Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   **(08)**

a)   Resolve into partial fractions: $\dfrac{x+1}{(x+3)(x-2)}$

b)   Resolve into partial fractions: $\dfrac{x}{x^2-1}$

c)   Find X if $\begin{bmatrix} 4 & 5 \\ -3 & 6 \end{bmatrix} + x = \begin{bmatrix} 10 & -1 \\ 0 & -5 \end{bmatrix}$

d)   Find x & y if $\begin{bmatrix} 3x^2 & 4 \\ 1 & y-3 \end{bmatrix} = \begin{bmatrix} 12 & 4 \\ 1 & 8 \end{bmatrix}$

e)   If $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 4 & 6 \end{bmatrix}$ find 2A+3B-4I

f)   Find the middle term in the expansion of $(x+5)^8$

Q.2   Attempt any **FOUR**   **(16)**

a)   Solve using determinants: $x+y+z=1$; $2x+3y+z=4$; $4x+9y+z=16$

b)   Prove using properties that $\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$

c)   Resolve into partial fractions: $\dfrac{x^2+2x}{(x-3)(x^2+1)}$

d)   Express the matrix 'A' as the sum of symmetric and skew-symmetric matrices $A = \begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$

e)   If $A = \begin{bmatrix} -1 & 3 & 5 \\ 0 & 6 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -5 \\ 7 & 8 \\ 1 & -1 \end{bmatrix}$, $C = \begin{bmatrix} 4 & -5 \\ 1 & 1 \end{bmatrix}$, *verify that* $(AB)C = A(BC)$

f)   Find A^{-1} by adjoint method if $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

Q.3   Attempt any **FOUR**   **(16)**

a) Solve the following equation $\begin{vmatrix} x+10 & x+2 & x+3 \\ x+4 & x+5 & x+6 \\ 2x+7 & x+8 & 0 \end{vmatrix} = 0$

b) Resolve into partial fractions: $\dfrac{x^2+x+1}{(x+1)^2(x+2)}$

c) Resolve into partial fractions: $\dfrac{2x^4+x^2+4}{(x^2+1)(2x^2+3)(x^2-2)}$

d) Solve the following simulations equations by matrix method: 2x+y=3; 2y+3z=4; 2z+2x=8

e) Using Binomial theorem prove that $\left(\sqrt{2}+1\right)^5 - \left(\sqrt{2}+1\right)^5 = 82$

f) The term independent of x in the expansion of $\left(x^3 + \dfrac{m}{x^8}\right)^{11}$ is 1320 find m.

Q.4   Attempt any **FOUR**   **(08)**

a) Prove that as $\cos(\pi + \theta) = -\cos\theta$

b) If A=30^0 verify that $\sin 3A = 3\sin A - 4\sin^3 A$

c) Express as product and evaluate $\sin 99^0 - \sin 81^0$

d) Prove that a=b cos c + C cosB

e) Find principal value of $\cos^{-1}\left(-\dfrac{1}{2}\right) - \sin^{-1}\left(\dfrac{1}{2}\right)$

f) In $\triangle ABC$ if a=125cm, b=123cm, c=62cm find $\sin\dfrac{A}{2}$

Q.5   Attempt any **FOUR**   **(16)**

a) If $\tan(x+y) = \dfrac{3}{4}$, $\tan(x-y) = \dfrac{8}{15}$ them show that $\tan 2x = \dfrac{77}{36}$

b) Prove that $\dfrac{\sec 8A - 1}{\sec 4A - 1} = \dfrac{\tan 8A}{\tan 2A}$

c) Prove that $\dfrac{\sin 4A + \sin 5A + \sin 6A}{\cos 4A + \cos 5A + \cos 6A} = \tan 5A$

d) Prove that $\tan^{-1}\left(\dfrac{1}{7}\right) + \tan^{-1}\left(\dfrac{1}{13}\right) = \cot^{-1}\left(\dfrac{9}{2}\right)$

e) Prove that $\left(b^2 - c^2\right)\sin^2 A + \left(c^2 - a^2\right)\sin^2 B + \left(a^2 - b^2\right)\sin^2 c = 0$

f) Solve $\triangle ABC$ if $b = 1$, $c = \sqrt{3} - 1$ & $A = 60^0$

Q.6   Attempt any **FOUR**   **(16)**

a) If α and β both are obtuse angles and $\sin\alpha = \dfrac{5}{13}$, $\cos\beta = \dfrac{-4}{5}$ evaluate $\cos(\alpha + \beta)$

b) Prove that $4\sin A\sin(60^0 - A)\sin(60^0 + A) = \sin 3A$

c) Show that $\cos^{-1}\left(\dfrac{4}{5}\right) + \tan^{-1}\left(\dfrac{3}{5}\right) = \tan^{-1}\left(\dfrac{27}{11}\right)$

d) In $\triangle ABC$ show that $\tan A + \tan B + \tan C = \tan A\tan B\tan C$

e) Solve $\triangle ABC$ in which the sides are a=52.8, b=39.3, c=72.1

f) In any $\triangle ABC$, prove that $a\cos\left(\dfrac{B-C}{2}\right) = (b+c)\sin\dfrac{A}{2}$

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL: **FOURTH**   PROGRAM: **IE/ E&TC**
COURSE CODE: **IEE/ETE406/IX/EJ308/IE311/ET311/4306**
COURSE NAME: **ELECTRONIC CIRCUIT DESIGN**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **30/04/2016**

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

| Section – I | Marks |

Q.1   Attempt any **FOUR**   (08)

a)   Draw the symbols of i) zener diode ii) BJT iii) FET iv) UJT

b)   List any four specification of FET.

c)   Draw the diagram of zener shunt regulator.

d)   Draw the pin diagram of IC723

e)   Draw the diagram direct coupled amplifier.

f)   What does the darling ton connection consist of essentially?

Q.2   Attempt any **TWO**   (16)

a)   1) State the specification of semiconductor diode.

   2) Write any two specification of the following transformer

   i) Power transformer

   ii) IF transformer.

   iii) AF transformer.

   iv) Pulse transformer.

b)   i) Design a stabilized power supply using capacitor filter to give dc output of 40V of 2kΩ load with the ripple factor not exceeding 2%.

   ii) Write down steps of emitter follower circuit.

c)   Design a series voltage regulator for output voltage in the range of 10 to 15V at 50mA, The unregulated power supply provided output of 25 ± 5V and $r_0 = 8\Omega$.

Q.3   Attempt any **TWO**   (16)

a)   Design a full wave rectifier with an LC filter to supply 20V dc at 200mA with a maximum ripple content of 1%.

b) Design a two stage RC coupled amplifier to meet the following specifications, load resistance $R_L=3k\Omega$ source resistance $R_S=600\Omega$, output voltage of $V_{(PP)}$ with a supply voltage of 15V, lower 3dB frequency is 50Hz.

c) Design a source follower circuit for $R_i>20M\Omega$, $R_0\leq500\Omega$, $R_L=1k\Omega$ lower 3dB frequency $f_l=30Hz$ with $V_{CC}=20V$.

Section – II   Marks

Q.4   Attempt any **FOUR**   (08)

a) Write any two drawbacks of class A power amplifier with resistive load.

b) Draw circuit diagram of complementary symmetry power amplifier.

c) Define oscillator. Write formula for frequency of oscillations for copilt's oscillator.

d) Define efficiency of power amplifier.

e) Draw circuit of wein bridge oscillator using BJT.

f) Define bistable multivibrator.

Q.5   Attempt any **FOUR**   (16)

a) Design a monostable multivibrator using IC 741 for pulse duration of 100msec with reference voltage of 5V. Use $V_{CC}=15V$.

b) Explain with circuit diagram transformer coupled class A power amplifier.

c) Design RC phase shift oscillator for following specifications using IC741,
Peak output voltage=14V,
Frequency of oscillations= 1KHz,
Supply voltage=15V.

d) Explain working of Hartley oscillator using BJT.

e) Design wein bridge oscillator using IC741 for frequency of 1KHz at peak output voltage of 14V.

f) Explain with circuit diagram monostable multivibrator using IC 555.

Q.6   Attempt any **TWO**   (16)

a) Design Hartley oscillator using BJT for $f_0=5MHz$, $V_{0(p)}=4V_{rmx}$, $R_L=2.2k\Omega$

b) Design astable multivirator using IC 555 for the maximum output frequency of 5KHz with duty cycle $\leq$ 25%. Also calculate the V_{CC} required for the 5V output.

c) Design a class B push-pull power amplifier to give 2W power to 4Ω load.

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E C D Datasheets
Appendix

Appendix - 1

Resistor Preferred Values

Ohms (Ω)				Kilohms (KΩ)			Megohms (MΩ)	
0.10	1.0	10	100	1.0	10	100	1.0	10
0.11	1.1	11	110	1.1	11	110	1.1	11
0.12	1.2	12	120	1.2	12	120	1.2	12
0.13	1.3	13	130	1.3	13	130	1.3	13
0.15	1.5	15	150	1.5	15	150	1.5	15
0.16	1.6	16	160	1.6	16	160	1.6	16
0.18	1.8	18	180	1.8	18	180	1.8	18
0.20	2.0	20	200	2.0	20	200	2.0	20
0.22	2.2	22	220	2.2	22	220	2.2	22
0.24	2.4	24	240	2.4	24	240	2.4	
0.27	2.7	27	270	2.7	27	270	2.7	
0.30	3.0	30	300	3.0	30	300	3.0	
0.33	3.3	33	330	3.3	33	330	3.3	
0.36	3.6	36	360	3.6	36	360	3.6	
0.39	3.9	39	390	3.9	39	390	3.9	
0.43	4.3	43	430	4.3	43	430	4.3	
0.47	4.7	47	470	4.7	47	470	4.7	
0.51	5.1	51	510	5.1	51	510	5.1	
0.56	5.6	56	560	5.6	56	560	5.6	
0.62	6.2	62	620	6.2	62	620	6.2	
0.68	6.8	68	680	6.8	68	680	6.8	
0.75	7.5	75	750	7.5	75	750	7.5	
0.82	8.2	82	820	8.2	82	820	8.2	
0.91	9.1	91	910	9.1	91	910	9.1	

Capacitor Preferred Values

Pico Farad (pF → 10⁻¹²)								Micro Farad (μF → 10⁻⁶)			
10	100	1000	0.01	0.1	1.0	10	100	1000			
12	120	1200	0.015	0.15	1.5						
15	150	1500	0.022	0.22	2.2	22	220	2200			
22	220	2200	0.033	0.33	3.3	33	330	3300			
27	270	2700	0.047	0.47	4.7	47	470	4700			
33	330	3300	0.068	0.68	6.8						
39	390	3900									
47	470	4700									
55	560	5600									
68	680	6800									
82	820	8200									

Appendix - 2

Rectifier Diode Specification Sheets

Type No.	Material (Si/G)	V_R(PIV) (V)	I_F (A)	V_F (V)	I_R (μA)
IN4001	S	50	1.0	1.1	5
IN4002	S	100	1.0	1.1	5
IN4003	S	200	1.0	1.1	5
IN4004	S	400	1.0	1.1	5
IN4005	S	600	1.0	1.1	5
IN5062	S	800	1.0	1.1	5
IN4006	S	800	1.0	1.1	5
IN4007	S	1000	1.0	1.1	10
IN4148	S	75	0.1	1.0	25 (nA)
IN5060	S	400	2.5	1.25	0.2
IN5551	S	600	2.5	1.25	0.2
IN5062	S	800	2.5	1.25	0.2
IN5391	S	200	1.5	1.4	250
IN5393	S	200	1.5	1.4	250
IN5397	S	600	1.5	1.4	250
IN5399	S	1000	1.5	1.4	250
IN5402	S	200	3.0	1.0	10
IN5408	S	1000	3.0	1.0	5
IN5409	S	200	2.5	1.25	0.2
OA 47	G	25	0.05	0.6	30
OA 85	G	115	0.05	0.1	4.5
OA 90	G	30	0.008	0.1	2.4
OA 95	G	115	0.05	0.1	4.5
BA 100	G	60	0.09	0.1	
BA 102	G	20	0.09	1.0	
BY 125	S	150	1.0	1.5	10
BY 100	S	1250	1.0	1.5	10
BY 126	S	650	1.0	1.5	10
BY 127	S	1250	1.0	1.5	10
DR 25	G	25	0.25		10

Switching and Detector Diodes

Type No.	Material	V_R(PIV) (V)	I_F (mA)	V_F (V)	I_R (μA)
IN914	S	75	10		25
IN915	S	50	10		5
OA 70	G	22.5	50	0.1	30
OA 72	G	45	10	0.2	18
OA 73	G	30	50	0.1–0.2	18
OA 79	G	45	35	0.15–0.3	0.1–2.8

Appendix - 3

Zener Diode

Type No.	Zener Voltage (V_Z at I_Z)	Zener Test Current (I_Z mA)	Zener Impedance (Z_Z Ω)
IN4370	2.4	20	30
IN4371	2.7	20	30
IN4372	3.0	20	29
IN746	3.3	20	28
IN747	3.6	20	24
IN748	3.9	20	23
IN749	4.3	20	22
IN750	4.7	20	19
IN751	5.1	20	17
IN752	5.6	20	11
IN753	6.2	20	7
IN754	6.8	20	5
IN755	7.5	20	6
IN756	8.2	20	8
IN757	9.1	20	10
IN758	10	20	17
IN759	12	20	30
IN957A	6.8	18.5	4.5
IN958A	7.5	14	5.5
IN960A	9.1	11.5	7.5
IN962A	11	9.5	9.5
IN964A	13	8.5	13
IN965A	15	7.8	16
IN966A	16	7.0	17
IN968A	20	6.2	25
IN972A	30	4.2	49
IN980A	62	2.0	185
IN983A	82	1.5	330
IN985A	100	1.3	500
IN3993	3.9	640	2
IN3994	4.3	580	1.5
IN3996	5.1	530	1.2
IN3997	5.6	490	1.1
IN3398	6.2	445	1.1
IN3399	6.8	405	1.0
IN3999	6.8	370	1.2
IN4000	—	355	13

IN746–970 series ± 5 %, suffix A for ± 5 % units, C for ± 2 %
IN746 series ± 10 %, suffix A for ± 5 % units, C for ± 2 %
IN795 series ± 10 %, suffix A for ± 10 % units, C for ± 2 %

Appendix - 4

Tables of Transistor Data

Transistor No	Material and Type	V_{CB} (V)	V_{CE} (V)	V_{EB} (V)	$I_{C(max)}$ (mA)	PT (mW)	h_{FE}	f_T (MHz)
AC105	PG	40	18	10	1 A	400	15	0.5
AC110	PG	20	15	10	50	30	75	1
AC126	PG	32	12	10	100	500	100	1.5
AC127	NG	32	12	10	500	340	50	1
AC128	PG	32	16	10	1 A	67	45/165	2
AC130	NG	20	15	10	100	145	50	-
AC131	PG	45	32	10	1 A	75	40/120	1
AC153	PG	32	18	10	2 A	1 W	50	1
AC163	PG	32	24	10	200	900	80	1
AC166	PG	32	20	6	800	200	45	0.8
BC107	NS	50	45	6	100	300	110	150
BC108	NS	30	20	6	100	300	120	150
BC109	NS	30	20	5	100	300	180	150
BC115	NS	40	30	5	100	300	80	40
BC116	NS	45	30	5	100	300	35	130
BC119	NS	60	40	5	1 A	800	40	40
BC126	NS	35	30	5	600	300	40	100
BC138	NS	60	40	5	1 A	800	35	40
BC139	PS	40	40	5	500	700	40	100
BC142	NS	80	60	4	1 A	800	20	40
BC146	NS	20	20	6	50	50	80	150
BC147A	NS	50	45	6	200	250	110/220	150
BC147B	NS	50	45	6	200	250	200/330	150
BC148	NS	30	20	5	200	250	110	150
BC151	PS	23	20	-	100	200	90/150	120
BC158	PS	30	25	5	100	300	70	100
BC161	PS	60	60	4	1 A	3.2 W	40	50
BC177	PS	45	45	5	100	300	70	130
BC178B	PG	30	25	-	200	300	180	100
BC179A	-	25	20	5	50	300	120	100
BC180	NS	40	30	5	500	300	100	150
BC194	NS	40	25	5	800	100	40/250	250
2N109	PG	35	25	12	150	165	65	0.15
2N244	NS	60	60	-	60	750	59	4
2N271	PG	30	10	20	200	150	45	-
2N312	NG	15	15	15	200	150	50	2
2N329B	PS	50	30	20	100	400	36/88	5
2N334A	NS	45	45	4	25	500	18/86	-
2N??	NS	40	15	5	200	360	30/120	300

