GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCE105/X104/R107/0107** COURSE NAME: **BASIC MATHEMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **30/04/2016**

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

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

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: $x+y+z=1;\quad 2x+3y+z=4;\quad 4x+9y+z=16$

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: $\frac{x^2+2x}{(x-3)(x^2+1)}$

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: $\frac{x^2+x+1}{(x+1)^2(x+2)}$

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

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 $\left(x^3+\frac{m}{x^8}\right)^{11}$ 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 $\cos^{-1}\left(-\frac{1}{2}\right)-\sin^{-1}\left(\frac{1}{2}\right)$

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

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

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

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

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

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

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 ΔABC *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 $\sin\alpha=\frac{5}{13}$, $\cos\beta=\frac{-4}{5}$ *evaluate* $\cos(\alpha+\beta)$

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

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

d) In ΔABC *show that* $\tan A+\tan B+\tan C=\tan A\tan B\tan C$

e) Solve ΔABC in which the sides are a=52.8, b=39.3, c=72.1

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

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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=8Ω.

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=3kΩ source resistance R_S=600Ω, 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>20MΩ, $R_0 \leq$ 500Ω, R_L=1kΩ 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=2.2kΩ

b) Design astable multivirator using IC 555 for the maximum output frequency of 5KHz with duty cycle ≤ 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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ECD Datasheets

Appendix - 1

Table 1: Standard Resistance 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	4.3	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	

Table 2: Standard Capacitor Values

Peko Farad ($pF \rightarrow 10^{-12}$)			Micro Farad ($\mu F \rightarrow 10^{-6}$)					
10	100	1000	0.01	0.1	1.0	10	100	1000
12	120	1200	-	-	-	-	-	-
15	150	1500	0.015	0.15	1.5	18	180	1800
22	220	2200	0.022	0.22	2.2	22	220	2200
27	270	2700	-	-	-	-	-	-
33	330	3300	0.033	0.33	3.3	33	330	3300
39	390	3900	-	-	-	-	-	-
47	470	4700	0.047	0.47	4.7	47	470	4700
56	560	5600	-	-	-	-	-	-
68	680	6800	0.068	0.68	6.8	-	-	-
82	820	8200	-	-	-	-	-	-

Table 3: Rectifier Diode Specification Sheet

Type No.	Material (S/G)	V_R(PIV) (V)	I_F (A)	V_F (V)	I_R (μA)
IN 4001	S	50	1.0	1.1	5
IN 4002	S	100	1.0	1.1	5
IN 4003	S	200	1.0	1.1	5
IN 4004	S	400	1.0	1.1	5
IN 4005	S	600	1.0	1.1	5
IN 4006	S	800	1.0	1.1	5
IN 4007	S	1000	1.0	1.1	10
IN 4148	S	75	0.1	1.0	25 (nA)
IN 5060	S	400	2.5	1.25	0.2
IN 5061	S	600	2.5	1.25	0.2
IN 5062	S	800	2.5	1.25	0.2
IN 5391	S	50	1.5	1.4	250
IN 5393	S	200	1.5	1.4	250
IN 5397	S	600	1.5	1.4	250
IN 5399	S	1000	1.5	1.4	250
IN 5402	S	200	3.0	1.0	10
IN 5408	S	1000	3.0	1.0	5
IN 5409	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	-	-
BA 102	G	20	0.09	-	-
BY 100	S	1250	1.0	1.5	10
BY 125	S	150	1.0	-	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		
Switching and Detector Diodes :			(mA)		
IN 914	S	75	10	-	-
IN 915	S	50	10	-	5
OA 70	G	22.5	50	0.1	30
OA 72	G	45	10	0.2	0.8
OA 73	G	30	50	0.1 - 0.2	18
OA 79	G	45	35	0.15 - 0.3	0.1 - 2.8

Table 4: Zener Diode Specification Sheet

Type No.	Zener Voltage (V_Z) at I_{ZT}	Zener Test Current (I_{ZT}) mA	Zener Impendence (Z_{ZT}) Ω
IN 4370	2.4	20	30
IN 4371	2.7	20	30
IN 4372	3.0	20	29
IN 746	3.3	20	28
IN 747	3.6	20	24
IN 748	3.9	20	23
IN 749	4.3	20	22
IN 750	4.7	20	19
IN 751	5.1	20	17
IN 752	5.6	20	11
IN 753	6.2	20	7
IN 754	6.8	20	5
IN 755	7.5	20	6
IN 756	8.2	20	8
IN 757	9.1	20	10
IN 758	10	20	17
IN 759	12	20	30
IN 957A	6.8	18.5	4.5
IN 960A	9.1	14	7.5
IN 962A	11	11.5	9.5
IN 964A	13	9.5	13
IN 965A	15	8.5	16
IN 966A	16	7.8	17
IN 968A	20	6.2	25
IN 972A	30	4.2	49
IN 980A	62	2.0	185
IN 983A	82	1.5	330
IN 985A	100	1.3	500
IN 3993	3.9	640	2
IN 3994	4.3	580	1.5
IN 3995	4.7	530	1.2
IN 3996	5.1	490	1.1
IN 3997	5.6	445	1.0
IN 3998	6.2	405	1.1
IN 3999	6.8	370	1.2
IN 4000	7	355	1.3

IN 4370 series : ± 10 % suffix A for ± 5 % units, C for ± 2 %,
IN 746 series : ± 10 % suffix A for ± 5 % units, C for ± 2 %,
IN 795 series : ± 10 % suffix A for ± 10 % units, C for ± 2 %,

Appendix - 4

Table 5 : Transistor Data Sheet

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	-
AC110	PG	20	15	10	50	30	75	0.5
AC126	PG	32	12	10	100	500	100	1
AC127	NG	32	12	10	500	340	50	1.5
AC128	PG	32	16	10	1 A	67	45/165	1
AC130	NG	20	15	10	100	145	50	2
AC131	PG	45	32	10	1 A	75	40/120	-
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	5	100	300	120	150
BC109	NS	30	20	5	100	300	180	150
BC115	NS	40	30	5	100	300	80	40
BC116	PS	45	40	5	100	300	35	130
BC119	NS	60	30	5	1 A	800	40	40
BC126	PS	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	5	1 A	800	20	40
BC146	NS	20	20	4	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	5	1 A	3.2 W	40	50
BC177	PS	45	45	5	100	300	70	130
BC178B	PG	30	25	5	200	300	180	100
BC179A	PS	25	20	5	50	300	120	100
BC180	NS	30	30	-	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	-
2N271	PG	30	10	20	200	150	45	4
2N312	NG	15	15	15	200	150	50	-
2N329B	PS	50	30	20	100	400	36/88	2
2N334A	NS	45	45	4	25	500	18/86	5
2N914	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	-	1A	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	60/240	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								
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	-	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	25	-	0.	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	470
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

