S.E. sem IV CBSGS Electronics M/J-2013
Sub :- EE MI&M.
05/06/13

1st Half-13-Mina - (d)-47

Con. 6672-13. **GS-7434**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the **remaining** questions.
(3) **Figures** to **right** indicates **full** marks.
(4) Assume **suitable** data wherever **required**.

1. Answer any **four** of the following :—
   (a) How CRO is applicable for component testing ? Justify. **5**
   (b) What is Lissajous pattern ? How measurement of frequency can be done it with ? **5**
   (c) How power factor meter works ? **5**
   (d) What is back emf voltage equation ? **5**
   (e) What is hybrid stepper motor ? **5**

2. (a) What is dual trace, multi-trace, dual beam and sampling storage oscilloscope ? **10**
   (b) With the neat diagram and waveform explain the working of phase meter using Flip-Flop. **10**

3. (a) What are the Essentials of indicating instrument ? Explain it in details. **10**
   (b) Explain the measurement of inductance by Maxwell's Hay's method. **10**

4. (a) List various types of DVMs and explain in detail. **10**
   (b) What are the Requirements of a good laboratory type signal generator ? Explain A.F. signal generator. **10**

5. (a) Explain construction and working principle of stepper motor. **10**
   (b) Explain Kelvin's double brige. **10**

6. (a) List various methods of analog to digital and digital to analog conversion and explain any one in detail. **10**
   (b) What is beat Frequency oscillator and explain its advantages. **10**

7. (a) Describe the panel layout of CRO. **10**
   (b) How to Measure medium, low and high resistance ? **10**

S.E (ETRX) Sem (IV) (R) May. 2013 27/5/13
Basic of Analog & Digital comm^n systems

AGJ 1st half (d+) 13

Con. 6606-13. **GS–7209**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from Q. **2** to Q. **7**.
(3) Assume **suitable** data if required with **justification.**

1. (a) Explain elements of communication **20**
   (b) Explain short noise
   (c) Explain modulation Index for AM, FM
   (d) Sky wave propagation.

2. (a) Explain Balance modulator. **10**
   (b) Explain – **10**
      (i) VSB system
      (ii) ISB system.

3. (a) What is need of superhetrodyne radio receiver. **10**
   (b) Explain Indirect F.M. generation method. **10**

4. (a) Explain Noise traingle in F.M. **10**
   (b) Explain Time Division multiplexing. **10**

5. (a) Explain pulse code modulation system. **10**
   (b) Explain PPM, PWM. **10**

6. (a) Explain Adaptive Deltamodulation. **10**
   (b) Explain Quantization. **10**

7. Write short notes on :– **20**
   (a) Line coding
   (b) Tracking in Radio receiver
   (c) Sampling theorem
   (d) Companding.

SE/ETRX/IV CR.) 21/5/13

ECAD

AGJ 1st half (d+) 45

Con. 6549-13. **GS–7101**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.

(2) Attempt any **four** questions from Question Nos. **2** to 7.

(3) Assume **suitable** data wherever **necessary** with proper **justification**.

(4) **Figures** to the **right** indicate **full** marks.

1. Attempt any **four** of the following :– **20**

   (a) Differentiate between direct coupled amplifier and R–C coupled amplifier.

   (b) Differentiate between small signal amplifier and power amplifier.

   (c) Explain why constant current source is used in differential amplifier.

   (d) Give criterion of sustained sinewave oscillations and explain how oscillation starts and stabilizes in oscillator circuit.

   (e) Give important features of CASCADE amplifier.

2. Design a two stage RC coupled amplifier for following specifications :– **20**

   $A_v \simeq 1000$, $S_{I_{CO}} < 10$, $R_i > 10\ k\Omega$

   $V_{CC} = 12$ V.d.c., $f_L < 20$ Hz.