Transistor No	Material and Type	V_{CB} (V)	V_{CE} (V)	V_{EB} (V)	$I_{C(max)}$ (mA)	PT (mW)	h_{FE}	f_T (MHz)
2N918	NS	30	15	3	50	200	20	600
2N930	NS	45	45	5	30	300	100	30
2N941	PS	25	8	25	50	250	10	16
2N1711	NS	75	50	7	600	800	100	70
2N1779	NG	25	-	15	200	100	20/60	3
2N1893	NS	120	80	7	500	800	40/120	50
2N2219	NS	60	30	5	800	800	100	250
2N2396	NS	60	40	5	300	450	40/120	40
2N2903	NS	60	30	7	50	300	125	60
2N2905	PS	60	40	5	600	600	100	200
2N2909	NS	60	40	5	1 A	400	40/120	50
2N2927	PS	25	25	4	500	400	30/130	100
2N2997	PG	30	15	0.3	50	75	40/500	400
2N2976	NS	45	45	60	30	250	50/240	60
2N3015	NS	60	30	5	500	800	30/120	30
2N3903	NS	60	40	6	200	310	50/150	250
2N3905	PS	40	40	5	200	310	50/150	200
2N5837	NS	10	5	3.5	300	2 W	25	1700
2N5843	PS	50	40	5	50	600	50/150	200
2N5855	PS	60	60	5	1 A	750	50/300	15
2N5856	NS	60	60	5	1 A	750	50/300	200

High frequency Transistors

Transistor No	Material and Type	V_{CB} (V)	V_{CE} (V)	V_{EB} (V)	$I_{C(max)}$ (mA)	PT (mW)	h_{FE}	f_T (MHz)
AF115	PG	32	15	2	10	75	50	75
AF116	PG	32	15	2	10	75	50	75
AF121	PG	25	25	-	10	140	30	270
AF181	PG	30	30	12	20	155	20	105
AF187	PG	18	-	12	100	185	25	3
AF194	PG	20	-	0.5	10	80	60	50
AF200	PG	25	-	0.3	10	225	30	100
AF202	PG	15	-	0.3	30	225	20	100
AF239S	PG	15	15	0.3	10	60	10	450
BF137	NS	160	160	5	100	680	25	50
BF154	NS	30	20	4	50	300	25	200
BF160	NS	30	12	2	50	200	20	400
BF179B	NS	220	115	5	50	600	20	60
BF183	NS	25	20	3	15	150	10	4??
BF194	NS	30	20	5	30	250	67/220	130
BF195	NS	30	20	5	30	250	36/125	100
SF104	PS	20	18	4	50	250	50/250	250
BF248	NS	30	25	3	600	400	30/300	180
BF249	PS	30	25	3	600	400	30/300	180
BF315	PS	20	20	4	100	360	60	300

Power transistors

Transistor No	Material and Type	V_{CB} (V)	V_{CE} (V)	V_{EB} (V)	$I_{C(max)}$ (A)	PT (W)	h_{FE}	f_T (MHz)
AD1364	PG	40	-30	10	10	11	30	1
AD140	PG	55	55-	-	3	35	30	0.3
AD143-5	PG	45	35	10	10	30	0.45	0.2
AD156V	NG	32	16	10	2	8	50/110	0.45
AD157V	NG	32	20	10	2	8	50/100	1
AD161	NG	32	20	10	4	4	80	1
AD162	PG	32	20	10	6	5	50	1
AD165	NG	25	20	10	5	6	60	1
AD262	PG	35	20	10	10	10	30	0.5
ACY12	PG	60	45	10	4	0.25	60/100	0.45
BD115	NS	245	180	-	0.6	10	22	0.35
BD124	NS	70	45	2	0.15	6	35	80
BD131	NS	70	45	6	2	15	40	60
BD132	PS	45	45	-	3	11	40	60
BD135	NS	45	45	5	3	11	40/250	50
BD136	PS	45	45	5	1	12	40/250	50
BD137	NS	60	60	5	1	12	40/160	50
BD138	PS	60	60	5	1	12	40/160	50
BD141	NS	140	170	7	8	12	20/70	50
BD145	NS	60	60	-	1	117	45	-
BD151	NS	35	30	5	5	15	30/150	50.
BD152	PS	50	45	5	3	25	30/150	-
BD165	NS	45	45	5	1.5	20	40	3
BD166	PS	45	45	5	1.5	20	40	3
BD181	NS	55	40	7	10	23	20/78	-
BD182	NS	70	60	7	15	117	20/70	-
BD187	NS	55	45	-	4	40	40	2
BD188	PS	55	45	-	4	40-	40	2
BD232	NS	55	500	5	0.25	11	25/150	20
SL100	NS	60	50	6	0.5	4.	40/300	3
SK100	PS	60	50	6	0.5	4	40/300	3
SL102	NS	30	30	3.5	1	3	50/280	-
SK102	PS	30	30	3.5	1	3	50/280	-
TIP29C	NS	100	100	5	1	30	40/200	3
TIP30C	PS	100	100	5	3	30	40/200	3
TIP31	NS	40	40	5	3	40	20/100.	3
TIP32	PS	40	40	5	3	40	20/100	3
TIP33	NS	40	40	5	10	80	20	3
TIP34	PS	40	40	5	10	80	20	3
TIP41	NS	40	40	6	6	2	15/75	3
TIP42	PS	40	40	6	6	2	15/75	3

Transistor No	Material and Type	V_{CB} (V)	V_{CE} (V)	V_{EB} (V)	$I_{C(max)}$ (A)	PT (W)	h_{FE}	f_T (MHz)
TIP62	PS	40	40	5	2	40	15/100	1
TIP120	NS	60	60	5	5	60	1000	-
TIP125	PS	60	60	5	5	60	1000	-
TIS45	NS	40	15	0.2	250	30/120	300	
2N1481	NS	60	40	12	1.5	5	30/120	1
2N1721	NS	150	100	1	50	35/100	16	
2N1722	NS	120	80	7.5	15	40/120	10	
2N2067	PG	40	25	20	3	50	20/90	
2N2033	NS	60	10	-	3	20		
2N3017	NS	60	-	8	1	5	20/60	1
2N3055A	NS	100	60	7	700 mA	15	50/200	80
2N3055	NS	100	60	5	15	115	50	100
2N3140	NS	140	140	1	2	25	20/70	0.2
2N3180	PS	60	-66	5	85	10	10	
2N3878	NS	50	50	7	4	35	10/30	-
ECN100	NS	-	-	0.7	5	20	40	
ECN149	NS'	50	40	3	4	50	50	-
ECP149	PS	50	40	6	4	30	10	-

FET table

Transistor No	Channel	V_{DS} (V)	I_D (mA)	I_{GSS} (nA)	$V_{GS(off)}$ (V)	I_{DSS} (mA)	Y_{FS} ($\mu\mho$)	Y_{OS} ($\mu\mho$)	P_D (W)
2N3821	N.CH	50	10	0.1	4	2.5	1.5 - 4.5	10	0.3
2N3822	"	50	10	0.1	6	2.1	3 - 6.5	20	0.3
2N4091	"	40	10	0.2	5-10	30	-	-	0.3
2N4221	"	30	15	-0.1	-6	-	2.5	-	0.3
2N4416	"	30	15	-0.1	-8	-	2.5-	20	0.3
2N4856	"	30	10	0.1	6	-	2.5	40	0.3
2N4857	"	40	10	-0.25	-4, -10	50	4.5 - 7.5	50	0.36
2N5457	"	25	10	-1.0	-6	3	3000	-	0.36
2N5458	"	25	10	-1	-7	6-9	3000	10-50	0.31
BFW10	"	15	-	0.1	8	820	4000	10-50	0.31
BFW11	"	15	-	0.1	6	810	3.2 mA/V	50	0.3

Unijunction transistors

Type	I_e (A)	η	I_p (μA)	I_v (mA)	V_{EB} (V)	P_D (W)	R_{bb} (kΩ)
2N2646	2	0.56 - 0.78	1.5	6	3.5	0.3	4.7 - 9.1
2N3980	1.5	0.68 - 0.82	2	1-10	3	0.36	4 - 8
2N4851	1.5	0.56 - 0.75	2	2	2.5	0.3	4 - 8
2N4948	1	0.55 - 0.82	0.6	4	2.5	0.36	4 -12

Darlington Transistors

78XX Voltage Regulator Datasheet :-

Device type with input Voltage	Output Voltage (V)	Output Current	Quiescent Current (mA)	Line regulation (mV)	Load regulation (mV)	Ripple rejection (dB)
78XXC (35)	5	1A	8	25	50	80
	12	1A	8	60	120	72
	15	1A	8	75	150	70
78LXXAC (35)	5	100 mA	3 to 5	10	5	62
	12	100 mA	3 to 5	20	10	54
	15	100 mA	3.1 to 5	25	12	51
78LXXC (35)	5	100 mA	3 to 6	10	5	60
	12	100 mA	3 to 6.5	20	10	52
	15	100 mA	3.1 to 6.5	24	12	49
78MXX (35)	5	0.5A	4 to 10	50	100	78
	12	0.5A	4 to 10	120	240	71
	15	0.5A	4 to 10	150	300	69

N Channel JFET

N-Channel

P Channel JFET

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM APRIL / MAY 2016
EXAM SEAT NO.

LEVEL :- **FIFTH**   PROGRAM : **INDUSTRIAL ELECTRONICS**
COURSE CODE :- **IEE502/IX408**
COURSE NAME :- **EMBEDED SYSTEMS**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **02 / 05 / 2016**

Instruction :-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	Marks

Q.1   Attempt any FOUR   (08)

a) Write an 8051 C program to send values from -4 to +4 on port 1.
b) Write the statement in 'C' to store the Word "GPKP" in code memory of 8051 microcontroller.
c) State any two advantages of 'C' programming over assembly language programming.
d) What value should be loaded in TMOD SFR to configure timer Φ and counter 1 in mode Φ and mode 1 respectively?
e) State any two single bit data types used in 'C' programming and its use.
f) State the various intercepts used by 8051 microcontroller along with their vector location.

Q.2   Attempt any FOUR   (16)

a) Assuming that crystal frequency = 22M-Hz write a program in 'C' for 8051 microcontroller to generate a square wave of frequency 1KHz at P1.2.
b) Assume that a 1Hz external clock is fed into TΦ Pin (P3.4). Write a 'C' program to display second and minutes on port 1 and port 2 respectively.
c) Write the different logical operators used in 'C' programming along with its symbol and operation.
d) Write an 8051 program to read a hexadecimal number from port Φ, convert it into decimal number and display the digits on port 1,2,3, continuously.
e) Draw the format of IE SFR and explain the significance of each bit
f) Write a 'C' program for 8051 using interrupts to do the following
   i) Generate 10KHz frequency square wave on P2.1.
   ii) Use timer 1 as event counter to count up an external pulse applied at INT 1 pin. Assume crystal frequency = 12MHz.

Q.3   Attempt any FOUR   (16)

a) Draw the format of TMOD SFR and explain the significance of each bit.
b) With the help of suitable diagram, explain various types of data transmission methods.
c) Write a 'C' program to transmit the message "INDIA" through serial port at a baud rate of 1200. Assume crystal frequency = 11.0592 MHz.
d) Write the steps in detail executed by 8051 micro controller upon activation of an interrupt.

P.T.O.

e) Write a 'C' program for 8051 using interrupt to do the following
   i) Receive data serially at a baud rate of 9600 through serial port and send it to port 2.
   ii) Read port 1 and send the data at port Φ continuously.
      Assume crystal frequency = 11.0592 MHz.

f) Write a 'C' program for 8051 to monitor the door sensor and sound the buzzer.
   when it opens. A door sensor is connected to P1.1 and a buzzer is connected P1.7.

Section – II	Marks

Q.4   Attempt any **FOUR**   (08)

a) List any two specifications of an ADC and also give its meaning.

b) Describe the functions of RS and RW pins of LCD.

c) State any two characteristics of output and driver circuit.

d) To rotate stepper motor 90^0 how many steps are needed if step angle is 0.9^0.

e) List any two specifications of DAC and its meaning.

f) Give any two advantages of data aquistion systems.

Q.5   Attempt any **FOUR**   (16)

a) Draw a neat interfacing diagram of LM-35 sensor with 8051 using ADC 0809.

b) Develop and execute C langulage program to rotate stepper motor in clockwise
   direction. Assume step angle $= 2^0$.

c) Draw the neat interfacing diagram of ADC 0809 with 8051 microcontroller.

d) Write a 'C' program for 8051 to rotate a DC motor with 25% duty cycle speed.

e) Develop "C" language program to display "GPKP" on first line of LCD.

f) Draw the interfacing diagram of stepper motor with 8051.

Q.6   Attempt any **FOUR**   (16)

a) Draw the interfacing diagram of 4 X 4 key board matrix with 8051.

b) Enlist and explain any four factors used for selection of ADC.

c) Draw a flow chart to read the data from sensor by 8051 microcontroller.

d) Write a "C" language program using DAC 0808 to generate square wave at DAC output.

e) Draw the interfacing diagram of DC motor with 8051.

f) Draw a neat interfacing diagram of 8051 μC based data acquisition system.

****

LEVEL: THRID   PROGRAM: CE/ME/IE/E&TC/SM/MT/IT

COURSE CODE:

MEE313/MTE312/ME214/R228/MG228/ITE312/R228/IEE/ETE312/IX/EJ210/R228/0228

COURSE NAME: HIGHER MATH'S

MAX. MARKS: 80   TIME: 3 HRS.   DATE: 02/05/2016

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   **(08)**

   a) Evaluate $\left(\dfrac{\Delta^2}{E}\right) x^2$ *taking* $h=1$

   b) Prove that $E\Delta = \Delta E$

   c) Prove that $\Delta \log f(x) = \log\left[1 + \dfrac{\Delta f(x)}{f(x)}\right]$

   d) If $z = \log(x^2 + y^2)$. *find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

   e) If $z = x^y$, *then find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

   f) If $u = \sin(xy)$, *find* $\dfrac{\partial^2 u}{\partial x.\partial y}$

Q.2   Attempt any **FOUR**   **(16)**

   a) Estimate the missing term in the following table.

x	1	2	3	4	5
y	2	5	7	-	32

   b) Express $f(x) = 2x^4 + x - 1$ in factorial notation & find $\Delta^3 f(x)$ *at* $x = 1.5$

   c) It f(x)is a polynomial of degree 2 in x If f(0)=8, f(1)=12, f(2)=18 then find f(x) using suitable interpolation formula.

   d) The following table gives the premium payable for the policy of RS.1000 at age x.

Age	20	25	30	35	40
Premium	23	26	30	35	41

   Find the premium, if the policy is taken at the age of 26 years.

   e) Find f(1.7), if f(-2)=4, f(-1)=26, f(0)=58, f(1)=112, f(2)=446

   f) Using Lagrange's formula, find f(6)

x	3	7	9	10
y	168	120	72	63

Q.3 Attempt any **FOUR**

a) If $z = \sin^{-1}\left(\dfrac{y}{x}\right)$, verify that $\dfrac{\partial^2 z}{\partial x.\partial y} = \dfrac{\partial^2 z}{\partial y.\partial x}$

b) If $\sin U = \dfrac{x^2 y^2}{x+y}$ show that $x\dfrac{\partial u}{\partial x} + y.\dfrac{\partial u}{\partial y} = 3\tan u$

c) If $u = x^2.\tan^{-1}\left(\dfrac{y}{x}\right) - y^2.\tan^{-1}\left(\dfrac{x}{y}\right)$ show that $\dfrac{\partial^2 u}{\partial x.\partial y} = \dfrac{x^2 - y^2}{x^2 + y^2}$

d) If $x = r\cos\theta$, $y = r\sin\theta$, find $\dfrac{\partial(x, y)}{\partial(r, \theta)}$

e) If $x = e^U.\cos V$ and $y = e^U.\sin V$ prove that $\dfrac{\partial(x, y)}{\partial(U, V)} \times \dfrac{\partial(U, V)}{\partial(x, y)} = 1$

f) If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x - y}\right)$ then prove that $x^2\dfrac{\partial^2 u}{\partial x^2} + 2xy\dfrac{\partial^2 u}{\partial x.\partial y} + y^2\dfrac{\partial^2 u}{\partial y^2} = \sin 4U - \sin 2U$

Q.4 Attempt any **FOUR**

a) Evaluate $L\{\sin 2t.\sin t\}$

b) Find the Fourier constant a_0 for the function $f(x) = e^{ax}$ in $(0, 2\pi)$ where $a \neq 0$

c) Evaluate $L\{e^{-t}\cos 2t\}$

d) Evaluate $L^{-1}\left\{\dfrac{1}{(s+1)^2}\right\}$

e) Evaluate $L^{-1}\left\{\dfrac{1}{s^2 + 5s + 6}\right\}$

f) Find a_0 for Fourier series expansion for the function $f(x) = x + x^2$ in $(-\pi, \pi)$

Q.5 Attempt any **FOUR**

a) Find the inverse Laplace transform of $\dfrac{1}{(s+2)(s+4)}$ using convolution theorem.

b) Solve the differential equation using Laplace transform.
$\dfrac{d^2 y}{dt^2} - \dfrac{dy}{dt} - 2y = e^{-t}$, $y(0) = -3$ & $y'(0) = 0$

c) Find $L\{t^2 e^{4t}\sin t\}$

d) Find $L^{-1}\left\{\dfrac{3s + 2}{(4s + 3)(2s + 7)}\right\}$

e) Find $L\{\sin^2(3t).e^{4t}\}$

f) $L^{-1}\left\{\dfrac{4}{s+3} - \dfrac{s+2}{s^2 - 2s - 3}\right\}$

Q.6 Attempt any **TWO**

a) Find a Fourier series to represent $f(x) = x^2$ in $(0, 2\pi)$ & Hence deduce that
$\dfrac{\pi^2}{12} = \dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + - - - - -$

b) Obtain Fourier series expansion for the function
$f(x) = x + \dfrac{\pi}{2}, -\pi < x < 0$
$= \dfrac{\pi}{2} - x, \ 0 < x < \pi$

Hence deduce, $\dfrac{\pi^2}{8} = \dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + - - - - -$,

c) Find the Fourier series expansion of $f(x) = x, \quad 0 < x < 1$
$= 1 - x, \quad 1 < x < 2$

****

LEVEL: **THRID**   PROGRAM: **CE/ME/IE/E&TC/SM/MT/IT**

COURSE CODE:

MEE313/MTE312/ME214/R228/MG228/ITE312/R228/IEE/ETE312/IX/EJ210/R228/0228

COURSE NAME: **HIGHER MATH'S**

MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **02/05/2016**

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
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4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   **(08)**

a) Evaluate $\left(\dfrac{\Delta^2}{E}\right) x^2$ *taking* $h = 1$

b) Prove that $E\Delta = \Delta E$

c) Prove that $\Delta \log f(x) = \log\left[1 + \dfrac{\Delta f(x)}{f(x)}\right]$

d) If $z = \log(x^2 + y^2)$. *find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

e) If $z = x^y$, *then find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

f) If $u = \sin(xy)$, *find* $\dfrac{\partial^2 u}{\partial x.\partial y}$

Q.2   Attempt any **FOUR**   **(16)**

a) Estimate the missing term in the following table.