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)
Power transistors								
AD136/4	PG	40	30	10	10	11	30	0.3
AD140	PG	55	55	-	3	35	30	0.2
AD143-5	PG	45	35	10	10	30	50/110	0.45
AD156V	PG	32	16	10	2	8	50/100	1
AD157V	NG	32	16	10	2	8	50/100	1
AD161	NG	32	20	10	1	4	80	1
AD162	PG	32	20	10	1	6	50	1
AD165	NG	25	20	10	1	5	60	0.5
AD262	PG	35	20	10	4	10	30	0.45
ADY12	PG	60	45	10	0.6	0.25	60/100	0.35
BD115	NS	245	180	5	0.15	6	22	80
BD124	NS	70	45	-	2	15	35	60
BD131	NS	70	45	6	3	11	40	60
BD132	PS	45	45	4	3	11	40	60
BD135	NS	45	45	5	1	12	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	40/180	50
BD141	NS	140	120	7	8	117	20/70	-
BD145	NS	60	60	5	5	15	45	50
BD151	PS	35	30	5	3	25	30/150	-
BD152	NS	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	28	20/78	-
BD182	NS	70	60	7	15	117	20/70	-
BD187	NS	55	45	5	4	40	40	2
BD188	PS	55	45	5	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	-
SK100	PS	60	50	6	0.5	4	40/300	-
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
TL 30C	PS	100	100	5	1	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	5	6	2	15/75	3
TIP42	PS	40	40	5	6	2	15/75	3
TIP62	PS	40	40	5	2	40	15/100	3
TIP120	NS	60	60	5	5	60	1000	-
TIP125	PS	60	60	5	5	60	1000	-
TIS45	NS	40	15	5	0.2	250	30/120	300
2N1481	NS	60	40	12	1.5	5	35/100	1
2N1721	NS	150	100	-	1	15	40/120	16
2N1722	NS	120	80	10	7.5	50	20/90	10
2N2067	PG	40	25	20	3	10	20	-
2N2033	NS	80	60	-	3	5	20/60	1
2N2017	NS	60	60	8	1	1	50/200	80
2N3053A	NS	80	60	5	700 mA	5	50	100
2N3055	NS	100	60	7	15	115	20/70	0.2
2N3140	NS	140	140	1	2	25	10	10
2N3180	PS	60	60	-	5	85	10/30	1
2N3878	NS	120	50	7	4	35	20	40
ECN100	NS	-	60	-	0.7	5	50	-
ECN149	NS	50	40	6	4	30	10	-
ECP149	PS	50	40	6	4	30	10	-

Table 6 Field effect transistor

Types	Channel	VDS (V)	I_G (mA)	I_{GSS} (nA)	$V_{GS(off)}$ (V)	I_{DSS} (mA)	Y_{fs} (μ℧)	Y_{os} (μ℧)	P_T (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	20	0.3
2N4222	"	30	15	- 0.1	- 8	-	2.5 - 6	40	0.3
2N4416	"	30	10	0.1	6	-	4.5 - 7.5	50	0.3
2N4856	"	40	-	- 0.25	- 4, - 10	50	-	-	0.36
2N5457	"	25	10	- 1.0	- 6	3	3000	10 - 50	0.31
2N5458	"	25	10	- 1	- 7	6 - 9	4000	10 - 50	0.31
BFW10	"	15	-	0.1	8	820	3.2 mA/V	50	0.3
BFW11	"	15	-	0.1	6	810	3.2 mA/V	-	0.3

Table 7 Unijunction transistor

Type	I_e (A)	η	I_p (μA)	I_v (mA)	V_{BE1} (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	-
2N4948	1	0.55 - 0.82	0.6	4	2.5	0.36	4 -12

Darlington Transistors

TYPE NO.	POLARITY	CASE	MAXIMUM RATINGS P_d (mW)	I_C (mA)	V_{CEO} V_{CES}* (V)	H_{FE} min	H_{FE} max	I_C (mA)	V_{CE} (V)	$V_{CE(SAT)}$ max (V)	I_C (mA)	I_T min (MHz)	Cob max (dB)	N.F. @ f = 1KHz max (dB)	COMPLEMENTARY TYPE
BC516	P	TO-92F	625	400	30	30K	–	20	2	1	100	250+	4.5+	15 #	BC517
BC517	N	TO-92F	625	400	30	30K	–	20	2	1	100	250+	3.5	15 #	BC516
MPSA12	N	TO-92A	625	500	20	20K	–	10	5	1	10	–	–	–	–
MPSA13	N	TO-92A	500	300	30+	5K	–	10	5	1.5	100	125	3+	2+	–
MPSA14	N	TO-92A	500	300	30+	10K	–	10	5	1.5	100	125	3+	2+	–
MPSA63	P	TO-92A	625	300	30	10K	–	100	5	1.5	100	125	–	–	–
MPSA65	P	TO-92A	500	300	30+	50K	–	10	5	1.5	100	125	4+	2+	–
MPSA66	P	TO-92A	500	300	30+	75K	–	10	5	1.5	100	125	4+	2+	–
MPSD04	N	TO-92A	625	300	25+	1K	–	10	5	1	100	100	–	–	MPSD54
MPSD54	P	TO-92A	625	300	25+	1K	–	10	5	1	100	100	–	–	MPSD04
2N997	N	TO-18	500	300	40	1K	70K	100	10	1.6	100	–	–	–	–
2N5306	N	TO-92B	600	300	25	2K	20K	2	5	1.4	200	60	10	–	–
2N5306	N	TO-92B	600	300	25	1K	70K	2	5	1.4	200	60	10	–	–
2N5307	N	TO-92B	600	300	40	2K	20K	2	5	1.4	200	60	10	–	–
2N5308	N	TO-92B	600	300	40	7K	70K	2	5	1.4	200	60	10	–	–

