is a golden ----- we can't miss it
(i) Chance (ii) opportunity (iii) Offer (iv) possibility
(d) He should learn to ------ his emotions under control

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(i) Keep (ii) hold (iii) Do (iv) make

27. Complete the collocation in the sentence by choosing the correct words:

a) The officer (pay/had) sympathy on the manager and offered financial aid.
b) The dog in our house (went/get) missing when we moved to a new place.
c) The champion (broke/made) his own record in the Olympics.
d) The company (made/launched) a new product in the market last month.

28. Fill in the blanks with right options to complete the collocation.

a) Youngsters today seem to prefer food.
a) quick b) fast c) rapid d) speed
b) She tears when she heard the news.
a) burst into b) blew up in c) burst away d) blew away
c) Working mothers often find that they are unable to time for their children.
a) waste b) save c) spare d)spend
d) He wasn't sure if he would get an appointment but he was willing to go to the CM's office and take a .
A) opportunity b) choice c) break d) chance

11) Fixed & Semi Fixed Expression

29) Choose the correct fixed expressions from the options given:

i) Life is not (a joyful trip/ a bed of roses).
ii) He always came up with for coming late(a lame excuse/ silly ideas).
iii) It is difficult such boring people (to put down with/ to put up with).
iv) The answer was on (the tip of my mouth/ the tip of my tongue).

Articles:

30) Fill in the blanks with suitable articles wherever necessary:

a) The man I met yesterday was blind.
b) This is the best book on elementary chemistry.
c) The bird in hand is worth two in the bush.
d) He is not an honorable man.

Abbreviation and Acronyms:

31) Expand the following abbreviations and acronyms:

A) ICBM (b) PV a) TOEFL b) VIRUS a) LASER b) UNESCO

Answers

(a) Inter Continental Ballistic Missile (b) Poly Vinyl Chloride
a) Test of English As Foreign Language b) Vital Information Resource Under Seize
1. Light Amplification by Stimulated Emission of Radiation
2. United Nations Educational, Scientific and Cultural Organization

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DEPARTMENT OF SCIENCE AND HUMANITIES

PREVIOUS YEAR QUESTION PAPER –PROBLEM SOLVING AND PYTHON PROGRAMMING

B.E./B.Tech. DEGREE EXAMINATIONS, JANUARY 2022.

First Semester

Civil Engineering

GE 3151 – PROBLEM SOLVING AND PYTHON PROGRAMMING

(Common to All Branches)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1 Write an algorithm to accept two numbers, compute the sum and print the result.

2. Define an iterative statement.

3. Are comments executable statements in a Python program? How comments are included in a Python program?

4. Identify the operand (s) and operator (s) in the following expression:
$sum = a + b$.

5. Name the two types of iterative statements supported by Python.

6. Define a recursive function.

7. In Python, how the values stored in a list are accessed? Should the elements of a list be of the same data type?

8. How Python's dictionaries store data? Give example.

9. Write the syntax for opening a file to write in binary mode.

10. What are the different modules in Python?

11. (a) (i) Draw a flow chart to accept three distinct numbers, find the greatest and print the result. (8)

(ii) Draw a flow chart to find the sum of the series

1 + 2 + 3 + 4 + 5 +....+ 100. (8)

Or

(b) State the Towers of Hanoi problem. Outline a solution to the Towers of Hanoi problem with relevant diagrams. (16)

12. (a) Outline the data types supported by Python with an example. (16)

Or

(b) Name the types of operators supported by Python and outline any two with an example. (16)

13. (a) Outline the conditional branching statements in Python with an example. (16)

Or

(b) (i) Outline while loop, break statement and continue statement in Python with an example. (12)

(ii) Write a Python program using function to find the sum of first 'n' odd numbers and print the result. (4)

14. (a) Name the operations that can be performed on a list and outline any four with an example. (16)

Or

(b) (i) Write separate Python programs to illustrate create, access, concatenate and delete operations in a tuple. (10)

(ii) Write a Python program to create a dictionary and sort the content based on values in reverse order. (6)

15. (a) Name the different access modes for opening a file and present an outline of the same. (16)

Or

(b) (i) What is an exception? Elaborate exception handling in Python. (8)

(ii) Wr a p am to enate the contents of two i sin file. the in two files from the user and t it.

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DEPARTMENT OF SCIENCE AND HUMANITIES

IMPORTANT QUESTIONS CY3151-ENGINEERING CHEMISTRY

UNIT-I WATER AND ITS TREATMENT

PART-A (2- MARKS)

1. What is the classification of impurities of water?
2. What is Hardness of water?
3. Define Scale and Sludge.
4. What is Desalination?
5. What is breakpoint chlorination?

PART-B (8 MARKS)

1. Explain the disadvantages of Boiler feed water..
2. Explain the Softening of water by Demineralization process.
3. Explain Water Quality Parameters.
4. Explain internal conditioning of water.
5. What is Desalination? Explain Reverse Osmosis method.
6. Explain Treatment of water for domestic supply.