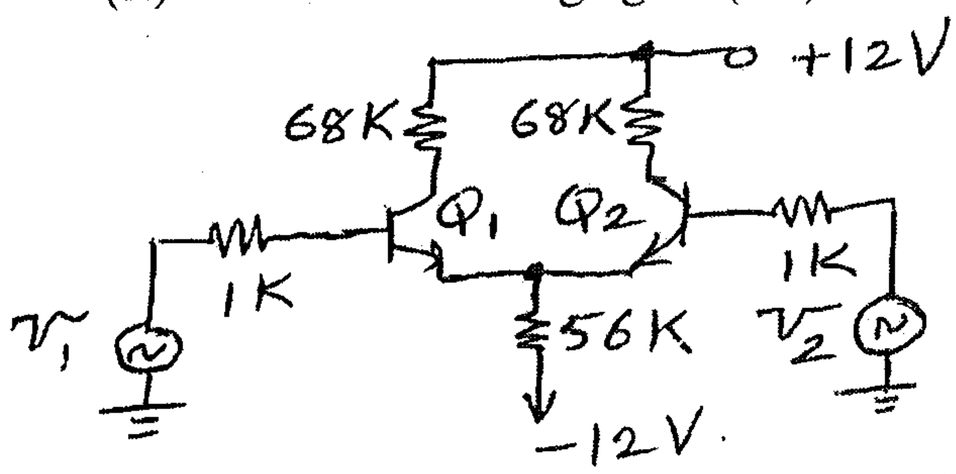
   Select transistor from the table given at the *end of question paper*.

3. (a) Explain how high frequency response of one stage RC coupled JFET CS type of amplifier can be determined. **10**

   (b) For the differential amplifier shown in **figure,** determine :–

   (i) Q-points of transistors **5**

   (ii) differential voltage gain (Ad). **5**



For transistors Q1 and Q2

$h_{ie_1} = h_{ie_2} = 2\,k\Omega$

$h_{fe_1} = h_{fe_2} = \beta_1 = \beta_2 = 100$

(neglect h_{oe} and h_{re})

4. (a) List diffferent types of negative feedbacks, give their stability ratios, effect of feedback on input resistance and on output resistance. **10**

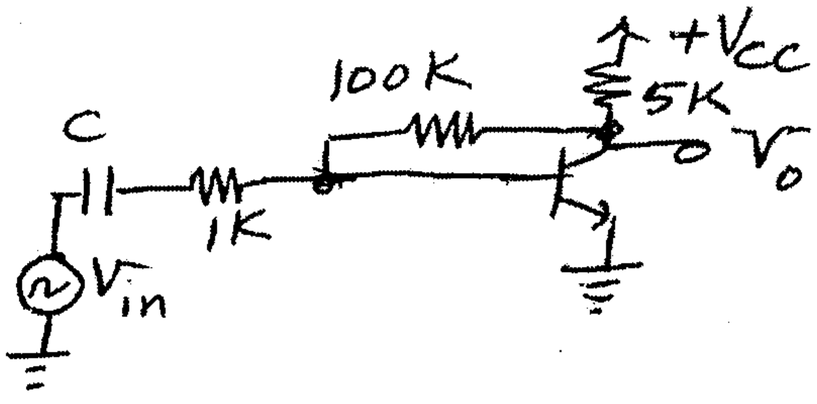
[TURN OVER

(b) For the amplifier circuit shown in **figure,** determine –

(i) Type of feedback

(ii) Stability ratio

(iii) A_{v_f} – voltage gain with feedback.



For transistor
h_{ie} = 1 k Ω
h_{fe} = 100
(Neglect h_{oe} a

5. (a) Design a class A transformer coupled power amplifier to obtain
load resistance of 10 ohm. V_{cc} = 12 V.d.c.

(b) Draw the circuit diagram of Wien Bridge oscillator and explain its

6. (a) Discuss problems encountered in multistage direct coupled amplifiers
to take care of these problems.

(b) For power dissipation of 25 Watts design a heat sink if–
$\theta_{j-c} = 1\,^{\circ}c/_{W}$, $\theta_{C-HS} = 0{\cdot}5\,^{\circ}c/_{W}$,
$T_{jmax} = 125°C$ and $T_{ambient} = 30°C$.

7. Write short notes on any **three** of the following :–

(a) Crossover distortion in class B amplifier and how to minimize the

(b) Class C amplifier and its application

(c) Nyquist stability criterion

(d) Hartley oscillator.