N Channel JFET

N-Channel

CASE	TYPE NO.	G_{fs} (mmho) MIN	G_{oss} (μmho) MAX	C_{iss} (pF) MAX	C_{rss} (pF) MAX	$V_{(BR)GSS}$ (V) MIN	$V_{GS(off)}$ (V) MIN	$V_{GS(off)}$ (V) MAX	I_{DSS} (mA) MIN	I_{DSS} (mA) MAX	PIN OUT
TO-72	2N4220	1.0	10	6.0	2.0	30	–	4.0	0.5	3.0	SDGC
TO-72	2N4221	2.0	20	6.0	2.0	30	–	6.0	2.0	6.0	SDGC
TO-72	2N4222	2.5	40	6.0	2.0	30	–	8.0	5.0	15.0	SDGC
TO-18	2N4338	0.6	5.0	7.0	3.0	50	0.3	1.0	0.2	0.8	SDG
TO-18	2N4339	0.8	15	7.0	3.0	50	0.6	1.8	0.5	1.5	SDG
TO-18	2N4340	1.3	30	7.0	3.0	50	1.0	3.0	1.2	3.6	SDG
TO-18	2N4341	2.0	60	7.0	3.0	50	2.0	6.0	3.0	9.0	SDG
TO-92	2N5457	1.0	50	7.0	3.0	25	0.5	6.0	1.0	5.0	DSG
TO-92	2N5458	1.5	50	7.0	3.0	25	1.0	7.0	2.0	9.0	DSG
TO-92	2N5459	2.0	50	7.0	3.0	25	2.0	8.0	4.0	16	DSG
TO-72	2N5556	---	---	6.0	3.0	30	0.2	4.0	0.5	2.5	SDGC
TO-72	2N5557	---	---	6.0	3.0	30	0.8	6.0	2.0	5.0	SDGC
TO-92	PN3685	1.5	25	4.0	1.2	50	1.0	3.5	1.0	3.0	DSG
TO-92	PN3686	1.0	10	4.0	1.2	50	0.6	2.0	0.4	1.2	DSG
TO-92	PN3687	0.5	5.0	4.0	1.2	50	0.3	1.2	0.1	0.5	DSG
TO-92	PN4302	1.0	50	6.0	3.0	30	–	4.0	0.5	5.0	DSG
TO-92	PN4303	2.0	50	6.0	3.0	30	–	8.0	4.0	10	DSG
TO-92	PN4304	1.0	50	8.0	3.0	30	---	10	0.5	5.0	DSG

P Channel JFET

TO-18	2N2608	1.0	---	17	---	30	1.0	4.0	0.6	4.5	SGD
TO-18	2N2609	2.5	---	30	---	30	1.0	4.0	2.0	10	SGD
TO-92	2N3820	0.8	200	32	16	20	---	8.0	0.3	15	DGS
TO-18	2N5020	1.0	80	25	7.0	25	0.3	1.5	0.3	1.2	SGD
TO-92	2N5460	1.0	75	7.0	2.0	40	0.75	6.0	1.0	5.0	DSG
TO-92	2N5461	1.5	75	7.0	2.0	40	1.0	7.5	2.0	9.0	DSG
TO-92	2N5462	2.0	75	7.0	2.0	40	1.8	9.0	4.0	16	DSG
TO-92	PN4360	2.0	100	20	5.0	20	0.4	10	3.0	30	SG

78XX Voltage Regulater 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	25	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

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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 $\frac{dv}{dt}$ 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.

P.T.O.

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 1ϕhalf wave controlled rectifier with R Load.
e) With diagram & waveform explain 1ϕhalf wave controlled rectifier with RL Load.
f) Explain 1ϕhalf 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} 1ϕhalf wave controlled rectifier with R & RL Load. (any 4 points)
c) Explain dynamic equalization network.
d) Describe two quadrant operation of 1ϕhalf wave controlled rectifier.
e) Compare 3ϕ uncontrolled half wave & bridge rectifier using efficiency, Form factor, ripple factor & TUF.
f) With diagram & waveform explain 3ϕhalf wave rectifier.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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EVEN TERM END EXAM APRIL/MAY -2016
EXAM SEAT NO. | | | | | | |

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 onrequest.
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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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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.

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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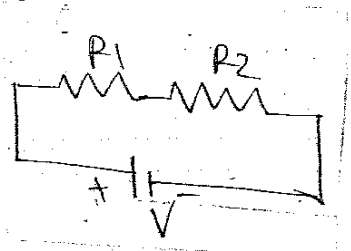
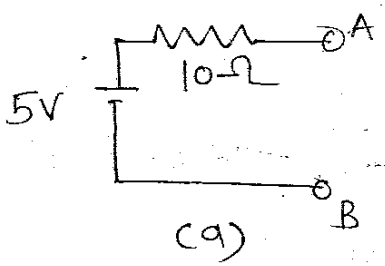
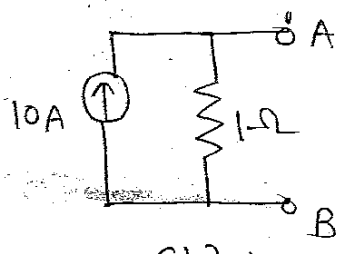


Que 2) (b)



(a)



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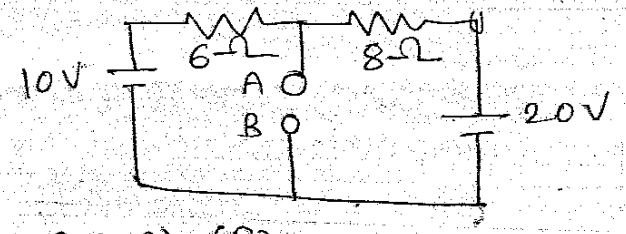
Que 2) (d)



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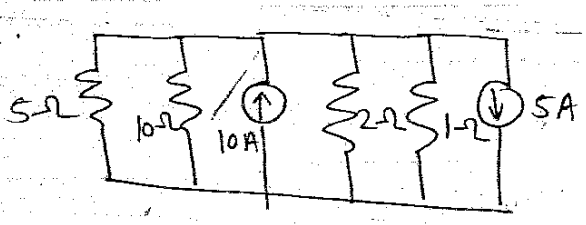