X	1	2	3	4	5
Y	2	5	7	-	32

b) Express $f(x) = 2x^4 + x - 1$ in factorial notation & find $\Delta^3 f(x)$ *at* $x = 1.5$

c) It f(x) is a polynomial of degree 2 in x If f(0)=8, f(1)=12, f(2)=18 then find f(x) using suitable interpolation formula.

d) The following table gives the premium payable for the policy of RS.1000 at age x.

Age	20	25	30	35	40
Premium	23	26	30	35	41

Find the premium, if the policy is taken at the age of 26 years.

e) Find f(1.7), if f(-2)=4, f(-1)=26, f(0)=58, f(1)=112, f(2)=446

f) Using Lagrange's formula, find f(6)

X	3	7	9	10
Y	168	120	72	63

Q.3   Attempt any **FOUR**   **(16)**

a) If $z = \sin^{-1}\left(\dfrac{y}{x}\right)$, *verify that* $\dfrac{\partial^2 z}{\partial x.\partial y} = \dfrac{\partial^2 z}{\partial y.\partial x}$

b) If $\sin U = \dfrac{x^2 y^2}{x + y}$ *show that* $x\dfrac{\partial u}{\partial x} + y.\dfrac{\partial u}{\partial y} = 3\tan u$

P.T.O.

Q.3   Attempt any **FOUR**

a) If $z = \sin^{-1}\left(\dfrac{y}{x}\right)$, verify that $\dfrac{\partial^2 z}{\partial x.\partial y} = \dfrac{\partial^2 z}{\partial y.\partial x}$

b) If $\sin U = \dfrac{x^2 y^2}{x+y}$ show that $x\dfrac{\partial u}{\partial x} + y.\dfrac{\partial u}{\partial y} = 3\tan u$

c) If $u = x^2.\tan^{-1}\left(\dfrac{y}{x}\right) - y^2.\tan^{-1}\left(\dfrac{x}{y}\right)$ show that $\dfrac{\partial^2 u}{\partial x.\partial y} = \dfrac{x^2 - y^2}{x^2 + y^2}$

d) If $x = r\cos\theta,\ y = r\sin\theta$, find $\dfrac{\partial(x,y)}{\partial(r,\theta)}$

e) If $x = e^U.\cos V$ and $y = e^U.\sin V$ prove that $\dfrac{\partial(x,y)}{\partial(U,V)} \times \dfrac{\partial(U,V)}{\partial(x,y)} = 1$

f) If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x-y}\right)$ then prove that $x^2\dfrac{\partial^2 u}{\partial x^2} + 2xy\dfrac{\partial^2 u}{\partial x.\partial y} + y^2\dfrac{\partial^2 u}{\partial y^2} = \sin 4U - \sin 2U$

Q.4   Attempt any **FOUR**

a) Evaluate $L\{\sin 2t.\sin t\}$

b) Find the Fourier constant a_0 for the function $f(x) = e^{ax}$ in $(0, 2\pi)$ where $a \neq 0$

c) Evaluate $L\{e^{-t}\cos 2t\}$

d) Evaluate $L^{-1}\left\{\dfrac{1}{(s+1)^2}\right\}$

e) Evaluate $L^{-1}\left\{\dfrac{1}{s^2 + 5s + 6}\right\}$

f) Find a_0 for Fourier series expansion for the function $f(x) = x + x^2$ in $(-\pi, \pi)$

Q.5   Attempt any **FOUR**

a) Find the inverse Laplace transform of $\dfrac{1}{(s+2)(s+4)}$ using convolution theorem.

b) Solve the differential equation using Laplace transform.
$\dfrac{d^2 y}{dt^2} - \dfrac{dy}{dt} - 2y = e^{-t}$, $y(0) = -3$ & $y'(0) = 0$

c) Find $L\{t^2 e^{4t}\sin t\}$

d) Find $L^{-1}\left\{\dfrac{3s+2}{(4s+3)(2s+7)}\right\}$

e) Find $L\{\sin^2(3t).e^{4t}\}$

f) $L^{-1}\left\{\dfrac{4}{s+3} - \dfrac{s+2}{s^2 - 2s - 3}\right\}$

Q.6   Attempt any **TWO**

a) Find a Fourier series to represent $f(x) = x^2$ in $(0, 2\pi)$ & Hence deduce that

$\dfrac{\pi^2}{12} = \dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + \ - - - -$

b) Obtain Fourier series expansion for the function
$$f(x) = x + \dfrac{\pi}{2}, \quad -\pi < x < 0$$
$$= \dfrac{\pi}{2} - x, \quad 0 < x < \pi$$

Hence deduce, $\dfrac{\pi^2}{8} = \dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + - - - -$,

c) Find the Fourier series expansion of
$$f(x) = x, \quad 0 < x < 1$$
$$= 1 - x, \quad 1 < x < 2$$

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL: **THRID**   PROGRAM: **CE/ME/IE/E&TC/SM/MT/IT**
COURSE CODE:
MEE313/MTE312/ME214/R228/MG228/ITE312/R228/IEE/ETE312/IX/EJ210/R228/0228
COURSE NAME: **HIGHER MATH'S**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **02/05/2016**

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
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5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   **(08)**

a) Evaluate $\left(\dfrac{\Delta^2}{E}\right)x^2$ *taking* $h=1$

b) Prove that $E\Delta = \Delta E$

c) Prove that $\Delta \log f(x) = \log\left[1+\dfrac{\Delta f(x)}{f(x)}\right]$

d) If $z = \log(x^2 + y^2)$. *find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

e) If $z = x^y$, *then find* $\dfrac{\partial z}{\partial x}$ & $\dfrac{\partial z}{\partial y}$

f) If $u = \sin(xy)$, *find* $\dfrac{\partial^2 u}{\partial x.\partial y}$

Q.2   Attempt any **FOUR**   **(16)**

a) Estimate the missing term in the following table.

x	1	2	3	4	5
y	2	5	7	-	32

b) Express $f(x) = 2x^4 + x - 1$ in factorial notation & find $\Delta^3 f(x)$ *at* $x = 1.5$

c) It f(x)is a polynomial of degree 2 in x If f(0)=8, f(1)=12, f(2)=18 then find f(x) using suitable interpolation formula.

d) The following table gives the premium payable for the policy of RS.1000 at age x.

Age	20	25	30	35	40
Premium	23	26	30	35	41

Find the premium, if the policy is taken at the age of 26 years.

e) Find f(1.7), if f(-2)=4, f(-1)=26, f(0)=58, f(1)=112, f(2)=446

f) Using Lagrange's formula, find f(6)

x	3	7	9	10
y	168	120	72	63

P.T.O

Q.3   Attempt any **FOUR**   **(16)**

a)   If $z = \sin^{-1}\left(\dfrac{y}{x}\right)$, *verify that* $\dfrac{\partial^2 z}{\partial x.\partial y} = \dfrac{\partial^2 z}{\partial y.\partial x}$

b)   If $\sin U = \dfrac{x^2 y^2}{x+y}$ *show that* $x\dfrac{\partial u}{\partial x} + y.\dfrac{\partial u}{\partial y} = 3\tan u$

c)   If $u = x^2.\tan^{-1}\left(\dfrac{y}{x}\right) - y^2.\tan^{-1}\left(\dfrac{x}{y}\right)$ *show that* $\dfrac{\partial^2 u}{\partial x.\partial y} = \dfrac{x^2 - y^2}{x^2 + y^2}$

d)   If $x = r\cos\theta,\ y = r\sin\theta,\ $ *find* $\dfrac{\partial(x,y)}{\partial(r,\theta)}$

e)   If $x = e^U.\cos V\ and\ y = e^U.\sin V$ *prove that* $\dfrac{\partial(x,y)}{\partial(U,V)} \ X\ \dfrac{\partial(U,V)}{\partial(x,y)} = 1$

f)   If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x - y}\right)$ *then prove that* $x^2\dfrac{\partial^2 u}{\partial x^2} + 2xy\dfrac{\partial^2 u}{\partial x.\partial y} + y^2\dfrac{\partial^2 u}{\partial y^2} = \sin 4U - \sin 2U$

Q 4   Attempt any **FOUR**   **(08)**

a)   Find L(f(t)) by using definition if $f(t) = 3,\ \ 0 < t < 5$
$= 0,\ \ t > 5$

b)   Find $L\left(e^{2+3t}\right)$

c)   Find $L\left(\cos^3 2t\right)$

d)   Find $L^{-1}\left(\dfrac{2}{s} + \dfrac{1}{s^3} + \dfrac{1}{s^2 + 4}\right)$

e)   Find $L^{-1}\left(\dfrac{1}{(s-3)^3}\right)$

f)   Find $\left(D^3 - 1\right)y = 0$

Q 5   Attempt any **FOUR**   **(16)**

a)   Find $L\left(t\ e^t \sin 2t\cos t\right)$

b)   Find $L\ \ L\left(\dfrac{e^{-3t}\sin 2t}{t}\right)$

c)   Find by L.T method the value of $\displaystyle\int_0^\infty e^{-3t}t\sin t\ dt$

d)   Find $L^{-1}\left(\dfrac{s+29}{(s+4)(s^2+9)}\right)$

e)   Using convolution theorem find $L^{-1}\left(\dfrac{1}{s(s+4)}\right)$

f)   Solve $\dfrac{d^3 y}{dx^3} - 4\dfrac{d2y}{dx^2} + 5D - 2 = 0$

Q 6) A) Attempt Any **TWO**   **08**

a)   Solve $\left(D^3 - 3D^2 + 4\right)y = 0$

b)   Solve $\dfrac{d^4 y}{dx^4} + 6\dfrac{d^2 y}{dx^2} + 9 = 0$

c)   Solve $\dfrac{d^3 y}{dx^3} + y = 0$

B) Attempt Any **ONE**   **08**

a)   Solve   by   using   L.T.   Method
$\left(D^2 - 3D + 2\right)y = 4e^{2t}$ *given that* $y^x(0) = -3\ and\ y'(0) = 5$

b) $\left(D^2 - D - 2\right)y = 20\sin 2t$ *given that* $y(0) = 1\ and\ y'(0) = 2$

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LEVEL: FIRST **PROGRAM: COMMON**
COURSE CODE: CCE107/X105/E109 **COURSE NAME: ENGINEERING DRAWING-I**
MAX. MARKS: 80 **TIME: 4 HRS.** **DATE: 29/04/2016**

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any **FOUR** (08)

a) Write Auto CAD command for the following
  i) To draw line of 40mm
  ii) To draw circle of radius 25mm

b) State the applications of parabola.

c) If point B is in the V.P. and 35mm above H.P. Draw its projection.

d) Draw conventions/ symbols for the following.
  i) Long brake line
  ii) Center line

e) A 2cm long line on a drawing represents a distance of 1 meter calculate Representative Fraction (R.F)

f) State the uses of the following drawing instrument.
  i) Set squares
  ii) French curves.

Q.2 Attempt any **FOUR** (16)

a) Construct parabola by rectangle method, given the base 100mm and height 70mm.

b) Draw direct (external) common tangent to two unequal circles of radius 25mm and 35mm respectively. The distance between the centers of two circles is equal to 100mm.

c) A string is unwound from a circle of 30mm radius. Draw the Involute of a circles the end of a string for unwinding the string completely. String is kept tight while being unwound.

d) The length of the top view of line parallel to VP and inclined at 45^0 to the H.P is 50mm. One end of the line is 12mm above the HP and 25mm in front of V.P. Draw the projection of the line and determine its true length.

e) Construct an ellipse by Arcs of circle method, given the major axis and minor axis 80mm and 50mm respectively.

f) The distance between end projections of a line PQ 100mm long is 80mm. The line is parallel to H.P. The end P is 15mm above H.P and 35mm in front of V.P Draw projections of line PQ and find inclination with V.P.

Q.3 Attempt any **TWO** (16)

a) Draw a cycloid of a circle of 50mm diameter.

b) Construct and Archemedian spiral for one convolution, given the greatest and least radii being 70mm and 15mm respectively.

c) A straight line AB 60mm long makes an angle of 55^0 to the H.P and 25^0 to the V.P The one end of the straight line AB is in the H.P and 20mm in front of V.P. Draw the projection of line AB.

Q.4 Attempt any **TWO** (08)

a) An isosceles triangle of base 30mm and attitude 50mm is having its base on H.P. plane is perpendicular to V.P and is inclined to H.P. in such a way that top view appears to be an equilateral triangle. Draw three views of plane.

b) A circular plate of diameter 60mm is resting on the V.P on a point of its circumference. The plate is inclined to V.P. in such a way that the elevation length of diameter (minor axis) passing through the point on V.P is 35mm, The plate is perpendicular to H.P. Draw its three views of the plate.

c) A pentagonal plate of 30mm side is resting on one of the side on H.P such that plate is inclined at 40^0 with H.P. and perpendicular to V.P. The center of plate is 50mm from V.P. draw its three views.

Q.5 Attempt any **TWO** (16)

a) A pentagonal prism having base side 30mm and axis 60mm long is resting on H.P on one of its base edge. Draw the projections of prism if the face containing that edge makes an angle of 60^0 with the H.P and its axis is parallel to V.P.

b) A cylinder having its base diameter 40mm and axis length 60mm is kept on the V.P on a point of its base circle such that its axis is inclined to V.P at 30^0 and parallel to H.P. Draw the projections of the cylinder.

c) A square pyramid side of the base 30mm and height 50mm is resting on its base with one of the sides of the base perpendicular to the V.P. It is cut by on AIP inclined at 45^0 to the H.P. in such a way that it bisects the axis. Draw F.V. sectional T.V. and true shape of section

     i)   F.V.   (02 Marks)
     ii)   Sectional T.V.   (02 Marks)
     iii)   True shape   (04 Marks)

Q.6 Attempt any **TWO** (16)

a) A right circular cylinder of 60mm base diameter and axis 100mm long is resting on the ground on its base. It is cut by a section plane perpendicular to V.P. and inclined to H.P (or ground) in such a way that the true shape of section is an ellipse having major axis 80mm. Draw

     i)   Front view   (02 Marks)
     ii)   Sectional Top view   (02 Marks)
     iii)   True shape of section   (04 Marks)

b) A cone of base diameter 40mm and axis length 50mm is kept on the H.P. on its base. It is cut by an AIP inclined at 45^0 to the H.P. and passes through a point on the axis 30mm above the base. Draw

     i)   Front view   (02 Marks)
     ii)   Sectional Top view   (02 Marks)
     iii)   True shape of section   (04 Marks)

c) A cone of base diameter 40mm and axis length 60mm is kept on the V.P. on a point of its base circle such that its axis inclined to V.P. at 30^0 and parallel to H.P. Draw the projections of cone.