DATA SHEET

Transistor type	*Pdmax @ 25°C Watts*	*Icmax @ 25°C Amps*	$V_{CE}^{(sat)}$ *volts d.c.*	V_{CBO} *volts d.c.*	V_{CEO} *(Sus) volts d.c.*	V_{CER} *(Sus) volts d.c.*	V_{CEX} *volts d.c.*	V_{BEO} *volts d.c.*	T_j *max °C*	*D.C. current gain min*	*typ.*	*max.*	*Small Signal min.*	*typ.*	h_{fe} *max.*	V_{BE} *max.*	θ_{j_a} *°C/W*	*Derate above 25°C W/°C*
2N 3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8	1·5	0·7
ECN 055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5	3·5	0·4
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·3
ECN 100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·05
BC147A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—
2N 525(PNP)	0·225	0·5	0·25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC147B	0·25	0·1	0·25	50	45	50	—	6	125	200	290	450	240	330	500	0·9	—	—

Transistor type	*hie*	*hoe*	*hre*	*θja*
BC 147A	2·7 K Ω	18μ ℧	$1·5 \times 10^{-4}$	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	$3·2 \times 10^{-4}$	—
BC 147B	4·5 K Ω	30μ ℧	2×10^{-4}	0·4°C/mw
ECN 100	50 Ω	—	——	——
ECN 149	15 Ω	—	——	——
ECN 055	12 Ω	—	——	——
2N 3055	6 Ω	—	——	——

BFW 11—*JFET MUTUAL CHARACTERISTICS*

–VGS volts	0·0	0·2	0·4	0·6	0·8	1·0	1·2	1·6	2·0	2·4	2·5	3·0	3·5	4·0
IDS max. mA	10	9·0	8·3	7·6	6·8	6·1	5·4	4·2	3·1	2·2	2·0	1·1	0·5	0·0
IDS typ. mA	7·0	6·0	5·4	4·6	4·0	3·3	2·7	1·7	0·8	0·2	0·0	0·0	0·0	0·0
IDS min. mA	4·0	3·0	2·2	1·6	1·0	0·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

N-Channel *JFET*

Type	V_{DS} *max. Volts*	V_{DG} *max. Volts*	V_{GS} *max. Volts*	P_d *max. @25°C*	T_j *max.*	I_{DSS}	g_{mo} *(typical)*	$-V_p$ *Volts*	r_d	*Derate above 25°C*	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ ℧	2·5	50 KΩ	——	0·59° C/mW

// SELETRX) SEM IV (CR) May 2013
DSD-II

14/5/2013

Con. 6508–13. **GS–6987**

(3 Hours) **[Total Marks : 100**

N.B. (1) Question No. **1** is **compulsory**.

(2) Solve any **four** questions out of remaining **six** questions.

(3) Write the assumptions **clearly** if any.

1. (a) Identify the equivalent states in the following states table and reduce the table : **5**

Present state	Next state/output	
	input x = 0	x = 1
A	A/O	B/O
B	A/O	D/1
C	C/O	E/O
D	E/O	F/1
E	C/O	D/1
F	A/O	B/1

(b) Write VHDL Code for ~~4:1~~ 4:2 multiplexer using conditional signal assignment statements. **5**

(c) It is required that one out of 8 LED's should be glowing one after the other at regular interval. The sequence should be repeated continuously. Draw the block diagram of this circuit. and explain the function of each block in brief. **5**

(d) Name the different types of programmable devices used for digital system design. Discuss the advantages of using programmable devices. **5**

