



# **SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY**

Approved by AICTE, New Delhi, Affiliated to JNTUH, Hyderabad.

[Formerly RVR Institute of Engineering & Technology]

Sheriguda (V), Ibrahimpatnam (M), R. R. District, T.S – 501510.

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### **MECHANISM TO DEAL WITH INTERNAL EXAMINATIONS RELATED GRIEVANCES IS TRANSPARENT, TIME-BOUND AND EFFICIENT.**

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## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by JNTU Act No. 30 of 2008)  
Kukatpally, Hyderabad – 500 085 Telangana (India)  
ACCREDITED BY NAAC WITH 'A' GRADE

**Dr. V.Kamakshi Prasad**

M.Tech., Ph.D. (IIT-M), FIE, MCSI, LMISTE

**Professor of Computer Science and Engineering &  
DIRECTOR OF EVALUATION**

Date:09-12-2019

To  
The Principals of all the Affiliated and Constituent colleges offering B.Tech/B.Pharm courses JNT  
University Hyderabad

Sir,

Sub: JNTUH, Hyderabad – Examination Branch - II Year I Semester III Year I Semester & IV  
Year I Semester B.Tech / B.Pharmacy Computer Based Test (CBT) –Jan -2020-Notification –  
Instructions to the Principals-Reg.

All the Principals of the Affiliated and Constituent Colleges offering B.Tech / B.Pharmacy courses are hereby informed that the University Examination Branch issues notification for conduct of Computer Based Test (CBT) for II Year I Semester III Year I Semester & IV Year I Semester Computer Based Test (CBT) B.Tech/B.Pharmacy Regular students in the month of January-2020 who are absent for mid-term examination(s) conducted at the college. Further this CBT shall also be conducted for the student(s) who are transferred from other Universities/Autonomous colleges under JNTUH, and for the internal marks component of substitute subjects .

The students appearing for the above examination commencing from 22-1-2020 are informed to note the schedule given below. The CBT exam registration service will be available from 11-12-2019

This notification is issued for the conduct of following examinations:-

1	II B.Tech I Sem. (R18) - Regular
2	III B.Tech I Sem. (R16) - Regular
3	IV B.Tech I Sem. (R16) - Regular
4	II B.Pharm I Sem. (R17) - Regular
5	III B.Pharm I Sem. (R17) - Regular
6	IV B.Pharm I Sem. (R16) - Regular

### STUDENT REGISTRATION SCHEDULE

<i>EVENT</i>	<i>Start date of registration for Regular (at respective colleges)</i>	<i>Last date of registration for regular (at respective colleges)</i>	<i>Date for Consolidated Fees Payment (Single RTGS TRANSFER For Regular Exams)</i>
Exam Registration Without Late Fee	11-12-2019	18-12-2019	27-12-2019 For II Year I Sem III Year I Sem & IV Year I Sem
Exam Registration With Late Fee of Rs.100/-	19-12-2019	23-12-2019	
Exam Registration With Late Fee of Rs.1000/-	24-12-2019	24-12-2019	

### EXAMINATION FEE

1.FOR ONE THEORY SUBJECT	Rs. 350/-
2.FOR TWO THEORY SUBJECTS	Rs. 450/-
3.FOR THREE THEORY SUBJECTS	Rs. 550/-
4.FOR FOUR THEORY SUBJECTS and above (And also for ALL THEORY SUBJECTS)	Rs. 750/-

**The Principals are requested to note the following instructions.**

1. The Computer Based Test (CBT) is intended to benefit the students who were absent during the mid examination conducted at the college. Further this CBT shall also be conducted for the student who are transferred from other Universities/Autonomous colleges under JNTUH, and for the internal marks component of substitute subjects.
2. The CBT will contain 25 objective questions from the entire syllabus of the subject and all are to be answered through online mode for 45 minutes duration for 25 marks (Each question carries 1 mark)
3. **The transfer students from other Universities/institutions to JNTUH Affiliated Colleges who are on rolls are provided one chance to write the CBT (Internal examination) in the failed subjects and/ or subjects not studied as per the clearance letter issued by the University.**
4. The CBT will be conducted in limited number of centers based on the number of registrations and the details will be kept in the examination portal.
5. The students who are interested to attend for the CBT have to register for the examination through web URL which has been using for B.Tech / B.Pharm Exam registrations with the same user ID and password from 11/12/2019, from exam registrations menu and CBT registration option (B.Tech: [registrations1.jntuh.ac.in/olrbtech](http://registrations1.jntuh.ac.in/olrbtech), [registrations2.Jntuh.ac.in/olrbtech](http://registrations2.jntuh.ac.in/olrbtech), [registrations3.jntuh.ac.in/olrbtech](http://registrations3.jntuh.ac.in/olrbtech)) (B.Pharm : <http://registrations3.jntuh.ac.in/olrbpharmacy> )
6. In case of any difficulty regarding registrations please contact: 9704033577,9989980170 .

7. The Examination time Table and centers for the CBT will be notified later .
8. Every college has to make the consolidated fees(CBT Exam. Registration Fee) payment for all the above examinations in the form of a single RTGS/NEFT/GRPT Transfer to the Registrar's Bank Account No.62079988622(State Bank Of India, JNTUH Campus Branch, IFSC/RTGS/GRPT Code:SBI0021008) on or before 27-12-2019 and submit the receipt of payment to the undersigned by 28-12-2019.
9. The Principals are requested to display the same in the student notice board and inform the students without fail.
10. The Cooperation of the Principals is highly solicited for the smooth conduct of CBT .

Yours Sincerely,

Sd/-  
**DIRECTOR OF EVALUATION**

Date: 09-12-2019

Copy to: - CE, All ACEs.