     Stage I   i) F.V   (01 Marks)
                  ii) T.V   (01 Marks)
     Stage II   i) F.V   (03 Marks)
                  ii) T.V   (03 Marks)

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LEVEL : - **THIRD**   PROGRAM : **IND. ELECTRONICS / E & TC**
COURSE CODE :- **IEE/ETE305/IX/EJ205**
COURSE NAME :- **ANALOG COMMUNICATION**
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 29 / 04 / 2016

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

	Marks

Q.1   Attempt any **FOUR**   (08)

    a) Define i) Baseband signal ii) Modulation with keeping amplitude constant.

    b) Define i) Modulation ii) Demodulation.

    c) Show the graphical representation of AM & FM.

    d) What is equation to represent FM?

    e) Define modulation index and deviation for FM.

    f) What is unicast and broadcast communication?

Q.2   Attempt any **FOUR**   (16)

    a) Derive the expression for AM is frequency domain.

    b) Explain the effect of modulation index on AM, with waveforms.

    c) Define communication. Draw and explain block diagram of communication system.

    d) Explain with block diagram 'Armstrong method' of FM generation.

    e) Compare AM & FM (min four points)

    f) A 500 W carries is modulated to dept 75% calculate
       i) total power in AM. ii) Power in sidebands   iii) Transmission efficiency.

Q.3   Attempt any **TWO**   (16)

    a) What is noise? Explain types of noise in detail.

    b) With mathematical expression & neat blick diagram, explain phase shift method
       to get <u>LSB</u> at output.

    c) A FM with $3\Pi \, \text{Sin} \, (10^9 t + 3 \sin 10^5 t)$ Calculate
       i) Carrier and modulating frequencies.   ii) Modulation index
       iii) Deviation (δ)   iv) Power dissipated in 0.25 kΩ resistor.

Q.4 Attempt any **FOUR** (08)

    a) State types of AGC.

    b) Draw the block diagram of TRF receiver.

    c) Define Pre-emphasis and de-emphasis.

    d) What is folded dipole antenna? Draw its radiation pattern.

    e) Write the applicatio of loop antinna.

    f) What is fading?

Q.5 Attempt any **FOUR** (16)

    a) Draw and explain block diagram of superheterodyne AM radio Receiver.

    b) Draw a neat circuit diagram of two stage IF amplifier and explain its working.

    c) Draw Yagi Uda Antenna and its radiation pattern and explain its operation.

    d) Explain why an antenna using a parabolic reflector is likely to be a highly directive receiving antnna?

    e) Compare sky wave propogation and space wave propagation with respect to following points i) range ii) Polorization iii) Appliction iv) Effect of fuding.

    f) Explain ground wave propagation.

Q.6 Attempt any **FOUR** (16)

    a) Draw and explain PLL based FM detector.

    b) Explain the demodulation of AM wave using diode defector.

    c) Define i) Sensitivity ii) Selectivity iii) fidelity iv) Image frequency rejection.

    d) Draw the radiation pattern for the resonant dipoles withfollowing length

        i) $l = \lambda/2$ ii) $l = \lambda$ iii)) $l = 3\lambda/2$ iv) $l = 3\lambda$

    e) Define skip distance how skip distance can be kept constant?

    f) What is electromagentic polarization? Define i) Reflection ii) Refraction.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL: FORTH   PROGRAM: IE/E&TC
COURSE CODE:IEE/ETE401/EX/EJ212   OURSE NAME: **POWER ELECTRONICS-I**
MAX. MARKS: 80   TIME: 3 HRS.   DATE: 04/05/2016

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

	Section – I	Marks

Q.1   Attempt any FOUR   (08)

a) Define commutation of SCR?
b) Compare PUT and UJT. (any 2 points)
c) What is necessity of commutation.
d) Sketch the V-I chara of an SCR and lebel it.
e) State any two advantages of PUT over UJT.
f) What is forword blocking state in SCR.

Q.2   Attempt any FOUR   (16)

a) Draw neat circuit diagram of SCR triggering using UJT relaxation oscillator. What are the advantages of using this triggering method.
b) Draw V-I characteristics of TRIAC and describe any one mode.
c) Explain two transistor analogy of SCR with neat diagram.
d) Draw and explain PUT relaxation oscillator.
e) Draw and explain V-I characteristic of DIAC and label it.
f) Explain class C commutation with neat circuit diagram.

Q.3   Attempt any FOUR   (16)

a) Explain class F commutation with neat circuit diagram.
b) Explain traic triggering using Diac.
c) List any 4 Ideal switch characteristics.
d) Explain $\dfrac{dv}{dt}$ triggering of thyristor.
e) Draw the symbol, constructional diagram and V-I characteristics of UJT.
f) Draw the circuit diagram of class D commutation with neat related waveform, explain the operation.

	Section – II	Marks

Q.4   Attempt any FOUR   (08)

a) Define & give equation for string efficiency.
b) Draw a vector diagram of line voltage & phase voltage.
c) Give the equation for Vdc & Vrms of 3ϕ uncontrolled bridge rectifier.
d) Draw a circuit diagram of 3ϕ half wave uncontrolled rectifier.
e) Define the use of free wheeling diode.
f) Define controlled rectifier.

Q.5   Attempt any TWO   (16)
  a) Derive the equation for static resistance.
  b) Give the causes of unequal current distribution.
  c) Explain 3φ bridge rectifier with circuit diagram & waveform.
  d) With diagram & waveform explain 1φ half wave controlled rectifier with R
      Load.
  e) With diagram & waveform explain 1φ half wave controlled rectifier with RL
      Load.
  f) Explain 1φ half wave rectifier with free wheeling diode..

Q.6   Attempt any FOUR   (16)
  a) Explain current shairing in the AC circuit.
  b) Give the difference bet^n 1φ half wave controlled rectifier with R & RL Load.
      (any 4 points)
  c) Explain dynamic equalization network.
  d) Describe two quadrant operation of 1φ half wave controlled rectifier.
  e) Compare 3φ uncontrolled half wave & bridge rectifier using efficiency,
      Form factor, ripple factor & TUF.
  f) With diagram & waveform explain 3φ half wave rectifier.

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LEVEL :- **THIRD**   PROGRAM : **IND.ELECTRONICS / E & TC**
COURSE CODE :- **IEE/ETE306/IX/EJ207**
COURSE NAME :- **DIGITAL TECHNIQUES AND APPLICATION**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **29 / 04 / 2016**

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   (08)

    a) State any two rules of BCD addition.
    b) Convert the following number to equivalent numbers system
       i) $(312.78)_{10} = (\quad)_2$ ii) $(11011.011)_2 = (\quad)_{10}$.
    c) 1's complement of i) $(110101)_2$ ii) $(110010)_2$.
    d) State De-Morgan's theorem.
    e) State two methods of CMOS & TTL interfacing.
    f) State use of IC 7400, IC 7402.

Q.2   Attempt any **FOUR**   (16)

    a) Give any four differences between binary code ad BCD code.
    b) Solve the following 1) 9's complement of i) $(35.63)_{10}$ ii) $(568)_{10}$
                 2) 10's complement of i) $(53.36)_{10}$ ii) $(658)_{10}$
    c) Compare CMOS & TTL with any four points.
    d) Prove the following usign Boolean algebra $A + \overline{A}.B + A.\overline{B} = A + B$.
    e) Simplify the following function using K-map and verify by reducing equation.

$$F(A,B,C,D) = ABC + B\overline{C}D + \overline{A}BC$$

    f) Explain working of TTL. NAND gate using diagram.

Q.3   Attempt any **FOUR**   (16)

    a) Convert the following hexadecimal number to binary i) B4D ii) 7AF4 iii) E5 iv) D7

    b) Reduce the following using K-map method and realized the minimum expression
       using NAND gate $F(A,B,C,D) = \Sigma M(1,3,5,8,9,11,15) + d(2,3)$.

    c) Draw pin and schematic diagram or IC 7400, IC7402, IC 7404, IC7408.

    d) Explain method of TTL to CMOS interfacing using supply voltage.

    e) Explain with diagram working of TTL NAND gate.

    f) Draw a circuit diagram and explain working of CMOS NAND gate.

P.T.O.

Q.4   Attempt ay **FOUR**   (08)

    a) List any two applications of shift registers.

    b) Write expression of output and truth table for half substractor.

    c) Define multiplexer.

    d) Draw the circuit diagram of 2:1 multiplexer.

    e) Write the two applications of flipflop.

    f) Write the truth table of 'T' flipflop.

Q.5   Attempt any **FOUR**   (16)

    a) Compare RAM & ROM. (any four points)

    b) Draw and explain full adder using two half adders.

    c) Draw the circuit diagram of SISO shift register and explain.

    d) Draw the circuit diagram of 3 bit synchronous counter. Write truth table.

    e) Give classification of ROM and explain two types.

    f) Reliaze using demultiplexer / decoder $F = \Sigma (0,2,5,7,8,12,15)$

Q.6   Attempt any **TWO**   (16)

    a) Explain with neat cirsuit diagram R-2R method of DAC, in detial.

    b) Design MOD-10 asynchronous counter and describe. Also draw its timing diagram.

    c) Design a full substractor circuit and draw the necessary truth. Reliaze it using K-map. Describe its operation.

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LEVEL: **THIRD**   PROGRAM: **IE / E&TC**
COURSE CODE: **IEE/ETE308/IX/EJ112** COURSE NAME: **CIRCUITS AND NETWORKS**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **28/04/2016**

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any **FOUR**   **(08)**

   a) Define i) Current ii) Voltage

   b) State Ohm's Law & write its equation for current.

   c) Draw diagram of three resistors (R_1, R_2, R_3) in parallel & state its equivalent resistance formula.

   d) Define ideal voltage source & practical current source.

   e) State Thevenin's theorem.

   f) State maximum power transfer theorem.

Q.2 Attempt any **FOUR**   **(16)**

   a) State super position theorem & explain with one example.

   b) Derive voltage division formula for following circuit.

   c) Distinguish between short circuit & open circuit (any four points)

   d) Convert voltage source shown in diagram (a) to equivalent current & current source shown in diagram (b) to equivalent voltage source.

   e) Explain the steps to solve examples with mesh analysis.

   f) Determine Thevenin's equivalent circuit across AB for following circuit.

Q.3 Attempt any **FOUR**   **(16)**

   a) Find voltage across 5Ω & current through 5Ω.

   b) Find equivalent resistance for following circuit.

   c) Find current through 3Ω using nodal analysis.

   d) Explain the concept of grounding in electronic circuits.

   e) Determine Norton's equivalent circuit at AB.

   f) Determine load resistance value to receive maximum power from source, also find maximum power delivered to load in circuit.

P.T.O

Q.4   Attempt any FOUR (08)

a) Define i) admittance ii) impedance

b) Draw waveform to represent phase relation between current and voltage in an inductor.

c) Draw circuit diagram for parallel resonance.

d) State the formula for quality factor in parallel resonance.

e) Define i) roll off rate ii) decibel.

f) Draw the frequency response of R-C low pass filter.

Q.5   Attempt any FOUR (16)

a) An ac voltage of 220V is applied to a pure inductance of 50Hz. If the current is 5A. Find the instantaneous voltage and current.

b) Draw the charging and discharging curves for capacitor and write its equations. What is time constant for the charging capacitor?

c) Explain series resonance in R-L-C circuit. Drive the formula for resonant frequency.

d) What is the resonance frequency of a series RLC circuit where R10Ω, L=25mH, C=100μf? Evaluate Q factor also.

e) With the neat circuit diagram explain series resonant band pass filter and also draw its frequency response.

f) Draw the circuit diagram and frequency response of R-L and R-C high pass filter.

Q.6   Attempt any FOUR (16)

a) State the phase relation between current and voltage in capacitor. And also state the power relation in capacitor.

b) Using charging and discharging curves derive the equation for voltage and current for inductor.

c) Describe the applications of resonance circuits.

d) Explain parallel resonant band stop filter.

e) With the circuit diagram and frequency response, explain series resonant bad stop filter.
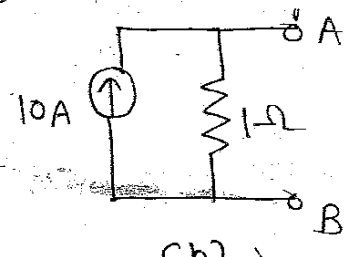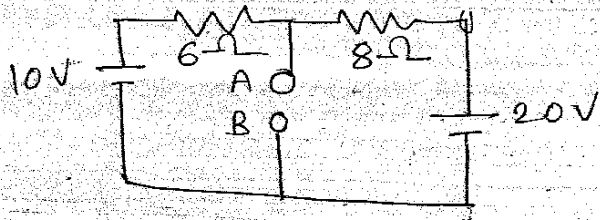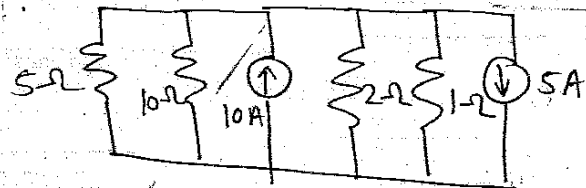
f) Describe parallel resonant band pass filter.

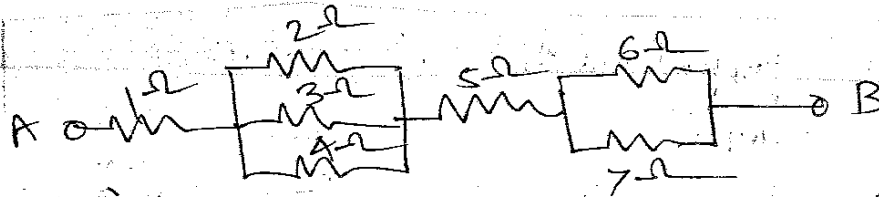*********
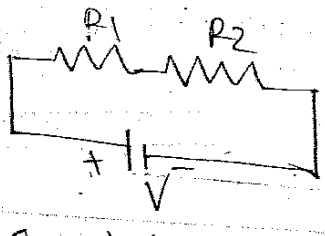
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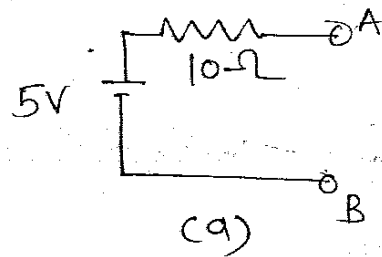
(a)

Que 2) (d)

(b)

Que 2) (f)

Que 3) (a)

Que 3) (b)
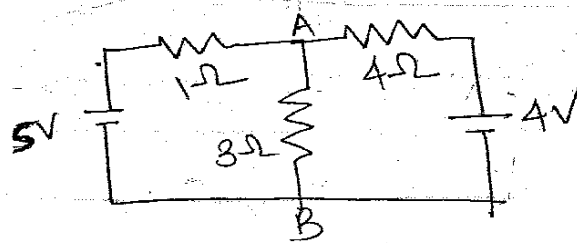
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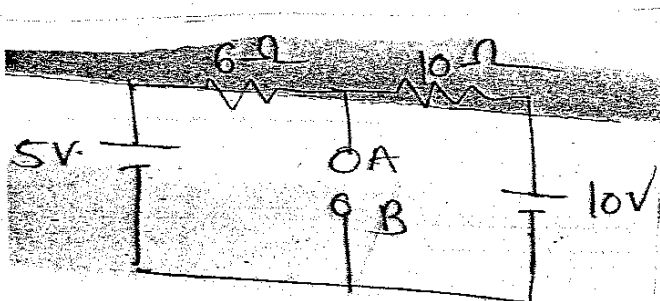
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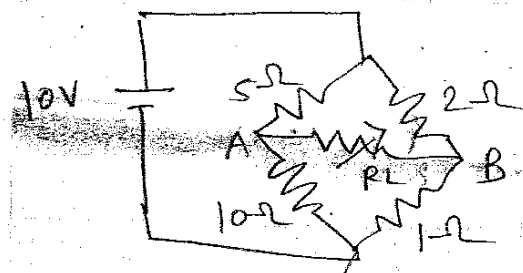
Que 3) (f)

LEVEL: **FIRST**

COURSE CODE: **IEE/ETE 107**

MAX. MARKS: **80**

PROGRAM: **E & TC/ IE**

COURSE NAME: **BASIC ELECTRICAL ENGG.**

TIME: **3 HRS.**　　DATE: **27/04/2016**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1　　Attempt any **FOUR**　　　　　　　　　　　　　　　　　　**(08)**

　　a)　Define the terms　i) Electric current　　ii) Potential Difference

　　b)　State Ohms law & state its equation.

　　c)　An insulating material ring has mean diameter of 80 mm and cross sectional area of 200mm^2 it is wound with 2000 turns of insulated wire. Another coil of 1000 turns is wound on top of the first coil. Assuming that all flux produced by the first coil links with other one. Find out the mutual inductance.

　　d)　State the units of magneto motive force and Reluctance.

　　e)　Define the tem 'Permeance', State its unit.

　　f)　State different types of magnets. State their applications.