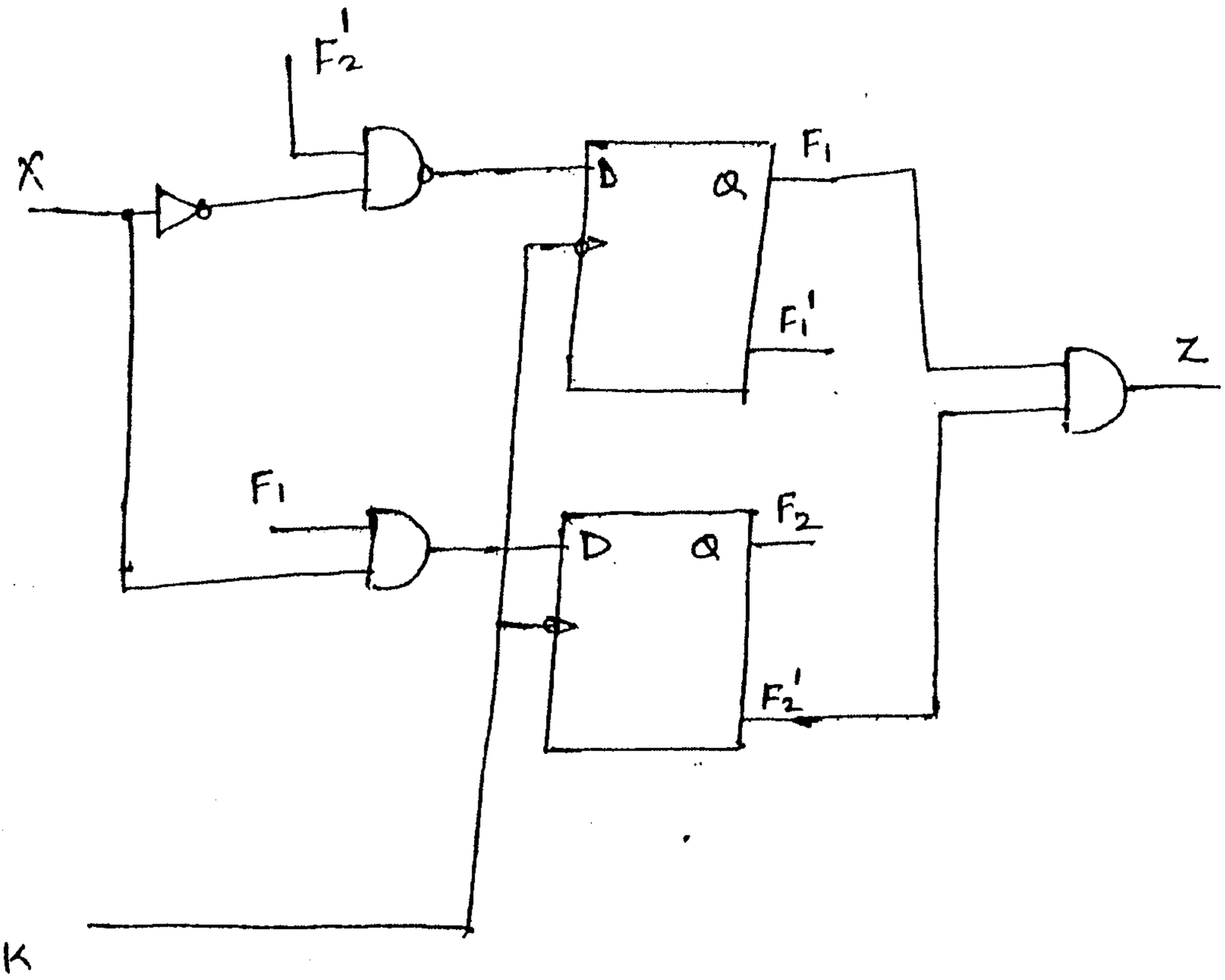
2. (a) For the sequential state machine given below :— **10**

(i) Derive the excitation and output equation

(ii) Write the next state equation

(iii) Construct state transition table

(iv) Draw the state diagram.



(b) Write a VHDL Code for a sequence detector which detects the sequence 1–0–1–1–0. **10**
Design Mealy type of machine with overlapping allowed.

3. (a) With suitable examples explain the Moore and Mealy types of sequential circuits. **6**
Compare the two types.

(b) Compare static RAM with dynamic RAM. **4**

(c) Design a 4 bit register using D flip-flops to operate as indicated in the table below :— **10**