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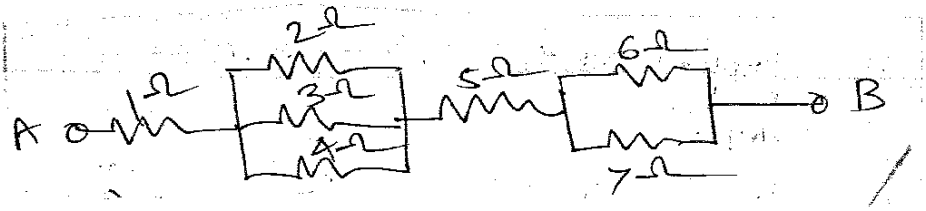

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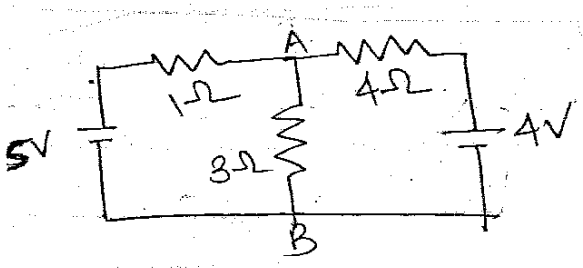

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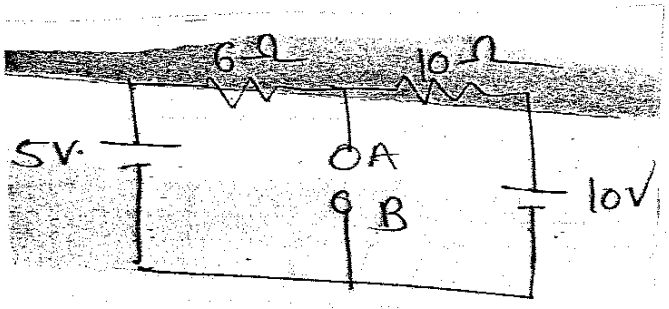
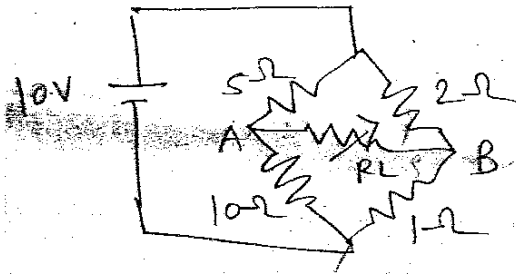


Que 3 (e)



Que 3) (f)

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **E & TC/ IE**

COURSE CODE: **IEE/ETE 107** COURSE NAME: **BASIC ELECTRICAL ENGG.**

MAX. MARKS: **80** 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.

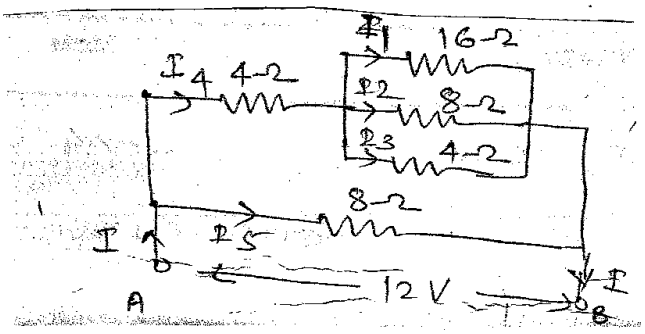
f) State different types of magnets. State their applications.

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.

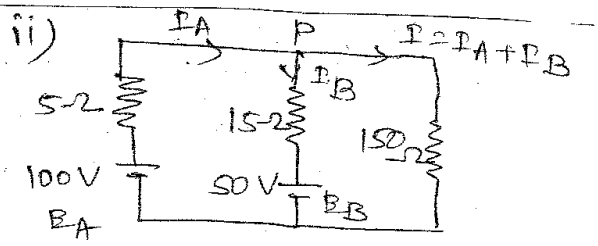
P.T.O.

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

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

b) i)State & explain Kirchoffs laws.

ii)



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.

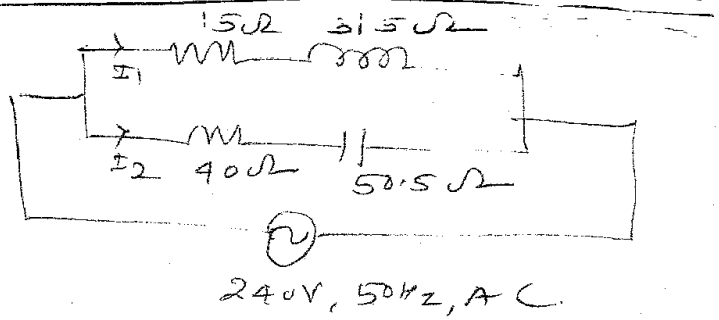
Q.6 Attempt any **FOUR** **(16)**

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.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

Q.1 Attempt any FOUR **Marks (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.

Section – II

Marks

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

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

b) If 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 $\overline{\text{INTQ}}$ 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.

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

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 $\mu = 0.27$, 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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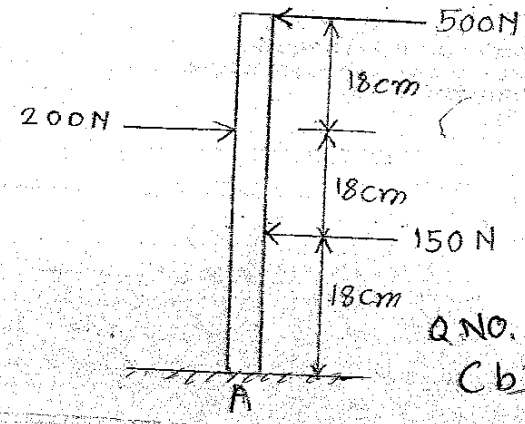