Q.2　　Attempt any **FOUR**　　　　　　　　　　　　　　　　　　**(16)**

　　a)　Explain the terms 'leakage flux' and 'fringing'.

　　b)　Draw the hysteresis loops for 'Non-magnetic materials'. Hard steel & soft magnetic material.

　　c)　Determine the equivalent resistance for the circuit given below. Between A & B terminals find the value of current flowing through 16-Ω resistance if 12 V battery is connected.
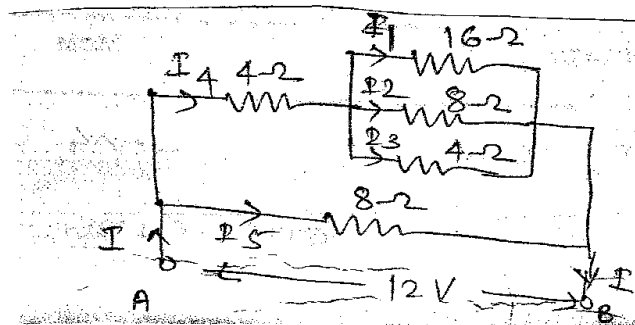
　　d)　Define the terms

　　　　i)Non-linear circuit　　　　ii) Branch　　　　iii) Node　　　　iv) Passive network

　　e)　Explain Faradays laws of electromagnetic Induction.

　　f)　A conductor of length 1m moves at angle 30^0 to the direction of uniform magnetic field of strength 1 Tesla with a velocity 80m/s. Calculate the emf induced. What will be the emf induced if the conductor moves at right angle to the field.

P.T.O.

Q.3   Attempt any **TWO**   **(16)**

    a)   Compare Electric circuit with magnetic circuit (Any 8 points)

    b)   i)State & explain Kirchoffs laws.
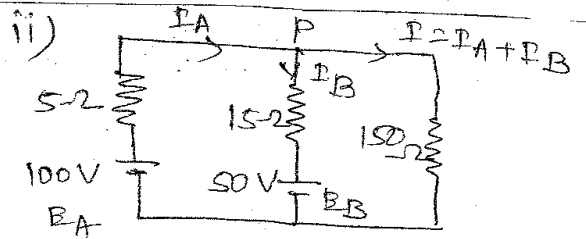
         Two batteries A & B connected in paralies supply power to the 150 ohm resistance. Find the current taken by 150 ohm resistance. Refer the circuit given above.

    c)   i)Write a note on : concept of self and Mutual Inductance.

         ii)State & explain Flemings Right hand Rule and Lenz law.

Q.4   Attempt any **FOUR**   **(08)**

    a)   Which type of circuit shows Lagging power factor?

    b)   Define   i) Cycle   ii) Frequency

    c)   State voltage and current relation in star connection.

    d)   Define Transformer.

    e)   Define Average value of an ac quantity.

    f)   Define Reactance state its unit.

Q.5   Attempt any **FOUR**   **(16)**

   a)   Define the following terms with respect to a.c. circuit.

         i)form factor   ii) Peak factor.

    b)   A circuit has a resistance of 100 Ω and an inductance of 0.5H. It is connected to a 230 v. 50Hz a.c. supply. Calculate.

         i)Inductive Reactance   ii) Impedance   iii) Current   iv) Power factor of the circuit.

    c)   State any four advantages of polyphase system.

    d)   Define RMS value, Find to rms value of sinusoidal a.c. current.

    e)   Draw circuit diagram and vector diagram of a.c. R-L series circuit.

    f)   Define Active, reactive and apparent power in a.c. circuit.

Q.6   Attempt any **FOUR**   **(16)**

    a)   An a.c. voltage is represented by $= 141.4 \sin 377t$. Determine rms value of voltage, angular velocity and frequency.

    b)   Define following terms

         i)Phase Angle   ii) Power factor

    c)   In a circuit of $z = (8+j\,6)$ ohm find the admittance in polar and rectangular form.

    d)   For the circuit shown in fig. Calculate the branch, currents I, and I_2 by Impedance method.
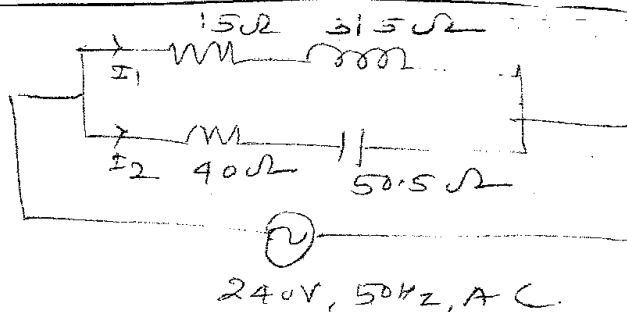
    e)   What is the impedance of an a.c. circuit. What is its unit? State the factors on which it depends.

    f)   State the meaning of terms Lag and Lead in relation to alternating quantity with necessary waveform.

<div align="center">**************</div>

LEVEL :- **FIRST** PROGRAM : **EE/IE/IT/E & TC**
COURSE CODE :- **CCE104/X103/X109/R105/R106**
COURSE NAME :- ENGINEERING CHEMISTRY
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **28 / 04 / 2016**

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

	Marks

Q.1 Attempt any **FOUR** (08)

  a) Why Cr & cu shows anamolous behaviour in electronic configuration?
  b) State Hund's rule of maximum multiplicity.
  c) Distinguish between atoms and ions (any two points)
  d) Why the galvanized containers are not used for storage of food stuffs?
  e) Give the disadvantages of hard water when it is used for sugar industry.
  f) Define i) Scale ii) pH of solution.

Q.2 Attempt any **FOUR** (16)

  a) Describe the formation of MgO molecule with diagram & name the type of bonding.
  b) Write orbital electronic configuration of following elements.
     $_{12}Mg^{24}$, $_{19}k^{39}$, $_{7}N^{14}$, $_{17}Cl^{35}$
  c) What are the different types of oxide films? Explain which oxide film is more protective.
  d) Draw the diagram. Give two chemical reactions in regeneration of ion exchange process.
  e) State and explain four causes of scale formation in boiler.
  f) Define Sterilization, explain by using bleaching powder.

Q.3 Attempt any **FOUR** (16)

  a) What is electroplating? Explain with suitable example.
  b) Define degree of ionization. Explain the Factors affecting degree of ionization.
  c) Describe the process of metal spraying for protection of metal from corrosion.
  d) Distinguish between galvanising and tinning. (any four points)
  e) Define pH. Draw the pH scale. What is the pH of i) Neutral Solution?
     ii) Extremely acidic solution? iii) Extremely basic solution.
  f) Write the disadvantages of hard water in drinking and cooking use.

P.T.O.

Q.4   Attempt any **FOUR**   (08)

    a) What is closed circuit voltage and open circuit voltage?

    b) Give the two points difference between primary cell and secondary cell.

    c) Define minerals and Ores.

    d) Give the important Ores of 'Cu' metal.

    e) List the methods of concentration of Ores.

    f) Define semiconductor. Give example.

Q.5   Attempt any **FOUR**   (16)

    a) Explain with diagram working of Hydrogen-Oxygen fuel cell.

    b) Give the difference between calcination and Roasting.

    c) How Bessemerisation of 'Cu' is carried out in Bessmer converter?

    d) Define alloy. Explain the purposes of alloy formation. (any Three)

    e) Give the properties and uses of Germenium as semiconductor.

    f) Give the properties and uses of glass wool.

Q.6   Attempt any **FOUR**   (16)

    a) Write a note on Reserve Batteries and solar cell.

    b) Give four physical properties and uses of 'Cu' metal.

    c) How electrorefining of Blister 'Cu' is carried out?

    d) Give the composition, properties and uses of Rose metal.

    e) Define adhesive. Give characteristics of good adhesive.

    f) Give the properties and uses of Teflon plastic.

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LEVEL: FOURTH   PROGRAM: IE/E&TC
COURSE CODE: IEE/ETE402/IX/EJ302   COURSE NAME: 8051 MICROCONTROLLER
MAX. MARKS: 80   TIME: 3 HRS.   DATE: 27/04/2016

Instruction:-

1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I

                                                      Marks

Q.1   Attempt any FOUR   **(08)**

     a)   State any four MCS-51 family members.

     b)   Describe the function of program counter?

     c)   Can you use DPTR to access internal ROM? Justify your answer.

     d)   What us the function of $\overline{EA}$ pin of the 8051?

     e)   State the various addressing modes of 8051 microcontroller

     f)   Describe the function of SWAP A instruction of 8051.

Q.2   Attempt any FOUR

                                                                 (16)

     a)   With the help of neat diagram, explain structure of port 1 of 8051 microcontroller.

     b)   Compare between microprocessor and microcontroller (four points)

     c)   State alternate function of port 3 pins of 8051 microntroller.

     d)   Draw the format of TCON register off 8051 microntroller and explain the function of each bit.

     e)   Write an assembly language program to find largest number from the array of 10 numbers, stored in external RAM (Assume suitable addresses)

     f)   With the help of ANL instruction of 8051 explain:

         i)   Direct addressing mode

         ii)   Indirect addressing mode

         iii)   Register addressing mode

         iv)   Immediate addressing mode.

Q.3   Attempt any FOUR

                                                                  (16)

     a)   State various architectural features of 8051. (any 8 features)

     b)   Draw an internal RAM & ROM structure of 8051 microcontroller.

     c)   Draw the format of PSW & explain the significance of each bit.

     d)   Describe the function of following instructions:

         i)   MOV A, @ A+DPTR

         ii)   MOV @Rp,A

e) Write an assemble language program for adding series of five numbers stored at 7000H onwards. Store the result in last location.

f) Explain the historical development of microcontroller from 4bit to 8bit.

<div align="center">Section – II</div>

Q.4   Attempt any FOUR   (08)

a) State any two advantages of LCD over seven-segment display.

b) It V_{ref}=5V is applied to 8bit ADC, what will be its step size?

c) What value should be loaded in timer1 register to achieve a baud rate of i)4800 ii)1200
   Assume crystal frequency =11.0592MHz

d) What value should be loaded in IP SFR to provide highest priority to serial port interrupt?

e) State any four 8051 microcontroller based applications.

f) What is the significance of GATE bit in TMOD SFR?

Q.5   Attempt any FOUR   (16)

a) Write an assemble language program for 8051 µc to flash the port ϕ at an regular interval of 1msec continuously. Assume crystal frequency =12MHz.

b) Write an assemble language program for 8051 µc to receive the data at a baud rate of 2400 through serial port & send it to port 2 continuously. Assume crystal frequency = 11.0592 MHz.

c) Draw the interfacing diagram of 8051 microcontroller with ADC 0808 & sensor LM35.

d) Write an assemble language program to display "TYETX" on to LCD. Also draw interfacing diagram.

e) Write an assemble language program to find the width of the Pulse applied at $\overline{INTQ}$ pin of 8051 microcontroller.

f) Write an assemble language program to find the frequency of unknown signal applied at Tϕ pin of 8051 microcontroller.

Q.6   Attempt any TWO   (16)

a) Design a 8051 microcontroller based function generator to generate various waveforms such as triangular wave saw tooth wave, square wave & stair case wave. (draw interfacing diagram & assemble language program)

b) Consider a switch is connected at P1.ϕ & stepper motor is interfaced to 8051 µc. Write an assemble language program to perform the following
   i)   When switch ='o', rotate the stepper motor clockwise.
   ii)   When switch ='1', rotate the stepper motor anticlockwise.

c) Write an assemble language program to generate a square wave of frequency 2KHz at P1.ϕ and also to transmit the word "GPKP" serially at a baud rate 9600. Assume crystal frequency=11.0592 MHz.

<div align="center">************</div>

LEVEL : - **FIRST** PROGRAM : **COMMON**
COURSE CODE :- **CCE110/X111/R112/0116**
COURSE NAME :- **APPLIED MECHANICS**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **26 / 04 / 2016**

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   (08)

   a) Define equilibrium and state the relation between resultant force and equilibrant force.
   b) State principle of Transmissibility.
   c) Define Resolution of force.
   d) State graphical conditions of equilibrium for parallel force system.
   e) Define angle of repose.
   f) If angle of repose is 30^0, calculate coefficient of friction.

Q.2   Attempt any **FOUR**   (16)

   a) A force of 100KN makes an angle of 135^0 with the horizontal. Find its orthogonal components.
   b) Calculate the total moment about point 'A' for the force system shown in fig.
   c) Find resultant force of concurrent force system graphically.
   d) Find support reaction of a given beam as shown in figure by analytical method.
   e) A body resting on a rough horizontal plane is on the point of moving by a pull of 22N acting 30^0 inclined to horizontal. Find the weight of body and coefficient of friction.

   f) A body of weight 400N is placed on plane inclined at an angle of 18^0 with the horizontal. If μ= 0.27, find the value of the force to be applied parallel to the plane just to move the body up the plane.

Q.3   Attempt any **FOUR**   (16)

   a) Two point loads are acting on beam as shown in fig. The self weight of beam is 2 KN/m. Using graphical method. Find support reactions.

   b) A sphere of diameter 1.2m and weighing 1800N rest against two smooth planes inclined at 60^0 and 45^0 respectively. Determine reactions offered by the planes.

   c) Determine analytically, the resultant of coplanar parallel forces acting vertically upwards. 40N, 20N at 30mm, 30N of 50mm and 60N at 70mm. All distances are taken from first force towards right.   PTO

d) Four forces 20N, 15N, 30N and 25N are acting at $0^0, 60^0, 90^0$ and 150^0 from X-axis taken in order. Find resultant by analytical method.

e) Two concurrent forces of magnitude 100N have their resultant as 100N. Calculate the angle between the forces.

f) Explain Law of frictions.

Q.4 Attempt any **FOUR** (08)

a) Define centriod of plain figure.
b) State or locate the centre of semicircle and semisphere.
c) State law of conservation of momentum.
d) State Newton's 1st law of motion.
e) State equation for angular motion and given meaning of each term.
f) Define power and its S.I. unit

Q.5 Attempt any **FOUR** (16)

a) Find the centre of gravity of an equal angle section 100 X 100 X10mm and locate on figure.

b) Find the centriod of shaded area as shown figure.

c) A body falling freely under gravity passes two points 9m aparts vertically in 0.2sec. Find from what height above the upper point did it start to fall?

d) A bullet weighing 3N leaves the barrel of a rifle with a muzzle velocity of 750m/s. If the length of parallel is 100cm. Find the impulse and impulsive force.

e) A particle is rotating at 300 RPM. If the radius of rotation is 1.5m calculate
i) angular Velocity ii) Linear velocity.

f) The shaft of an electric motor rotates at 1500 rpm at a particular instant. In 8 second the speed uniformly decreases to 500 rpm. Find the angular retardation.
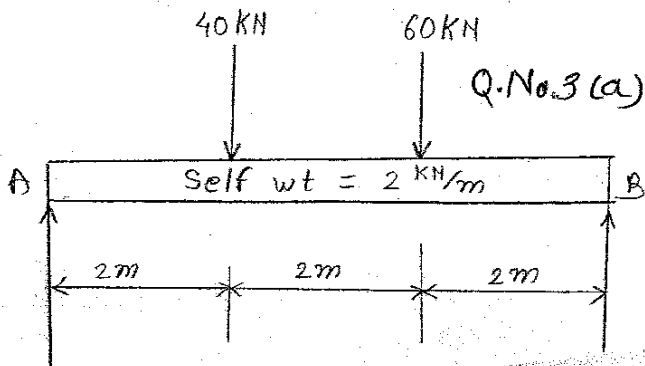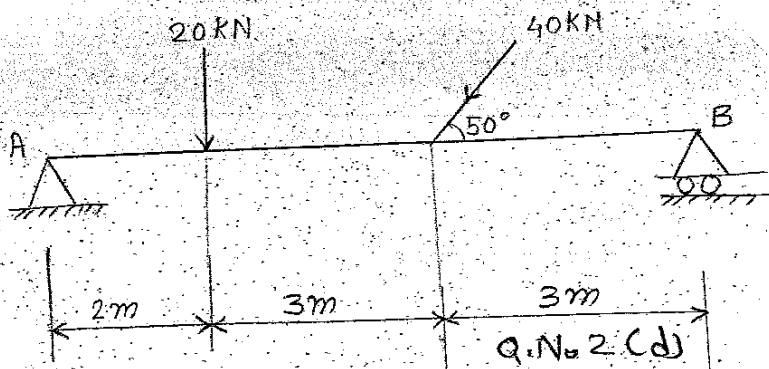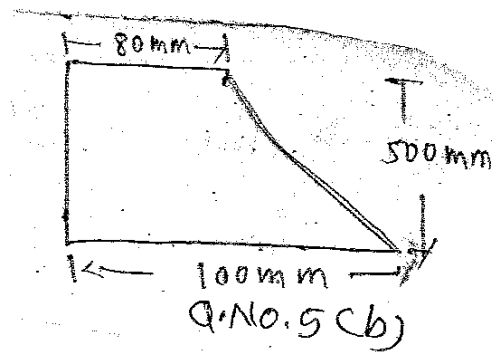
Q.6 Attempt any **FOUR** (16)

a) How many litres of water can be raised in 10 minutes to a height of 30m by means of pump of 2.5KW power and efficiency 80%?

b) Water having volume of 1500 liters is lifted to a height of 6m and is delivered at velocity of 4m/sec. What is the energy possessed by water?

c) A machine having following observation. Find the law of machine.