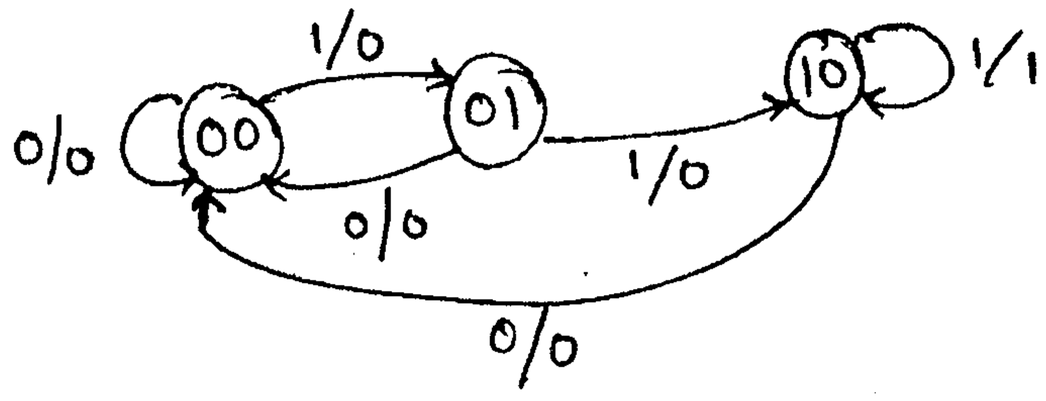
Mode	**Select**	**Operation**
a_1	a_0	
0	0	Hold
0	1	Clear
1	0	Complement the contents
1	1	Circular right shift

4. (a) Write the features of counter IC 74163. Design Mod 200 counter using the same IC. **10**

   (b) Draw the state diagram for a sequential state machine which has two inputs EN and S. As long as EN is negated (= 0), the machine should remain in reset state with output z = 0. When EN is asserted (= 1) and at S, two consecutive 0's and two consecutive 1's are received irrespective of the sequence (i.e. 0011 or 1100), the output should become 1 and remain 1 until EN is again negated ? **10**

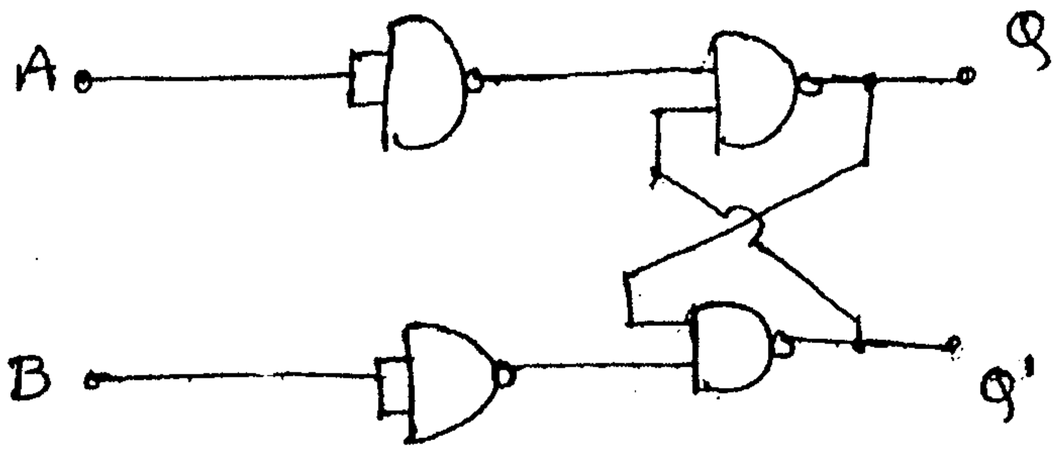
   Also draw the state table for the same.

5. (a) A sequential circuit having one input and 1 output has state diagram shown below. **10**
   Design the circuit using J.K. flip-flop.



   (b) Draw the architecture of FPGA 4000 family. Explain the function of each block. **10**

6. (a) Analyse the following feedback sequential machine :— **10**



   (b) Write a VHDL code for 8 bit barrel shifter. **10**

7. Write notes on the following :—

   (a) Fundamenal and pulse mode asynchronous sequential circuits **6**

   (b) Features of VHDL **7**

   (c) Read only memory. **7**

ETRX Maths (IV) 9/5/2013
Advanced Engineering Mathematics

Con.6422–13. **GS–6885**

(3 Hours) **[Total Marks :100**

N.B. (1) Question No.**1** is **compulsory**.
(2) Attempt any **four** from the remaining six questions.
(3) **Figures** to the **right** indicates full marks.