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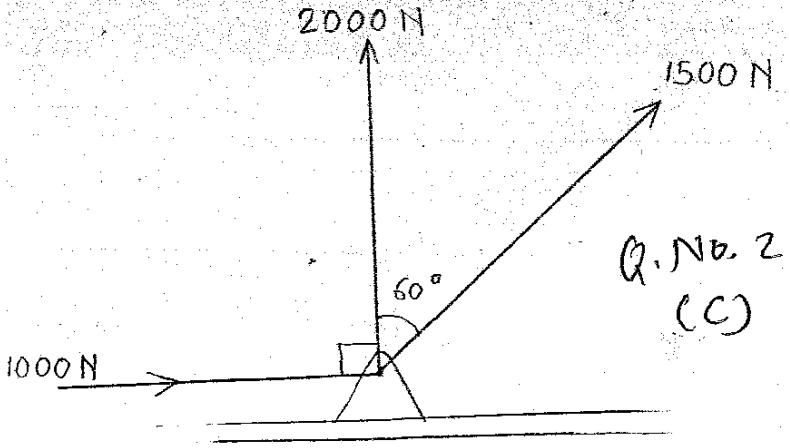
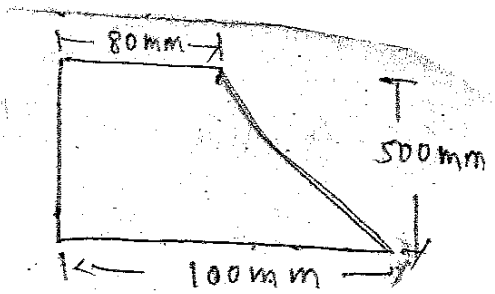
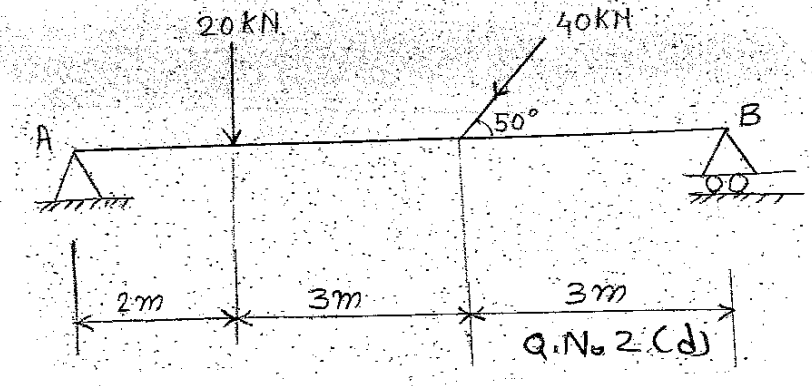
(b)



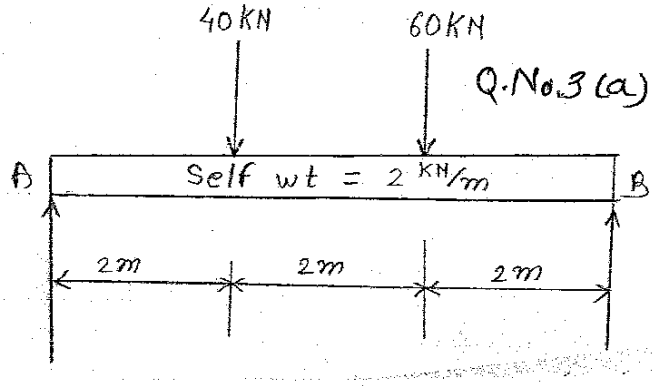
Q. No. 2
(c)



Q. No. 5 (b)



Q. No. 2 (d)



Q. No. 3 (a)

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **IE /E&TC**

COURSE CODE: **IEE/ETE307/IX/EJ206/IE207/ETE207/4207**

COURSE NAME: **LINEAR INTEGRATED CIRCUIT**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **04/05/2016**

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) State function current mirror bias circuit.

b) Draw the equivalent circuit of op-amp.

c) Define i) slew rate ii) output resistance.

d) State the necessity of negative feedback.

e) Draw the circuit diagram of voltage follower circuit.

f) Calculate the gain of inverting amplifier if R_f=10kΩ and R_1=2kΩ

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

a) Explain operation of dual input balanced output amplifier with circuit diagram.

b) Compare the any four characteristics of IC741 with those of ideal op-amp.

c) Draw the pin diagram of IC 741 and also draw the voltage transfer curve of op-amp.

d) Calculate the output voltage for open-loop non-inv. amplifier if V_{in}=10mv dc. Also draw input and output waveforms.

e) Draw instrumentation amplifier using 3 op-amp. State its voltage gain.

f) Explain the concept of virtual ground with reference to op-amp.

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

a) Explain working of the DC level shifter circuit.

b) Draw single input balanced output differential amplifier and define the term balance output and unbalanced output.

c) Draw block diagram of op-amp and explain the function of input stage and output stage.

d) Define :

1) Input offset voltage
2) Input bias current
3) Large signal voltage gain
4) CMMR.

e) Compare with four points between differentiator and integrator.

f) Draw the circuit diagram of I to V converter. Derive expression for its output.

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

a) State the functions of multivibrator. List various types of multivibrator.

b) List two merits and demerits of active filter over passive filters.

c) Give the types and application of comparators using IC741.

d) Draw circuit diagram of wide- band pass filter.

e) State any four applications of PLL.

f) Draw the pin diagram of IC 555.

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

a) Draw and explain frequency multiplier using PLL.

b) Explain operation of inverting zero crossing detector with neat diagram.

c) For a first order Butterworth high-pass filter calculate the cut off frequency f_c, if the component values are R=15kΩ and c=0.01μf. calculate the pass band gain if R_F =10kΩ and R_1=5kΩ

d) Explain operation of quadrature oscillator using IC741 with neat diagram.

e) Draw circuit diagram for inverting schematic trigger using op-amp. Also draw its neat labelled transfer characteristics.

f) Explain the use of PLL in FM detection.

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

a) Draw and explain internal schematic block diagram of PLL IC565.

b) Define the following terms w.r.t PLL i) Capture Range ii) Lock range. Also draw transfer characteristics of PLL.

c) Draw the circuit diagram and frequency response of active notic filter using op-amp.

d) Explain the operation of first order Butterworth high-pass filter using op-amp.

e) Explain operation of astable multivibrator using op-amp IC741.

f) Compare between voltage comparator and Schmitt trigger with four points.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FIRST | PROGRAM: IE/E&TC

COURSE CODE: IX/EJ108 | COURSE NAME: ENGINEERING SCIENCE

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 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 Faraday's laws of electromagnetic induction.

b) Define i) forbidden band ii) Fermi level

c) Draw energy band diagrams for conductor and insulator.

d) What is meissner effect?

e) State necessary conditions for TIR.

f) State ant two applications of laser.