Load (N)	100	200	300	400	500	600
Effort (N)	10	18	25	28	33	39

d) For a lifting M/C UR=50.6. An effort of 90N lifts load of 1800N and an effort of 135N requires a load of 3150N. Determine law of M/C and Maximum efficiency of machine.

e) Define i) Mechanical Advantages ii) Velocity Ratio
iii) Efficiency   iv) Reversible machine.

f) Draw the nature of graphs for a lifting machine.
i) Load Vs effort   ii) Load Vs idea effort.   iii) Load Vs Mechanical Advantage
iv) Load Vs effort lost in friction.
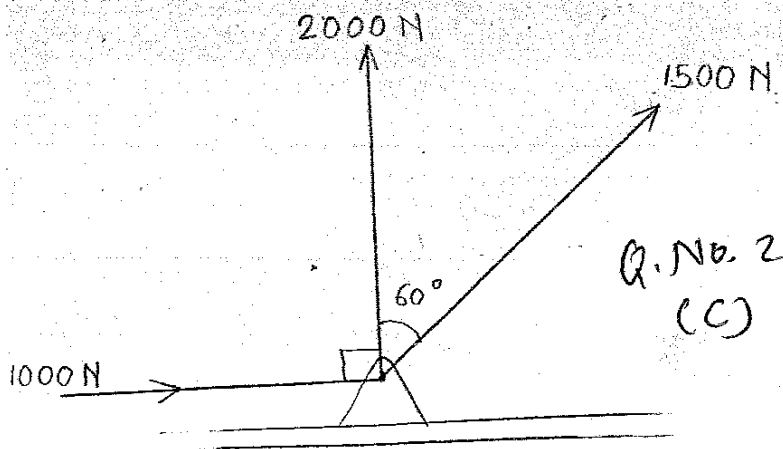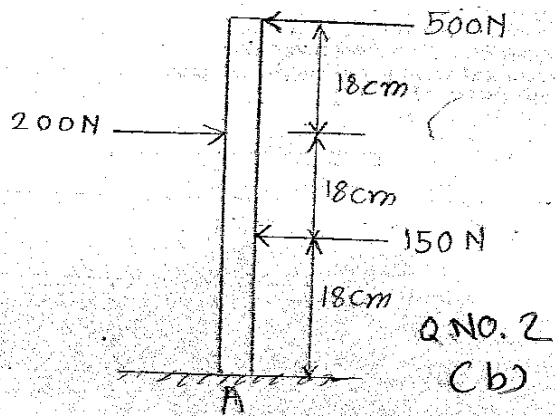
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0

500N

18cm

200N

18cm

150 N

18cm

Q NO. 2
(b)

A

2000 N

1500 N

60°

Q. No. 2
(C)

1000 N

80mm

500mm

100mm

Q.No.5 (b)

20KN

40KN

50°

B

A

2m   3m   3m

Q.No 2 (d)

40 KN   60KN

Q.No.3 (a)

A   Self wt = 2 KN/m   B

2m   2m   2m

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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL : - **THIRD**   PROGRAM : **IND. ELECTRONICS & E & TC**
COURSE CODE :- **IEE/ETE303/IX/EJ203**
COURSE NAME :- **ELECTRONICS MEASUREMENTS AND INSTRUMENTS**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **26 / 04 / 2016**

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   (08)

   a) Write basic principle of digital frequency meter with the help of diagram.

   b) What is absolute and secondary instrument?

   c) Give any two differentiating points of AC and DC bridges.

   d) Write torque equation of PMMC instrument. Give meaning of each term in equation.

   e) Draw neat labeled circuit diagram of inductance comparison bridge.

   f) Define following terms i) Measurement ii) Instrument.

Q.2   Attempt any **TWO**   (16)

   a) Draw block diagram and waveforms of ramps type DVM and dual slope

       type DVM.

   b) Explain Wagner's ground connection using circuit diagram.

   c) Explain eight static characteristics of instrument

Q.3   Attempt any **FOUR**   (16)

   a) Give four advantages of digital instrument.

   b) Explain measurement of unknown resistance using Kelvin's bridge.

   c) Draw block diagram of successive approximation type DVM and explain its operation.

   d) Derive equation for measurement of unknown capacitance using schering bridge.

   e) Explain operation of time period measurement with the help of block diagram.

   f) Explain DC bridge using circuit diagram. Also derive its bridge balance equation.

P.T.O.

Q.4 Attempt any **FOUR** (08)

    a) What is signal generator? State its types.

    b) What is the purpose of error detector in Recorder?

    c) List any four applications of CRO.

    d) State the function of delay line.

    e) What is the need of recorders?

    f) How current probe operates?

Q.5 Attempt any **FOUR** (16)

    a) Explain with block diagram X-Y recorder.

    b) Explain how frequency and phase difference is measured using CRO.

    c) Explain with block diagram operation of AF type signal generator.

    d) Draw the block diagram of digital storage oscilloscope.

    e) Explain indetail block diagram of function generator.

    f) Compare single trace CRO with dual trace CRO.

Q.6 Attempt any **FOUR** (16)

    a) Explain the vertical deflection system of CRT.

    b) Explain the time domain and frequency domain.

    c) Explain in detail strip chart recorder.

    d) List the advantages and applications of DSO.

    e) Explain the operation of Logic Analyzer.

    f) State the need of synchronization between horizontal and vertical deflection systems in CRO.

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LEVEL : - FIFTH   PROGRAM : IND.ELECTRONICS / E & TC
COURSE CODE :- IEE/ETE508/IX/EJ404
COURSE NAME :- INDUSTRIAL ORGANIZATION & MANAGEMENT
MAX. MARKS : 80 TIME : 3 HRS. DATE :- 25 / 04 / 2016

Instruction :-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	Marks

Q.1 Attempt any FOUR   **(08)**

a) Define the term manufacturing?

b) What you know about agro industry?

c) Write about management concept.

d) What is administration?

e) Show line and staff organization.

f) Define the term 'Organization'.

Q.2 Attempt any FOUR   **(16)**

a) Differentiate between Authority and Responsibility.

b) How a joint stock company is formed? Enlist its advantages.

c) Describe the role of cooperative society in India.

d) What is centralized and decentralized departementation?

e) Write about 'Span of control'.

f) Enlist advantages and disadvantages of globalization.

Q.3 Attempt any FOUR   **(16)**

a) Describe various types of business.

b) Write about engineering and process industry.

c) Describe various principles of management (any four)

d) State the importance of controlling as management function.

e) Describe various levels of management.

f) Enlist the advantages of effective directing.

Section – II	Marks

Q.4 Attempt any FOUR   (08)

  a) Enlist four functions of personnel management.

  b) Classify various types of trainings.

  c) What is VAT? How it affects business?

  d) Define fixed and working capital.

  e) Define inventory.

  f) What is the role of 'quality circle'?

Q.5 Attempt any TWO   (16)

  a) Define accident. And explain the causes and remedies for accidents in industry.

  b) Explain ESI act giving all the provisions in it.

  c) Why accounting of business is important? How balance sheet is created?

Q.6 Attempt any TWO   (16)

  a) What is quality? Why it is important? Explain quality assurance.

  b) Explain the modern management techniques i) SAP ii) ERP.

  c) i) What is 'Kaizen'?   ii) Describe any four taxes paid by industries.

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EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO.

LEVEL : - FIFTH   PROGRAM : INDUSTRIAL ELECTRONICS

COURSE CODE :- IEE511 / ETE 511

COURSE NAME :- PLC & DRIVES

MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 06 / 05 / 2016

Instruction :-

1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	Marks

Q.1   Attempt any FOUR   (08)

a) Enlist various basic elements of drive.

b) Give advantages of converter fed IM.

c) Enlist the advantages of frequency control technic.

d) Give advantages of using microcomputer in DC drive.

e) Enlist differetn methdos used for speed control of drives.

f) Give any four applications where DC drives are used.

Q.2   Attempt any FOUR   (16)

a) Draw and explain stator voltage control technic for speed control.

b) Explain the terminology stability of drive in detail.

c) Explain roles of various deives in cement mills.

d) Draw and explain slip-energy recovery system.

e) Draw and explain microcontroller based stepper motor control technic.

f) How AC motor can be controlled by using controlled rectifier?

Q.3   Attempt any FOUR   (16)

a) Draw and explain microprocessor based DC motor control technic.

b) Differentiate AC drive and DC drive (any four points)

c) Explain the roles of drives in steel rolling mills.

d) Draw and explain Rotor voltage control technic.

e) How sugar mills can be controlled by using various drives? Explain with sutable diagram.

f) Explain stator current control technic in detail.

P.T.O

Q.4   Attempt any FOUR

(08)

a) Give any four advantages of PLC.

b) List the output devices.

c) List the comparison instruction.

d) Explain following insturctions. i) SQI ii) SQO.

e) What are the different PLC programming languages?

f) List relay type instructions and explain any one.

Q.5   Attempt any FOUR

(16)

a) What is role of PLC in automation?

b) Draw and explain the architecture of PLC.

c) Draw block diagram of discrete AC input modules and explain working of each block.

d) Explain the meaning of term sinking and sourcing.

e) Explain instruction off-delay timer in programming language.

f) Draw the ladder diagram for following i) EX-OR gate ii) NOR gae.

Q.6   Attempt any FOUR

(16)

a) Draw the ladder diagram for following expression   Y= (A+B) (C+D).

b) Explain Up-counter in programming language.

c) Explain On-delay timer.

d) What are the different points of PLC? Explain any one in brief.

e) Give the classification of I/O, modules & explain it.

f) Write a note on RTO input module.

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LEVEL :- **SECOND** PROGRAM : **COMMON**
COURSE CODE :- **CCE202/0101/0102**
COURSE NAME :- **COMMUNICATION SKILL**
MAX. MARKS : 40   TIME : **2 HRS.**   DATE :- **06 / 05 / 2016**

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

		Marks

Q.1 Attempt any **FOUR** (Answer the following questions in 3-5 sentences)   (08)

a) Draw a well labelled diagam illustrating the process of communication.

b) Enlist any four examples in which written communication is used.

c) Enlist four advantages of oral communication.

d) Explain two principles of effective written communication.

e) Define Haptics.

f) Enlist any four advantages of OHP.

Q.2 Attempt any **FOUR** (Answer the following question in 12-14 sentences)   (16)

a) State i) Mechanical Barrier ii) Organizational Barriers.

b) Explain with sutiable example i)Upward communication.ii)Horizontal communication.

c) Enlist four tips for prepared speech.

d) State any four precautions one should take when making a presentation.

e) State and explain any four interview techniques.

f) State the guidelines on preparing presentation i) Thinking about audience ii) Good slide show design.

Q.3 Attempt any **TWO**   (16)

a) Explain types of communication. i) Verbal- Non-verbal ii) Oral – Written.

b) Following is the opinion of 100 parents about the new pattern of board exam of students X. In this problem the data is given in %.

   i) In favour of new pattern – 60 ii) Against new pattern – 30 iii) No comments -10
      Prepare a pie-chart.

c) Write an application along with your resume to Modern Automobile Factory, Pune-8 for the post of Junior Engineer.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. ☐☐☐☐☐☐

LEVEL: **FIFTH**   PROGRAM: **IE/E&TC**
COURSE CODE: **IEE/ETE512**   COURSE NAME: **PIC MICROCONTROLLER**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **07/05/2016**

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I   Marks

Q.1   Attempt any FOUR   (08)
a) Write the function of following pins of PIC18 i) RC4/SDI/SDA ii) RB5/PGM
b) Define the term i) Two byte instruction ii) four byte instruction
c) Write an assembly language program to add Two B.C.D numbers, the numbers are 25 & 49 store the result at file registers 60H & 61H.
d) Draw the format of T_2CON register & T_1CON register.
e) Draw the block diagram of timers 2
f) State any four table processing Instructions.

Q.2   Attempt any FOUR   (16)
a) Draw & explain the program memory of PIC18 microcontroller.
b) Explain any four Assembler directives of PIC18.
c) Assume XTAL=10MHz. write an assembly language program to generate the square wave of 50Hz frequency on pin port B-7. Use timers 3 16 bit mode with maximum presacalar is allowed.
d) Write an assembly language program to find the square of number in an array the ten numbers are stored at file register 50H onwords & stored the square of number at file register 60H. onwords .
e) Explain following instruction with respect to description, operation, operand, No. of bytes effect on flag & examples. I) CALL K,S ii) TBLWR * –
f) Explain the timer 3 programming with neat block diagram. Also writes the steps for programming of timer3.

Q.3   Attempt any TWO   (16)
a) Draw the architecture of PIC 18 micro controller also explain the architecture with respect to following points i) Oscillators ii) Ports iii) Multiplier unit iv) Parallel slave port (PSP)
b) i) What is addressing mode. Explain any three types of addressing mode with suitable examples.
ii) Write an assembly language program to find even & odd numbers in an array of ten data bytes. The numbers are stored at file location 30H onwords stored even number at location 40H onwords & stored odd number at 50H location onwords.

P.T.O

c) Draw & explain the format of T$_3$CON register. Also write an assembly language program to generate an delay of 25MS on port pin portC.4 assume XTAL=10MHz. Use timer1.

Q.4 Attempt any **FOUR**   (08)
   a) Draw the PIC 18 connection to RS 232.
   b) Write any two ADC feature of PIC18 F458.
   c) Draw the format of INT CON register.
   d) Enlist any four application of steeper motor.
   e) Calculate the no. of steps per revolution if steps angle is 45^0
   f) Draw the block diagram of DS 1306 RTC chip.

Q.5 Attempt any **FOUR**   (16)
   a) Explain in detail interrupt Vs polling. Also explain sources if interrupt in PIC18.
   b) Draw and explain ADCON1 format in detail.
   c) WALP for PIC18 to rotate steeper motor anticlockwise direction. Use normal four step sequence.
   d) Explain how to calculate period of PWM & duty cycle of PWM.
   e) Write a program for PIC18 to rotate the dc motor in clockwise direction depending or counter clockwise direction depending on status of switch which is connected to port D.7 & perform following.
      i)   If sw=0, the dc motor moves clockwise
      ii)   If sw=1, the dc motor moves counter clockwise.
   f) Draw a neat interfacing diagram of DAC 0808 with PIC18.

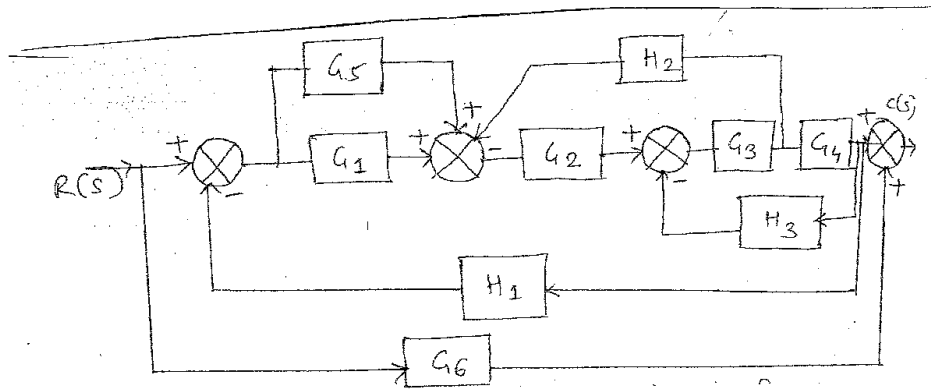**Q.6** Attempt any **FOUR**   (16)
   a) WALP to transmit massage "MSBTE" serially at band rate of 4800, 8 bit data, 1 start & stop bit continuously. (XTAL=10MHz)
   b) Write an assembly language program to get data from channels (RAO) of ADC & displays the result on port C & port D. assume crystal FOSC/4
   c) WALP to display "INDIA" on LCD display.
   d) Write a program to monitor status of switch to perform. (switch is connected to port B.2)
      i)   If port B.2=1, DC motor rotates 75%duty cycle.
      ii)   If port B.2=0, DC motor rotates 25%duty cycle.
   e) Draw a neat interfacing diagram of DC motor with PIC18 microcontroller, using optoisolator.
   f) WALP for IC18 to receive byte if data serially & put them on portB. Set the baud rate of 4800, 8-bit data, 1 start & stop bit.
                         ****

Q.3   Attempt any TWO   (16)

a) Derive the transfer function of the system shown below.

b) Find time domain specifications for $\dfrac{C(s)}{R(s)} = \dfrac{1}{s^2 + s + 1}$

c) For the unity feedback control system $G(s) = \dfrac{10}{s(s+1)(s+5)}$ Determine the stability of the system by plotting the Bode plot of the system.