UNIT-II-NANO CHEMISTRY

PART-A (2- MARKS)

1. Define the terms of Nanowire, Nanorods& Nano tubes.
2. What are the types of carbon nanotubes?
3. What are Nano-particals?
4. Define Nanoclusters.
5. List out any four applications of nano materials.

PART-B (8 MARKS)

1. Distinction between Nano Particles, Molecules and Bulk materials.
2. Define Carbon Nanotubes .Explain types and Synthesis of Carbon nanotubes.
3. Explain the Synthesis of Nano Materials by Bottom-up process.(Sol-gel and Solvothermal process)
4. Explain the Synthesis of Nano Materials by Top-up process.(Laser-ablation, CVD, Electro deposition)
5. Explain the Application of Nano materials.

UNIT-III-PHASE RULE & COMPOSITES

PART-A (2- MARKS)

1. State Phase rule & Reduced phase rule.
2. Define Phase, Component & Degree o freedom.
3. What is Triple point & Eutectic point.
4. Define Composites.
5. What are meant by fibre, particulates, flakes &whiskers.

PART-B (8 MARKS)

1. Draw and explain the Phase diagram of water system.
2. Lets discuss in details Pb-Ag system and give its applications.
3. Explain Thermal Analysis.
3. Discuss in details of Constituents of Composites.
4. Explain the Types of Composites. (FRP)

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UNIT-IV-ENERGY RESOURCES AND STORAGE DEVICES

PART-A (2- MARKS)

1. Define Nuclear energy
2. What are Fertile and Fissile nuclides?
3. What is Super Capacitor?
4. What is Solar cell and Wind energy?
5. Define Geothermal energy

PART-B (8 MARKS)

1. Describe using a block diagram the Light water nuclear reactor for power generation.
2. Write a note on Solar Cell, Wind and Breeder reactor.
3. What are Lead accumulators? Explain the construction and functioning of Lead accumulators.
4. Explain the working of Hydrogen-oxygen fuel cell.
5. Write a short note on Lithium ion battery.
6. Explain Electric Vehicles and Plug-in Electric Vehicles.

UNIT V-FUELS AND COMBUSTION

PART-A (2- MARKS)

1. Define Cetane & Octane number of gasoline?
2. What are the classifications of Fuels?
3. Define Calorific value of fuel?
4. What is Ignition and Spontaneous ignition temperature?
5. What are Power alcohol & Bio-diesel?

PART-B (8 MARKS)

1. Explain the Manufacture of Metallurgical coke by Otto-Hoffmann method.
2. Explain proximate analysis of coal.
3. What is Synthetic petrol? How is it manufactured by Bergius process?
4. Write a detailed account on Refining of petroleum.
5. What is Flue gas analysis? Explain ORSAT method.

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IMPORTANT FORMULAS MA3151 MATRICES AND CALCULUS
UNIT-III (FUNCTIONS OF SEVERAL VARIABLES)

PART - A

1. If $x = r\cos\theta$ and $y = r\sin\theta$, evaluate $\frac{\partial(x,y)}{\partial(r,\theta)}$.
2. If $u = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$, Find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.
3. State Euler's theorem on homogeneous function.
4. Find $\frac{du}{dt}$ if $u = \frac{x}{y}$, where $x = e^t$, $y = \log t$.
5. If $u = (x-y)^4 + (y-z)^4 + (z-x)^4$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
6. If $u = (x-y)(y-z)(z-x)$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.
7. If $\log u = \frac{x^3+y^3}{x+y}$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2u\,logu$.
8. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x+y}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$.
9. Find the Jacobian of the transformation $u = \frac{2x-y}{2}$, $v = \frac{y}{2}$. Find $\frac{\partial(u,v)}{\partial(x,y)}$.
10. Find the Jacobian of the transformation $x = r\cos\theta$, $y = r\sin\theta$. Find $\frac{\partial(x,y)}{\partial(r,\theta)}$
11. Find the Jacobian of the transformation $x = u(1+v)$, $y = v(1+u)$. Find $\frac{\partial(u,v)}{\partial(x,y)}$
12. Define stationary value
13. If $u = x^2 + y^2 + z^2$ and $x = e^t$, $y = e^t\,sint$, $z = e^t\,cost$ find $\frac{du}{dt}$
14. Find the stationary values for the function $f(x,y) = x^3 - y^3 - 3xy$
15. Find $\frac{dy}{dx}$ if $f(x,y) = x^3 - y^3 - 3xy$

PART - B

1. i) If f(x,y) = $\varphi(u,v)$, where $u = x^2 - y^2$ and $v = 2xy$, Prove that

   $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 4(x^2+y^2)\left[\frac{\partial^2 \varphi}{\partial u^2} + \frac{\partial^2 \varphi}{\partial v^2}\right]$.

   ii) If f be a function of x & y , u and v are the two variables, show that,

   $u = lx + my, v = ly - mx$ prove that

   $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 4(l^2+m^2)\left[\frac{\partial^2 f}{\partial u^2} + \frac{\partial^2 f}{\partial v^2}\right]$

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