1. (a) A random variable x has the probability function : **5**

X :	–2	–1	0	1	2	3
P(X=x):	0.1	k	0.2	2k	0.3	3k

Find (i) k (ii) $P(x \leq 1)$ (iii) $P(-2 < x < 1)$
(iv) Obtain the distribution function of X

(b) In the set of natural numbers, prove that the relation xRy if and only if $x^2-4xy+3y^2=0$, is reflexive, but neither symmetric nor transitive. **5**

(c) Find the characteristic roots of $A^{30}-9A^{28}$ where $A=\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$ **5**

(d) Find Laurent's series for $f(z)=(z-3)\sin\left(\frac{1}{z+2}\right)$ about $z=-2$. **5**

2. (a) If X, Y are independent Poisson variates such that P(X=1) = P(X=2) and P(Y=2)=P(Y=3) find the variance of 2X – 3Y. **7**

(b) Find the residues of $f(z)=\frac{\sin \pi z}{(z-1)^2(z-2)}$ at its poles. **7**

(c) If $A=\begin{bmatrix}\pi & \pi/4\\ 0 & \pi/2\end{bmatrix}$ find cos A **6**

3. (a) Check whether A = {2, 4, 12,16} and B = {3, 4, 12, 24} are lattices under divisibility ? Draw their Hasse diagrams. **7**

(b) Nine items of a sample had the following values.
45, 47, 50, 52, 48, 47, 49, 53, 51
Does the mean of 9 items differ significantly from the assumed population mean 47.5 ?

(c) Find the characteristic equation of the matrix A and hence find the matrix represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ **6**

where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$

4. (a) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls. **7**

(b) Let $S = \left\{ \begin{bmatrix} a & a \\ a & a \end{bmatrix} \middle| a \in R \right\}$ and + and · be matrix addition and matrix multiplication. Is (S, +, ·) an integral domain ? Is it a field ? **7**

(c) Show that $\int_C \frac{dz}{z+1} = 2\pi i$, where C is the circle $|z| = 2$. Hence deduce that **6**

$$\int_C \frac{(x+1)dx + ydy}{(x+1)^2 + y^2} = 0 \text{ and } \int_C \frac{(x+1)dy - ydx}{(x+1)^2 + y^2} = 2\pi$$

5. (a) The number of defects in printed circuit board is hypothesised to follow Poisson distribution. A random sample of 60 printed boards showed the following data. **7**

Number of defects :	0	1	2	3
Observed frequency :	32	15	9	4

Does the hypothesis of Poisson distribution seen appropriate ?

(b) If f and g are defined as **7**

$f : R \to R$, $f(x) = 2x - 3$

$g : R \to R$, $g(x) = 4 - 3x$

(i) Verify that $(fog)^{-1} = g^{-1} of^{-1}$

(ii) Solve $fog(x) = g$ of (1)

(c) For a distribution the mean is 10, variance is 16, γ_1 is 1 and β_2 is 4.Find the first four moments about the origin. Comment on the nature of the distribution. **6**

6. (a) Prove that the set A = {0, 1, 2, 3, 4, 5} is a finite Abelian group under addition modulo 6. **7**

(b) If $f(\xi) = \int_C \frac{3z^2 + 2z + 1}{z - \xi} dz$ where C is the circle $x^2 + y^2 = 4$ find the values of **7**

(i) f(3), (ii) f'(1 –i), (iii) f'' (1 – i)

Con. 6422–GS-6885-13. **3**

(C) A manufacturer known from his experience that the resistance of resistors he produces is normal with $\mu = 100$ohms and standard deviation $\sigma = 2$ ohms. What percentage of resistors will have resistance between 98 ohms and 102 ohms ? **6**

7. (a) By using residue theorem evaluate $\oint_c \frac{\sin^6 z}{(z-\pi/6)^3}\,dz$ where C is $|z|=1$ **7**

(b) The ratio of the probability of 3 successes in 5 independent trials to the probability of 2 successes in 5 independent trials is 1/4. What is the probability of 4 successes in 6 independent trials ? **7**

(c) If $A=\begin{bmatrix}1 & 2\\ 0 & 1\end{bmatrix}$ and $B=\begin{bmatrix}2 & 0\\ ½ & 2\end{bmatrix}$, prove that both A and B are not diagonalisable but AB is diagonalisable. **6**