Section – II   Marks

Q.4   Attempt any FOUR   (08)

a) State the conditions by which system becomes unstable.

b) Draw the block diagram of generalised servo system.

c) Give two disadvantages of Routh's array criterion

d) Draw block diagram of process control system.

e) List any four applications of servomotors.

f) Distinguish between A.C servomotor & D.C servomotor (2 points)

Q.5   Attempt any FOUR   (16)

a) Find the range of k for stability of a unity feedback system with open loop transfer function. $G(s) = \dfrac{k}{s(s+2)(s+4)(s+6)}$

b) State the principal of ON-OFF controller. Write its equation and define neutral zone.

c) Draw electronic PD controller. State its advantages.

d) Draw and explain construction of variable Reluctance steeper motor.

e) Explain the concept of relative stability and conditionally stability of a system.

f) Derive the equation for the transfer function of armature controlled DC servomotor.

Q.6   Attempt any FOUR   (16)

a) Explain the steps to sketch root locus

b) State the principle of derivative control action. Write its standard equation & draw its output waveform.

c) List two applications & two draw backs of PI controller. Define the terms proportional band and offset.

d) Explain synchro as error detector.

e) Compare between armature controlled and field controlled DC servomotor with four points.

f) Check the stability of following system by Routh's criteria and determine the number of roots on imaginary axis if any $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24$

****

LEVEL: FOURTH PROGRAM: IE/E&TC
COURSE CODE: IEE/ETE404/IX/EJ303/IE210/4210
COURSE NAME: **PRINCIPLES OF CONTROL SYSTEM**
MAX. MARKS: 80 TIME: **3 HRS.** DATE: **09/05/2016**

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.
8) Logarithmic graph paper will be provided on request.


Section – I
Marks

Q.1 Attempt any **FOUR** (08)

a) Define the transfer function of the system. Give equation for standard transfer function of any closed loop system.

b) Define transient response of the system.

c) Define gain margin and phase margin.

d) With neat diagram define summing point and take off point.

e) What do you mean by poles and zeros?

f) Define types 0 system.

Q.2 Attempt any **FOUR** (16)

a) Draw the standard test signals used in time domain analysis and give their Laplace representation of each.

b) Find out the transfer function of fig.1

fig.1
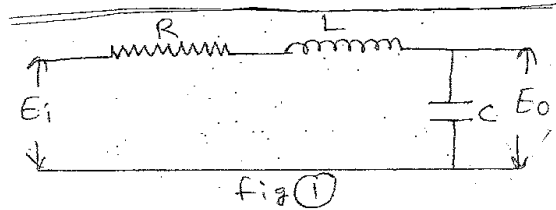
c) Give advantages and disadvantages of frequency response analysis (any four points each)

d) Compare open loop system and closed loop systems (any four point)

e) Derive co-relation between time and frequency domain specifications.

f) Define following terms related to transient response specifications.
   i) Delay time (Td) ii) Rise time (Tr) iii) Peak overshoot (Mp) iv) Peak time(Tp)

P.T.O.

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I   Marks

Q.1   Attempt any **FOUR**   (08)
   a)   State the application of frequency counter. (any two)
   b)   State the application of process controller. (any two)
   c)   What is effect of connecting wire resistance or lead resistance in case of low value resistance measurement.
   d)   State any two features of IC 7135.
   e)   State any two advantages of microprocessor based process controller.
   f)   State any two applications of Event counting.

Q.2   Attempt any **TWO**   (16)
   a)   Design a time period measurement system for a low frequency signal of 50Hz with resolution of 0.01 Hz.
   b)   Design a µp based level controller for following specification.
        i)Range 2 meter to 16 meter in the form of 4 mA to 20 mA
        ii) Set point at 10 meter
        iii) Proportional Band 60%
        iv) o/p 0-10v
   c)   Design a capacitance meter for measurement of capacitance from 0 to 20µf. Use IC 7135 for display.

Q.3   Attempt any **TWO**   (16)
   a)   Design a resistance meter to measure the resistance from 100 Ω to 10 K Ω
   b)   With the help of neat diagram explain the operation of process indicator cum controller in proportional mode.
   c)   Explain the design procedure of digital frequency meter & also draw its block diagram.

Section – II   Marks

Q.4   Attempt any **FOUR**   (08)
   a)   State disadvantages of frequency synthesizer,
   b)   State different types of A to D converters.
   c)   List advantages of dual slope DVM over Ramp type DVM.
   d)   State any two features of IC 7135.
   e)   How better accuracy is obtained in Digital voltmeter ?
   f)   What do you mean by ON-OFF controller?

P.T.O.

Q.5   Attempt any **TWO**   **(16)**
a)   Design a CMOS compatible output frequency synthesizer for.
     i)Frequency range : 1 Hz to 10 KHz
     ii) 0.1% accuracy

b)   Describe operating principle of $3\frac{1}{2}$ digit DVM. Explain operation of successive approximation type DVM.

c)   Design an ON-OFF controller for 0-200^{0}c using RTD.Add the hysteresis of 5%

Q.6   Attempt any **TWO**   **(16)**
a)   Draw and explain block diagram of frequency synthesizer. Define the following terms.
     i)Lock frequency
     ii) Capture frequency
     iii) Free running frequency

b)   Design DVM by using dual slope technique.for Vin=2V and 1MHz square wave is used as a clock.

c)   Draw a neat diagram and design ON-OFF temperature controller.

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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL: FOURTH   PROGRAM: INDUSTRIAL ELECTRONICS
COURSE CODE: IE401/4401   COURSE NAME: C PROGRAMMING
MAX. MARKS: 80   TIME: 3 HRS.   DATE: 09/05/2016

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	**Marks**

Q.1   Attempt any FOUR   (08)

   a)   Define algorithm & flowchart.

   b)   Enlist any four keywords.

   c)   Write a fundamental data types in 'C'

   d)   Enlist relational operator with its meaning.

   e)   Write a syntax of if-else loop.

   f)   Write a use of conditional operator with syntax.

Q.2   Attempt any FOUR   (16)

   a)   Explain algorithm & draw flowchart of subtraction of two numbers.

   b)   Explain break & continue statement.

   c)   Explain for loop with one example.

   d)   Write a programme of addition of three numbers & find its average.

   e)   Define function also give the example of function.

   f)   Define following term.

      i)   Function prototype.

      ii)   Recursion

Q.3   Attempt any FOUR   (16)

   a)   Enlist storage class specifer and explain each in short.

   b)   Explain the following with example.

      i)   Assignment operator

      ii)   Conditional operator

   c)   Explain syntax of switch case statement with example.

   d)   Explain use of following in C programming

      i)   Printf

      ii)   Scanf

   Also give one simple example.

e) Distinguish between call by value & call by reference.

f) Write a programme for multiplication of three numbers using function declare function name as mul ().

<div align="center">Section – II</div>

Marks

Q.4   Attempt any **FOUR**   (08)

a) Which header files are used in C programming?

b) Define i) structures ii) unions

c) What is an array? State its types.

d) How do you identify C preprocessor statements?

e) What is pointer? How it is declared?

f) How the arrays are declared and initialised.

Q.5   Attempt any **FOUR**   (16)

a) Explain multidimensional arrays.

b) Explain file handling in C language.

c) Explain how to access the structure members from structures.

d) Explain one dimensional array with suitable.

e) Explain structures within structure with a program.

f) Explain declaration, intialisation and accessing of pointer variable.

Q.6   Attempt any **FOUR**   (16)

a) Explain which functions are used for opening and closing of data file in C.

b) Explain the arrays of pointers.

c) Explain two dimensional arrays.

d) Explain in detail unions.

e) Write a short note on pointers.

f) Define a structure called cricket that will describe the following information:

Player name

Team name

Batting average

Using cricket, declare an array player with 50 elements and write a program to read the information about all the 50 players and print a team wise list containing names of players with their batting average.

<div align="center">*******************</div>

EXAM SEAT NO. [ ][ ][ ][ ][ ][ ]

LEVEL: SECOND   PROGRAM: INDUSTRIAL ELECTRONICS
COURSE CODE: IE205   · COURSE NAME: ELECTRICAL ENGINEERING
MAX. MARKS: 80   TIME: 3 HRS.   DATE: 09/05/2016

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any FOUR   (08)
     a) Define ohms law.
     b) Define i) Branch   ii) Node
     c) State Kirchhoffs current law.
     d) Define reluctance, state its unit.
     e) State Lenz's law.
     f) State voltage and current relationship in star connected three phase circuit.

Q.2   Attempt any FOUR   (16)
     a) State and explain Norton's theorem.
     b) Find the current I in the circuit.
     c) Explain in brief magnetic field (strength and flux density) due to single turn coil carrying current.
     d) Using superposition theorem, find the current through the 40 Ω resistor of the circuit shown.
     e) Draw magnetization curve for magnetic material and also for non-magnetic material.
     f) Transform voltage source of the fig (a) and (b) into an equivalent current source.

Q.3   Attempt any TWO   (16)
     a) Obtain an expression for mutual inductance between two coils. Also find expression for co efficient of coupling in terms of mutual inductance and self inductance.
     b) Obtain an expression for the current at any instant during its growth and decay in an inductive circuit (R-L series)
     c) State and explain maximum power transfer theorem.

Q.4   Attempt any FOUR   (08)
     a) State the need for starters for dc Motors.
     b) State the classification of 3 phase induction Motors.
     c) Define Reactance. State its unit.
     d) Define a Transformer.
     e) Name any four parts of a Transformer.
     f) State voltage and current Relation in delta connection.

P.T.O.

Q.5   Attempt any FOUR   (16)

    a)   Draw circuit connection diagram of three point starter and label the parts.

    b)   The emf per turn of a single phase 50Hz 3000/220 volt Transformer is 10 volt. Calculate the no. of primary and secondary turns.

    c)   How will you reverse direction of rotation of Induction Motors. Explain with help of circuit diagram.

    d)   Explain & draw three phase four wire system.

    e)   Define RMS value & average value of sinusoidal quantities & the relation between them.

    f)   Describe briefly the working of purely inductive circuit.

**Q.6**   Attempt any FOUR   (16)

    a)   Classify D.C. Motor.

    b)   Explain in detail various Lossess & effiency in the transformer.

    c)   Write a note on Pulse Transformer.

    d)   What are the advantages of Polyphase system?

    e)   A sinusoidal alternating voltage of 50 Hz has an rms value of 200volt. Write down the equation for instanteons value and find this value after 0.0125 second passing through a positive maximum value.

    f)   Define the terms

        i) waveform   ii) cycle   iii) frequency   iv) periodic time
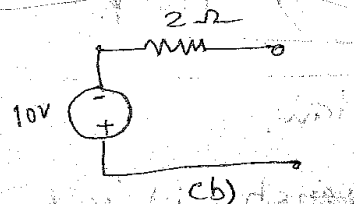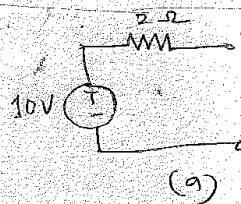
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Q.2 b)
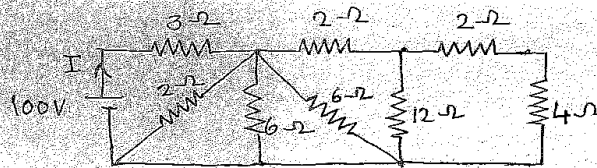
Q. 2 d)
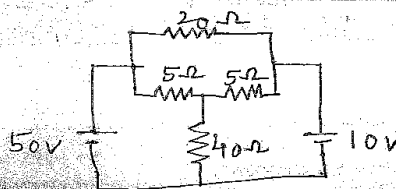
Q.2 f)

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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO. ☐☐☐☐☐☐

LEVEL: **THIRD**   PROGRAM: **IE/E&TC**
COURSE CODE: **IEE/ETE309/IXEJ209/IE408/IE409**
COURSE NAME: **MICROPROCESSOR & INTERFACING**
MAX. MARKS: **80**   TIME: **3 HRS.**   DATE: **10/05/2016**

Instruction:-
1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   **(08)**

a) What is function ALE signal?

b) Classify following instructions as one byte, two byte or three byte instructions.

   i)   Mov A,M

   ii)   SUB B

   iii) LXI H, 2000H

   iv)   ADI FFH

c) Classify interrupts in 8085.

d) Write any four features of 8085.

e) Define machine cycle and instruction cycle.

f) State the function of sub routine.

Q.2   Attempt any **FOUR**   **(16)**

a) Explain addressing modes of 8085 with examples.

b) How to generate control signals for memory and I/O? Explain with logic diagram.

c) Write an assembly language program to multiply two 8 bit No. & stored the result at 7000 & 7001 H memory locations.

d) What happens when CALL instruction is executed?

e) Explain given instruction with reference to operation, flags affected, addressing modes & no. of byte
   i)   DCX
   ii) RLC
   iii) ORI
   iv) XRI

f) Differentiate between hardware interrupt and software interrupt.

Q.3   Attempt any **FOUR**   **(16)**

a) Draw instruction cycle waveform for instruction given below.

Memory address	M/C code	Opcode	Operand
2040	32		
2041	80	STA	1080H
2042	10		

P.T.O

b) Draw architectural block diagram of 8085 processor.

c) Explain the formats of SIM and RIM instruction.

d) Write an assembly language program to exchange the 10 byte of data stored at location 6050H onwords exchange with data stored at location 7050 onwords.

e) Explain the function of PUSH and POP instructions with the help of suitable program.

f) Explain the following 8085 instructions.
      i)   ACI
      ii)   DAA
      iii) DAD R_P
      iv) SPHL

Q.4   Attempt any **FOUR**   **(08)**

a) Write the memory mapping table to interface 8k byte of EPROM & 8k byte of ROM with 8085 microprocessor.

b) How many address lines are required to interface 2764 ROM & 6064 RAM memory with 8085 µp

c) Write any four feature of 8255 PPI.

d) Draw the format of BSR control word of 8255 PPI.

e) Write the function of following pins of ~~8279~~ 8259 interrupt controller i) CAS_0-CAS_1 ii) IR_0-IR_1

f) Enlist any two operating modes of 8259 programmable interrupt controller.

Q.5   Attempt any **FOUR**   **(16)**

a) Interface 2k x 4 (2114) memory chip & give memory mapping.

b) Write the difference between memory mapped I/O & I/O mapped I/O.

c) Write a note on serial communication protocol RS 232.

d) Interface two LEDs to microprocessor using 8255 PPI. Use one LED in common anode & anther in common cathode technique. Also write program to blink them alternately.

e) Draw format of OCW1 & OCW3 of 8259 programmable interrupt controller. Also write function of each bit.

f) Draw & explain functional block diagram of 8259 programmable interrupt controller.

Q.6   Attempt any **FOUR**   **(16)**

             8 to switches
a) Interface a ~~steeper motor~~ to 8085 using 8255 interface 8255 in I/O mapped I/O.

b) Explain strobed I/O mode in input mode of 8255 PPI with suitable diagram.

c) Interface 8255 to 8085 in I/O mapped I/O. also specify address of 8255 ports and control register.

d) Explain cascade PIC system of 8259 interrupt controller with suitable diagram.

e) Draw the timing diagram of out 70H instruction.

f) ~~Write the difference between absolute decoding & partial decoding (any 4 points)~~

f) Draw the interfacing diagram of 7-segment display in common cathod type.
****

LEVEL: **THIRD**

COURSE CODE: **IX307**

MAX. MARKS: **80**

PROGRAM: **INDUSTRIAL ELECTRONICS**

COURSE NAME: **INDUSTRIAL DRIVES**

TIME: **3 HRS.**   DATE: **11/05/2016**

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1   Attempt any **FOUR**   (08)

a) Draw block diagram of basic element of an electric drive.

b) What is hoist? Draw neat diagram of it.

c) Why series dc motor is never started on No-Load?

d) Draw speed torque characteristics of fan load.

e) Write various starters used for induction motor.

f) Draw neat circuit diagram of frequency control inverter using power MOSFET.