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

a) Derive an expression for force acting on a conductor placed in a magnetic field.

b) On the basis of band theory, distinguish between conductor & semiconductor (any four points).

c) State any four properties of superconductors.

d) State any four applications of optical fibers.

e) Explain spontaneous of light.

f) A wire carrying a current of 2.4 ampere is 0.2m long. If it is kept in a magnetic field of strength 2.5 $x10^{-2}$ weber/m^2 at an angle of 30^0 with the field, calculate the force acting on it.

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

a) Explain in brief construction of AC generator.

b) Derive an expression for couple acting on a rectangular coil placed in a magnetic field.

c) State any four applications of superconductivity.

d) Distinguish between step index and graded index optical fibers(any four points)

e) State and explain any four properties of laser.

P.T.O

f) An optical fiber has a numerical aperture of 0.2 and a core of refractive index 1.4 Calculate refractive index of cladding.

Section – II **Marks**

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

a) Define specific conductivity & give its unit.

b) Distinguish between primary cells & secondary cells.

c) Define open circuit voltage & closed circuit voltage.

d) Give any two properties of Asbestos.

e) Name any two ores of copper with formula.

f) Write two engineering properties and two uses of aluminum.

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

a) Define degree of ionization. Explain the factors affecting degree of ionization.

b) Explain construction and working of dry cell.

c) Write properties & uses of the following

1) Thermocole

2) Teflon

d) What are composite materials? Gibe applications of composite materials.

e) Give construction, working and application of Ni-Cd battery.

f) Give composition, properties and applications of Rose metal.

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

a) Calculate p^H of $\frac{N}{500}$ NaoH solution.

b) Write composition & uses of Tinmann's solder & Brazing Alloy.

c) What are fuel cells? Explain construction, working of H_2-O_2 fuel cell.

d) Give properties & uses of glass wool.

e) Describe electrolytic of reduction of alumina.

f) Give characteristics of good adhesive.

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EVEN TERM END EXAM APRIL/MAY. -2016

EXAM SEAT NO. | | | | | | |

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_1 CON register.

e) Draw the block diagram of timer2

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 B 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.

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.

c) Draw & explain the format of T_3CON register. Also write an assembly language program to generate an delay of 25MS on port pin portC.4 assume XTAL=10MHz. Use timer1.

Section – II **Marks**

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.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

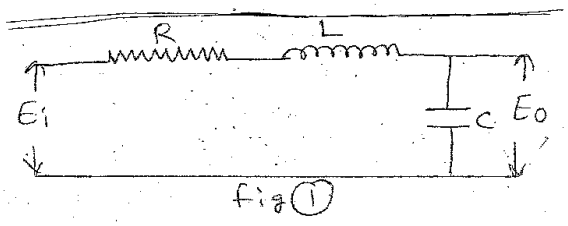


fig (1)

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.

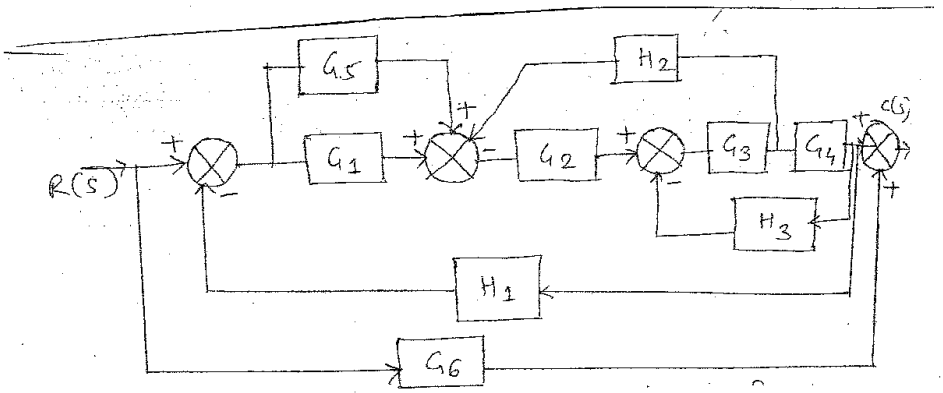
f) Define following terms related to transient response specifications.

i) Delay time (Td) ii) Rise time (Tr) iii) Peak overshoot (Mp) iv) Peak time(Tp)

P.T.O.

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

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



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

c) For the unity feedback control system $G(s) = \frac{10}{s(s+1)(s+5)}$ 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. $G(s) = \frac{k}{s(s+2)(s+4)(s+6)}$
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 $s^5+6s^4+15s^3+30s^2+44s+24$

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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	STA	1080H
2041	80		
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 interrupt controller i) CAS_0-CAS_1 ii) IR_0-IR_1

f) Enlist any two operating modes of ~~8259~~ 8279 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)**

a) Interface a ~~steeper motor~~ 8 switches 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.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM:

COURSE CODE: **EEE305/EE201/E201/0201** COURSE NAME: **APPLIED MATHS**
IEE301/IX201/IE201/4201
ITE301/IF201/IT201
ETE301/EJ201/ET201

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 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)**

Integrate w.r.t x (a to c)

a) $\frac{1}{\sin^2 x \cos^2 x}$

b) $\frac{\log x}{x}$

c) $\frac{1}{\sqrt{x+2}-\sqrt{x}}$

d) *Evaluate* $\int_0^{\log 2} e^{2x} dx$

e) *Evaluate* $\int_0^{\frac{\pi}{4}} \cos\left(2\theta+\frac{\pi}{4}\right) d\theta$

f) *Evaluate* $\int_0^{\frac{1}{2}} \frac{dx}{\sqrt{1-x^2}}$

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

Integrate w.r.t x

a) $\frac{x \tan^{-1} x^2}{1+x^4}$

b) $\frac{1}{\sin(x-a)\sin(x-b)}$

c) $\sqrt{\frac{x+4}{3-x}}$

d) $\frac{1}{1-2\cos 2x}$

e) $(\log x)^2$

f) $\frac{1}{1+x+x^2+x^3}$

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

a) *Evaluate* $\int_0^a \sqrt{\frac{a-x}{x}} dx$

b) *Evaluate* $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\cot x}}$

c) Find the area under the curve $y = \sin x$ *from* $x = 0$ *to* $x = 2\pi$

d) Find the area between the parabola $y^2 = 2x$ and the straight line $y = 4x - 1$

e) Find the mean value of the function of period 2π defined as

$y = 2\sin x, \quad 0 < x < \pi$
$= 0 \quad \pi < x < 2\pi$

P.T.O

f) An alternating current is given by $i=a\sin x$. Find the R.M.S. Value of the current over a half wave.

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

a) Show that $y\sec^2 = \tan x + c$ is a solution of $\frac{dy}{dx} + 2y\tan x = \sin x$

b) State order and degree of $\frac{d^2y}{dx^2} = \sqrt[4]{-y + \left(\frac{dy}{dx}\right)^2}$

c) Show that differential equation $(2xy^2 - 2y^2 + 4x^3)dx + (3x^2y^2 - 4xy - 3y^2)dy = 0$

d) Find y interms of x, *if* $\frac{dy}{dx} = 3x^2 - 2x + 5$, given that y=5 when x=2

e) If $z_1 = 6 - 2i$, $z_2 = 5 - 3i$, *find* $(2z_1+3z_2)(3z_1-2z_2)$ in the form of a+ib

f) Find x and y satisfying $\frac{x+3i}{2+yi} = 1 - i$

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

a) A particle starts from rest. Its acceleration at any time is (t+3) m/s^2. Find the distance travelled in 4 secs.

b) Solve $(x^2 - y^2)dx = 2xydy$

c) Solve $(2x + 3\cos y)dx + (2y - 3x.\sin y)dy = 0$

d) Solve the equation $x^3 + 1 = 0$ and find the continued product of the roots.

e) Simplify $\dfrac{(\cos 5\theta - i\sin\theta)^{\frac{2}{5}}\left(\cos\frac{2}{7}\theta + i\sin\frac{2}{7}\theta\right)^7}{(\cos 4\theta + i\sin 4\theta)^{\frac{1}{4}}\left(\cos\frac{2}{3}\theta - i\sin\frac{2}{3}\theta\right)^3}$

f) If $z_1 = -1 + i\sqrt{3}$, $z_2 = 2 + 2\sqrt{3}i$ *find the* argument *of* $(z_1.z_2)$ *and* $\left(\frac{z_1}{z_2}\right)$

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

a) Solve $x\log x\frac{dy}{dx} + y = 2\log x$

b) Solve $y\sqrt{1-x^2}dy + x\sqrt{1-y^2}dx = 0$ *when* $x = 3/5$, $y = 4/5$

c) If $\cosh(\alpha + i\beta) = x + iy$, *prove that* $\frac{x^2}{\cosh^2\alpha} + \frac{y^2}{\sinh^2\alpha} = 1$ *and* $\frac{x^2}{\cos^2\beta} - \frac{y^2}{\sin^2\beta} = 1$

d) Using Euler's formula, prove that

i) $\sin(i\theta) = i\sinh\theta$

ii) $\cos(i\theta) = \cosh\theta$

e) Express $z = \frac{1}{\sqrt{2}}(1+i)$ in the form of $r(\cos\theta + \sin\theta)$ and hence find the value of z^5

f) Simplify $z = \frac{1}{i} + \frac{2}{i^2} + \frac{3}{i^3} + \frac{4}{i^5}$ and find the value of z^4

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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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.

Section – II	Marks

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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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

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

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 : - **FIFTH** PROGRAM : **ELECTRONICS & TELECOMMUNICATION**
COURSE CODE :- **ETE501/EJ401**
COURSE NAME :- **MOBILE COMMUNICATION**
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 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) Give the chanel bandwidth for i) AMPS ii) GSM..

b) State the function of duplexer in cell phone receiver.

c) Draw the block diagram of logic unit.

d) State the two advantages of power control in cellular system.

e) Define the terms reverse channel and roamer.

f) What is hand off ? State its types.

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

a) Explain with diagram operation of cordless telephone system.

b) Illustrate the call making of landline user to mobile user with timing diagram.

c) Draw the block diagram of mobile unit and state function of each block. State two features of mobile handset also.

d) Define i) Cell ii) Co-channel interference iii) System capacity iv) Frequency reuse distance.

e) Explain with diagram micro cell zone concept.

f) Draw & explain basic cellular system. State the advantages of cellular system.

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

a) Explain inbrief N- AMPS & IS-95.

b) Draw the block diagram of cell phone transmitter. State its functions.

c) Describe frequency synthesizer used in mobile handset with neat diagram.

d) Compare cell splitting concept with cell sectorization.

e) What is cluster? Explain effect of cluster size on system capacity and co-hannel interference.

f) Describe channel planning for wireless system.

P.T.O.

Section – II	Marks

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

a) State the different functions of SS7.

b) State features of 4G.

c) What are different GSM services?

d) State the GSM channel types.

e) What is mobile switching centre?

f) State any four features of IS -95.

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

a) Draw architecture of GSM and explain.

b) Compare GSM and CDMA with respect to following points

i) Hand off used ii) Access methods iii) Number of user. iv) Channel Bandwith.

c) State features of 3G CDMA.

d) Describe frequency and channel specification of IS -95.

e) Draw system architecture of IS-95. Explain workign of any two blocks.

f) Describe operation of WLL with suitable diagram.

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

a) List the specifications of IMT 2000.

b) Describe universal Mobile Telecommunication system with suitable block diagram.

c) How the call is processed in IS-95 CDMA? Explain.

d) Explain security and indentification in IS-95 CDMA.

e) Explain GSM radio subsystem with necessary diagram.

f) Describe call processing in GSM system with suitable diagram.

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EVEN TERM END EXAM APRIL/MAY -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **IE/E&TC**

COURSE CODE: **IEE/ETE103/IX/EJ111/IE202/4202/ET112**

COURSE NAME: **BASIC ELECTRONICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **20/04/2016**

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 the difference between conductor & insulator (any two point)

b) Write any two application of P-N junction diode.

c) State the values of Ripple factor & efficiency of half wave rectifier.

d) Define rectifier. Give classification of rectifier.

e) Draw the symbol of NPN & PNP Transistor.

f) Define α & β of Transistor.

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

a) Draw & explain the V-I characteristics of PN Junction diode.

b) Explain P-type & N-type Extrinsic semiconductor with neat diagram.

c) Explain half wave rectifier with suitable diagram.

d) Explain the working principle of CLC filter with circuit diagram.

e) With suitable diagram explain fixed bias circuit.

f) Draw & explain input characteristics of Transistor in common Emitter (CE) configuration.

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

a) With the help of neat diagram explain construction of zener diode.

b) Draw the V-I characteristics of zener diode & explain it.

c) Explain operation of series inductor filter with suitable diagram.