Q.2   Attempt any **FOUR**   (16)

a) What are different factors considered for drive selection? Explain these in brief.

b) Explain in brief dynamic braking with neat diagram.

c) Draw speed torque characteristics of synchronous motor and explain it.

d) With neat diagram, explain motor resistance control method of speed control.

e) Differentiate between stator voltage control method and stator current control method of speed control (Any four points)

f) What is slip energy? Explain it.

Q.3   Attempt any **TWO**   (16)

a) Explain the requirements of adjustable speed drive. Compare AC and DC drives.

b) With neat circuit diagram explain in detail Kramer's system (Basic and static)

c) With necessary diagram explain in detail frequency control method of speed control.

P.T.O

Q.4   Attempt any **FOUR**   **(08)**

a)   State two advantages of µp for DC drives.

b)   Draw circuit diagram of 1ϕ semicoverter with free wheeling diode.

c)   What is the function of freewheeling diode in 1ϕ full converter?

d)   State applications of drive (any four)

e)   Draw speed Torque characteristics of DC series motor.

f)   Give classification of chopper.

Q.5   Attempt any **FOUR**   **(16)**

a)   Describe the role of drive in paper mills.

b)   What is PLL? Explain with block diagram how to control speed of DC motor using PLL.

c)   Compare between step up chopper & step down chopper (four points)

d)   Draw µc based stepper motor control. Also write drives required at each stage for textile mill.

e)   Compare between 1ϕ converter & 3ϕ converter.

f)   Explain in brief circulating current mode and non circulating current mode of dual converter.

Q.6   Attempt any **FOUR**   **(16)**

a)   Write applications of chopper (any four)

b)   Explain with neat diagram two quadrant chopper drive.

c)   Compare between full converter & semi converter on

   i)   Quadrant of operation

   ii)   Freewheeling diode

   iii)   Power flow direction

   iv)   No. of SCR

d)   Draw & explain 1ϕ dual converter drive.

e)   State & explain role of drive in sugar mill.

f)   Draw block diagram of PLC controlled motor drive write its application.

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EVEN TERM END EXAM APRIL / MAY 2016
EXAM SEAT NO.

LEVEL :- **THIRD**   PROGRAM : **IND. ELECRONICS & E & TC**
COURSE CODE :- **IX/EJ304**
COURSE NAME :- **INSTRUMENTATION**
MAX. MARKS : **80**   TIME : **3 HRS.**   DATE :- **11 / 05 / 2016**

Instruction :-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	Marks

Q.1   Attempt any **FOUR**   (08)

    a) Define active and passive transducers. Give two examples of each type.

    b) Write any two advantages of electrical transducer over mechanical transducer.

    c) Draw the diagram of liquid level measurement using float.

    d) Define pyrometer.

    e) What are the basic requirements of transducers?

    f) What are different scales of temperature measurement?

Q.2   Attempt any **FOUR**   (16)

    a) Explain in detail characteristics of transducer.

    b) Explain temperature compensation technique used for strain gauge.

    c) Explain capacitive level detector usign neat diagram.

    d) Draw a neat constructional diagram of RTD and state its features.

    e) Draw infrared rediation pyrometer and explain its principle of working.

    f) Explain with diagram anagular displacment using RVDT

Q.3   Attempt any **FOUR**   (16)

    a) Explain with neat diagram photo voltaic tranaducer.

    b) Explain level measurement using ultrasonic method.

    c) Draw construction of thermocouple and explain its principle of working.

    d) Explain liquid level measurment using resistive method with help of suitable diagram.

    e) Give classification of strain gauges and explain any one type in detail.

    f) How thickness is measured using inductive method?   P.T.O.

Q.4   Attempt any **FOUR**   (08)

a) Which material is best for construction of diaphragm? Why?

b) Draw block diagram of R.F. telemetry.

c) Give basic principle of signal conditioning.

d) Give two limitations of electromagnetic flow meter.

e) Enlist types of Modulation.

f) Draw block diagram of single channel DAS.

Q.5   Attempt any **FOUR**   (16)

a) Explain ultrasonic flow meter.

b) Give basic principle of transmitter. Enlist its types.

c) Explain frequency division multiplexing.

d) Give two advantages and two disadvantages of piezoelectric transducer.

e) Explain TDM.

f) Explain power line carrier.

Q.6   Attempt any **FOUR**   (16)

a) Give four advantages of unbonded strain gauge type pressure transducer.

b) Draw and explain instrumentation amplifier.

c) Explain log converter.

d) Draw and explain i) C type ii) Spiral type Burdon tube,

e) Explain multiplier integrator.

f) Draw and explain differentiator.

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LEVEL: **FOURT H** PROGRAM: **IE/E&TC**
COURSE CODE: **ETE403/IX/EJ409** COURSE NAME: **DATA COMMUNICATION & NETWORKING**
MAX. MARKS: **80** TIME: **3 HRS.** DATE: **11/05/2016**

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I Marks

Q.1 Attempt any **FOUR** (08)

   a) Draw block diagram of data communication system.

   b) Define i) Router ii) Bridge

   c) Define routing table in packet switching network.

   d) Give one advantage & one disadvantage of massage switching.

   e) Draw delay in virtual circuit packet switching.

   f) Define full duplex mode.

Q.2 Attempt any **FOUR** (16)

   a) Write short note on IEEE standard.

   b) Explain MAN in detail.

   c) With an example, explain how frame relay works.

   d) Explain i) De- facto ii) De Jure

   e) Explain full duplex modem.

   f) Compare circuit switching & virtual circuit packet switching.

Q.3 Attempt any **FOUR** (16)

   a) What is the relation between data rate and bandwidth?

   b) Explain set up phase in virtual circuit packet switching.

   c) Enlist types of addressing. Explain any one.

   d) Explain i) delay distortion ii) Noise

P.T.O

e) Draw frame relay frame format & explain each part.

f) Explain i) Ring topology ii) Mesh topology.

|Section – II|Marks|

Q.4 Attempt any **FOUR** (08)

a) Enlist various types of errors & classify it.

b) Define the term URL & draw block diagram.

c) Draw block diagram for MIME.

d) Define term Redundancy.

e) Explain primary & secondary domain.

f) What is mean by cryptography?

Q.5 Attempt any **FOUR** (16)

a) Draw and explain piggybacking.

b) Explain in detail simple mail transfer protocol

c) Draw and explain encryption model in detail.

d) Explain in detail Go-Back N ARQ protocol.

e) Write a note about Fast Ethernet & Gigabit Ethernet.

f) Explain multipurpose Internet mail extension in detail.

Q.6 Attempt any **FOUR** (16)

a) Explain ESS with its architectural block diagram.

b) Draw and explain format of selective repeat ARQ protocol.

c) Define the term POP and IMAP explain it in detail.

d) Differentiate FHSS & DSSS (any four point)

e) Explain in detail flow control and error control technic.

f) Draw the format & explain FTP.

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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO.

LEVEL: FOURTH   PROGRAM: **INDUSTRIAL ELECTRONICS**
COURSE CODE: IX401   COURSE NAME: **INDUSTRIAL AUTOMATION**
MAX. MARKS: 80   TIME: **3 HRS.**   DATE:12/05/2016

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I

                                                                        Marks

Q.1   Attempt any **FOUR**   (08)

     a)   Write I/P & O/P devices of PLC.

     b)   Draw basic block diagram of PLC.

     c)   What is ON delay timer?

     d)   Write any two advantages of ladder diagram programming?

     e)   Write control word of ON delay timer.

     f)   Enlist various applications of PLC in industries.

Q.2   Attempt any **FOUR**   (16)

     a)   What is programmable logic controller?

     b)   Write evolution of PLC in automation.

     c)   Explain unitary PLC with proper diagram.

     d)   Explain PLC architecture.

     e)   Write note on up counter (CTU) with timing diagram.

     f)   Explain use of PLC in Bottle filling plant.

Q.3   Attempt any **FOUR**   (16)

     a)   Explain with neat diagram modular PLC.

     b)   Compare relay logic controller & PLC (any four points)

     c)   Describe operating cycle of PLC with neat diagram.

     d)   Explain off delay timer (Toff) with proper timing diagram.

e) Write classification of PLC, what is small size PLC & medium size PLC?

f) How PLC cam be used in plastic Industry?

Marks

Q.4   Attempt any FOUR

(08)

a) Define SCADA.

b) Enlist different layers used in SCADA.

c) What is use of controller layer in SCADA?

d) Enlist various functions of SCADA.

e) Give the need of HMI.

f) Define robotics.

Q.5   Attempt any FOUR

(16)

a) What is SCADA? Give basic SCADA system integrating industrial process & operator panel.

b) Draw the functional block diagram of SCADA? Explain various layers in it.

c) Explain system monitoring & system management functions of scada system.

d) What is HMI? Draw its basic block diagram.

e) Explain the functional block diagram of autonomous robotic system.

f) Give the advantages of robotics.

Q.6   Attempt any FOUR

(16)

a) How the communication is done between SCADA & PLC?

b) What are the various types of HMI? Explain in detail.

c) What are the characteristics of HMI? Explain in detail.

d) Explain the architecture of HMI.

e) What are the various application of robotic system?

f) Give the classification of industrial robots based on

   i)   Mechanical configuration

   ii)   Method of control.

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LEVEL : - **FIRST** PROGRAM : **IND. ELECTRONICS / E & TC**
COURSE CODE :- **IEE/ETE101/IX/EJ109**
COURSE NAME :- **ELECTRONICS COMPONENT & APPLICATION**
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 16 / 04 / 2016

Instruction :-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available o request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1   Attempt any **FOUR**   (08)

   a) Name any four specifications of capacitor.

   b) What is resistor? State different types of resistor?

   c) Write colour code for following values of capacitor i) 33 μF ii) 47nF.

   d) Explain NTC resistors with temperature-resistance characteristics?

   e) State any four applications of an inductor.

   f) List any four general specifications of resistor.

Q.2   Attempt any **FOUR**   (16)

   a) Give construction, advantages and applications of slug-tuned inductor.

   b) Write note on : Logarithmic Potentiometer.

   c) Explain Air-gang capacitor with its constructional diagram.

   d) Give construction details of LDR. State their applications.

   e) Compare Air-core and Ferrite-core inductor.

   f) Explain the Trimmer capacitor with construction diagram and write its two applications.

Q.3   Attempt any **FOUR**   (16)

   a) What are the types of frequency range inductors? And explain in detail Toroidal Inductors.

   b) Explain in detail, how the resistors are identified using colour band system?

   c) Write a note on losses in an inductors & also explain how these losses can be reduced.

   d) State the functions of following parts of electrolytic capacitor
     i) 'AJ' foil ii) Oxide film iii) Spacer iv) 'AJ' container.

   e) Explain construction and application of carbon film resistor.

   f) Write merits and demerits of glass capacitor and also two applications of it.

P.T.O.

Q.4   Attempt any **FOUR**   (08)

   a) What is PCB? State any two types of it.

   b) State any four characteristics of cables.

   c) What is mechanical life and electrical life of switches?

   d) Give comparison between rotary switch and slide switch. (any two points)

   e) State any four types of connectors.

   f) Draw the diagram of optical fiber cable.

Q.5   Attempt any **FOUR**   (16)

   a) Draw and explain twin core cable.

   b) Explain epoxy laminates used in PCB.

   c) Draw and explain construction of push to ON switch.

   d) Explain wave soldering process used in PCB.

   e) Draw neat labeled diagram of general purpose relay.

   f) With neat diagram explain BNC connector.

Q.6   Attempt any **FOUR**   (16)

   a) Draw and explain construction of LED.

   b) Draw and explain FRC cable.

   c) Write any four necessary conditions required for soldering.

   d) With neat diagram explain video connector.

   e) Give the comparison between relay and switch. (any four points)

   f) Draw and explain common anode LED. Display.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM APRIL / MAY 2016

EXAM SEAT NO.

LEVEL : - FIFTH   PROGRAM : IND. ELECTRONICS
COURSE CODE :- IEE501/IX301/IE304/4304
COURSE NAME :- POWER ELECTRONICS - II
MAX. MARKS : 80   TIME : 3 HRS.   DATE :- 18 / 04 / 2016

Instruction :-

1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available o request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I	Marks

Q.1 Attempt any FOUR   (08)

a) Define leakage current.

b) Give any two applications of chopper.

c) What is servo type regulator? Explain with circuit diagram.

d) Define and draw Turn ON time of GTO.

e) Classify cycloconverter.

f) Give voltage and current ratings of IGBT.

Q.2 Attempt any FOUR   (16)

a) Explain working of series turn off chopper with help of neat diagram.

b) Draw construction and give operating principle of power MOSFET.

c) Explain i) Need ii) Power supply requirement for SMPS.

d) Draw and explain output characteristic of MOSFET.

e) With neat circuit diagram, explain three phase to single phase cycloconverter.

f) Explain the terms related to SMPS i) Isolation ii) Multiple output.

Q.3 Attempt any FOUR   (16)

a) Define leakage current. Give two applications of GTO.

b) Explain two quadrant choppers.

c) Define i) Power line disturbance ii) Efficiency of SMPS.

d) Draw and explain parallel turn off chopper.

e) Differentiate between SMPS and linear regulator.

f) Explain waveforms of voltage, current and power in single phase to single phase cycloconverter.

P.T.O.

Q.4 Attempt any **FOUR** (08)

    a) Give need of protection circuits.

    b) Compare series and parallel inverter (any Two points)

    c) Draw simple bridge inverter with R-load.

    d) List any four specifications of inverter.

    e) Draw a circuit diagram of optoisolator.

    f) Give the classification of inverter.

Q.5 Attempt any **FOUR** (16)

    a) Draw a neat block diagram of on-line UPS and explain function of each block.

    b) Explain Snubber circuit with circuit diagram.

    c) Draw a neat circuit diagram of basic series inverter and explain it.

    d) With neat circuit diagram give the operating principle of inverter.

    e) Draw and explain principle of induction heating.

    f) With diagram explain MC Murray Bed ford inverter.

Q.6 Attempt any **TWO** (16)

    a) Explain any eight specifications of UPS.

    b) With neat circuit diagram explain working of parallel inverter with RL load.

    c) Draw and explain A.C. & D.C. circuit breaker.

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EXAM SEAT NO.

LEVEL: FIFTH   PROGRAM: ELECTRONICS & TELECOMMUNICATION
COURSE CODE: ETE506/EJ410   COURSE NAME: AUDIO VIDEO ENGINEERING
MAX. MARKS: 80   TIME: 3 HRS.   DATE: 22/04/2016

Instruction:-
1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
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7) Use of Mobile is strictly prohibited.

<div align="center">Section – I</div>   Marks

Q.1   Attempt any **FOUR**   (08)

     a) State Grassman's law.

     b) Compare between woofer, mid-range and tweeter. (any two points)

     c) Draw the architecture of JPEG file format.

     d) What is horizontal and vertical resolution?

     e) Define i) contrast ii) Brightness.

     f) What is mono and stereo amplifiers?

Q.2   Attempt any **FOUR**   (16)

     a) Draw the architecture and explain MPEG file format.

     b) Give comparison between additive and subtractive color mixing (any four points)

     c) Explain the terms aspect ratio and image continuity.

     d) Explain any four controls available on Hi-Fi amplifier and its functions also.

     e) Explain vestigial sideband transmission system.

     f) With neat diagram, explain AVI system.

Q.3   Attempt any **FOUR**   (16)

     a) Draw and explain composite video signal with suitable waveforms.

     b) Explain horizontal sync plus in detail.

     c) With neat block diagram, explain Hi Fi amplifier.

     d) Explain any one type of video compression technique.

     e) Explain secondary colors of TC system with suitable diagram.

     f) Explain cross over network circuit.

P.T.O

Q.4   Attempt any FOUR   (08)

   a)   Define i) Attenuator ii) Balun antenna.

   b)   What is function of delay line in PAL-D?

   c)   Draw diagram of delta gun picture tube.

   d)   Give any four advantages of CCTV.

   e)   Draw basic circuit for U & V signal separation.

   f)   Enlist drawbacks of delta gun picture tube.

Q.5   Attempt any FOUR   (16)

   a)   Explain two merits & two demerits of negative modulation.

   b)   Draw circuit diagram for colour signal matrixing & give any two
        disadvantages of NTSC.

   c)   What is EHT? Explain it with circuit diagram.

   d)   Explain master antenna television with suitable diagram.

   e)   Draw block diagram for PAL-D decoder. Explain the function of color
        Killer circuit.

   f)   Enlist any four standard of HDTV.

Q.6   Attempt any FOUR   (16)

   a)   Draw & explain block diagram of colour TV transmitter.

   b)   Give advantages of i) PIL picture tube ii) LCD.

   c)   With circuit diagram, explain chroma signal amplifier.

   d)   Explain working of plasma TV with neat sketch.

   e)   Compare NTSC, PAL and SECAM (any four points)

   f)   What is conditional access service? Draw & explain the block diagram for
        DTH receiver.

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