P.T.O

d) Explain operation of full wave Bridge Rectifier with neat diagram.

e) Draw & explain Regulated power supply.

f) Draw pin configuration of IC 79XX voltage Regulator. Also write any four features of IC 79XX voltage Regulator.

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

a) Draw the symbol of N- channel JFET.

b) Define Transconductance with respect to JFET.

c) What will be the output voltage of 7805 regulated IC, if 8v input is given to it?

d) Define the term gain with reference to Amplifier.

e) What are the applications of direct-coupled amplifier?

f) Draw frequency response curve of transformer coupled amplifier.

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

a) Draw & explain output characteristics of P-channel JFET.

b) Explain with diagram the working of direct- coupled amplifier.

c) Draw & describe the working of zener diode regulator.

d) Give the brief classification of FET.

e) Explain the different regions in frequency response of R-C coupled amplifier.

f) Draw & explain pin diagram. of IC723

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

a) Draw the circuit of two stage R-C coupled amplifier & explain its working with its applications.

b) Explain the construction & working of n-channel MOSFET & list out application of n-channel MOSFET.

c) Draw the transistor series regulator & explain the functioning of each component & state the difference between series & shunt regulator.

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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 : - **THIRD** PROGRAM : **INDUSTRIAL ELECTRONICS**
COURSE CODE :- **IEE310**
COURSE NAME :- **ELECTRICAL MACHINES**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **21 / 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 the voltage equation for the d.c. motor and give various terms involved in it.
b) State the working principle of d.c. motor
c) Define efficiency of transformer.
d) What is the principle of operation of a transformer?
e) Define slip of induction motor.
f) Why starter is necessary for three phase induction motor?

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

a) Draw connection diagram of a Star-delta starter for 3 phase induction motor. State its necessity.
b) Explain the condition for maximum and starting torque in 3 phase induction motor.
c) Derive the emf equation of d.c. generator.
d) Draw the equivalent circuit of transformer and lebel it.
e) State the concept of isolation transformer in detail.
f) Define Earthing and explain any one type of earthing in detail.

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

a) Compare distribution transformer and isolation transformer.
b) Derive emf equation of transformer.
c) Explain with neat sketch 3 point starter for D.C. motor.
d) Explain the working of 3 phase induction motor.

P.T.O.

e) Draw the power flow diagram for a 3 phase I.M. and explain.

f) Define i) Synchronous speed ii) Frequency
iii) Reactance iv) Impedance of 3 phase induction motor.

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

a) Write down any four applications of single phase induction motors.

b) What are the types of 3 phase alternators according to rotor constructions?

c) Define pitch factor of an alternator.

d) What is regulation of an alternator?

e) Differentiate between alternator and generator.

f) What is meant by stepper motor?

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

a) Explain construction of single phase induction motor with neat diagram.

b) Draw neat diagram of capacitor start capacitor run 1 phase induction motor and explain its operation.

c) State the advantages of stationary armature of an alternator.

d) A 3 phase star connected alternator is rated at 1600kw 13500volt. The Ra and Xs are 1.5Ω and 30Ω respectively per phase. Calculate the percentage regulation for a load of 1280kw at 0.8 p.f. leading.

e) Explain bidirectional stepper motor with neat diagram.

f) Draw neat diagram of drag cup servo motor and explain.

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

a) Explain shaded pole induction motor with neat diagram.

b) What is repulsion motor draw its neat diagram, explain construction and working.

c) How the regulation of an alternator can be obtained by using synchronous impedance method? Explain.

d) Derive emf equation of 3 phase alternator.

e) Explain variable reluctance motor with neat diagram.

f) Explain permanent magnet stepper motor with two phase winding.

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EVEN TERM END EXAM APRIL/MAY.-2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **IND.ELECTRONICS / E & TC**
COURSE CODE :- **IEE/ETE302/IX/EJ202**
COURSE NAME :- **APPLIED ELECTRONICS**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **23 / 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 efficiency of power amplifier? Write its equation.

b) State Barkhausen criteria.

c) Why negative feedback is used in amplifier?

d) Draw neat circuit diagram of Wein bridge oscillator.

e) State applications of class B amplifier (any four)

f) What is oscillator? Draw block diagram of oscillator.

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

a) Compare Hartley oscillator and colpitts oscillator (any four points)

b) Draw circuit diagram of class C amplifier and explain its working.

c) Draw block diagram of voltage series negative feedback. Explain its operation.

d) Draw complementary symmetry push pull amplifier and explain its working.

e) If C= 0.01mf then calculate value of R which generate frequency of 10KHz in RC phase shift oscillator. Draw corresponding circuit diagram.

f) Draw circuit diagram and explain operation of transformer coupled resistive load single stage power amplifier.

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

a) State the effect of negative feedback on voltage gain, Bandwidth, input impedance and output impedance.

b) Draw circuit diagram of Hartley oscillator. How 360° push shifting occurs in output? Explain it.

P.T.O.

c) Classify power amplifier and write advantages of each power amplifier.

d) Draw and explain current shunt negative feedback.

e) Explain concept of cross over distortion with suitable waveform. Also name the circuit in which cross over distortion occurs.

f) Determine value of C for Hartley oscillator if $L_1 = L_2 = 220\mu H$, F= 100KHz. Draw circuit diagram for same.

Q.4 Attempt any **FOUR** (16)

a) Give equations for i) Frequency of oscillations. ii) Total time period.

b) Explain exponential sweep circuit.

c) Define i) Clipper ii) clamper.

d) Draw and show collector current waveforms with different time delays.

e) Draw circuit diagram of transistor constant current sweep with single supply Vyy.

f) Give any two applications of Integrator.

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

a) Define i) Delay time ii) Full time iii) T_{OFF} iv) Storage time

b) Draw and explain working of sweep circuit using UJT.

c) Explain working of Integrator circuit. Give its two applications.

d) Draw waveform of Astable Multivibrator and explain.

e) Explain Bootstrap sweep circuit.

f) Draw and explain combinational clipper.

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

a) Draw and explain Schmitt trigger with waveforms.

b) With circuit and waveforms, explain current time base generator.

c) Explain full wave voltage doubler.

d) Draw waveforms of Monostable Multivibrator and explain.

e) Explain transistor constant current sweep.

f) Draw responses of differentiator to i) Square wave ii) Triangular wave.

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