All B.Tech/B.Pharmacy affiliated Colleges (through Examination Portal).

AR (EXAMS),SDC Section, Concerned Seat Clerk.

**SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY(X3)**  
**B.Tech-II Year -I Semester-R18 Regulation -Computer Based Test**

**ELECTRONICS AND COMMUNICATION ENGINEERING**  
Without Late Fee

HTNO	STUDENT NAME	SUBJECT -CODE	TOTAL SUBJECTS	EXAM FEE	RETAINED FEE	CONDONATION FEE	PC FEE	NET FEE(Exam Fee+Condonation Fee+PC Fee - Retained Fee)
18X31A0408	ANNU DEVI VARDHAN REDDY	[153AN, 153AT, 153BH, 153BQ, 153BT]	5	750	0	0	0	750
TOTAL AMOUNT:				750	0	0	0	750

153AN	DIGITAL SYSTEM DESIGN
153AT	ELECTRONIC DEVICES AND CIRCUITS
153BH	NETWORK ANALYSIS AND TRANSMISSION LINES
153BQ	PROBABILITY THEORY AND STOCHASTIC PROCESSES
153BT	SIGNALS AND SYSTEMS

  
**PRINCIPAL**  
 Sri Indu Institute of Engineering & Tech  
 Sheriguda(VIII), Ibrahimpatnam,  
 R. R. Dist. Tetangana -501 510

**SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY(X3)**  
**B.Tech-IV Year -I Semester-R16 Regulation -Computer Based Test**

**ELECTRONICS AND COMMUNICATION ENGINEERING**  
Without Late Fee

HTNO	STUDENT NAME	SUBJECT -CODE	TOTAL SUBJECTS	EXAM FEE	RETAINED FEE	CONDONATION FEE	PC FEE	NET FEE(Exam Fee+Condonation Fee+PC Fee - Retained Fee)
16X31A04 37	EDDANDI SHARAT HKUMAR	[137AP, 137BK, 137CH, 137EK, 137JD]	5	750	0	0	0	750
TOTAL AMOUNT:				750	0	0	0	750

137AP	ARTIFICIAL INTELLIGENCE
137BK	COMPUTER NETWORKS
137CH	EMBEDDED SYSTEM DESIGN
137EK	MICROWAVE ENGINEERING
137JD	VLSI DESIGN

  
**PRINCIPAL**  
 Sri Indu Institute of Engineering & Tech.  
 Sherguda(VIII), Ibrahimpatnam,  
 R.R. Dist. Telangana -501 510

Date :- 28/11/2019,  
Sherguda.

To  
The HOD sir,  
ECE  
SIJET,  
Sherguda.

Sub:- Regarding mid marks placed in the  
Notice board

Respected sir,

I B. Lakshmi Priya bearing roll No  
16X31A0423 studying ECE 4th year in your college  
In mwe mid-I I secured 20 marks out of 25 marks  
but in notice board it is displayed as absent  
so I request you to change my mid marks in  
notice board

Thanking you sir,

Yours faithfully

B. Lakshmi Priya

16X31A0423

  
**PRINCIPAL**  
Sri Indu Institute of Engineering & Tech  
Sherguda (Vill), Ibrahimpatnam  
R R Dist. Telangana -501 510

27/11/2019.

Shenguda.

To  
The HOD  
Sri Indu Institute of Engg & Tech.  
Shenguda.

Respected Sir,

I T. Anusha bearing roll number 19X35AD421 in Electronics & Communication Engineering department, in NATL internal marks, I secured 17 marks out of 25 marks but display marks shown as absent. So I request you to modify the internal marks of NATL & update it in the display.

Thanking you,

Yours faithfully,

T. Anusha

19X35AD421.

  
PRINCIPAL  
Sri Indu Institute of Engineering & Tech  
Shenguda(VIII), Ibrahimpatnam,  
R.R. Dist. Tetangana -501 510



27/11/2019,  
Shenguda.

To  
The HOD,  
Sri Indu Institute of Engineering & Technology,  
Shenguda.

Respected Sir,

I K. Lavanya bearing roll number 16X31A0468 in  
Electronics & Communication Engineering Department. In VLSI  
Internal marks, I secured 24 marks out of 25 but in  
display marks was shown as 12 marks instead of 24.  
So, I request you to modify the internal marks of VLSI  
& update it in the display.

Thanking you,

Yours faithfully,  
K. Lavanya  
16X31A0468.

  
**PRINCIPAL**  
Sri Indu Institute of Engineering & Tech  
Shenguda(VIII), Ibrahimpatnam  
R.R. Dist. Telangana -501 510

date:-26/11/2019  
Sheriguda.

To  
The HOD,  
ECE,  
SIJET,  
Sheriguda.

Sub: Regarding mid marks placed in the notice board.

Respected sir,

I, K. Amuktha bearing Roll No. 17X31A045, studying ECE 3<sup>rd</sup> year in your college. In LDIC mid-I I secured 24 marks out of 25 marks, but in notice board it is displayed as 15 marks. So I request you to change my mid marks in notice board.

Thanking you sir,

Yours sincerely,  
K. Amuktha,  
17X31A0457,  
ECE

  
PRINCIPAL  
St. Indu Institute of Engineering & Tech  
Sherguda (Vill). Ibrahimpalnam,  
R.R. Dist. Tetsangana -501 510

26/11/2019  
Sheniguda.

To  
The Hod,  
ECE  
SIET  
Sheniguda

Sub: Regarding marks placed in the notice board  
Respected Sir,

I, T. Divyashree bearing Roll no 18X31A0471  
Studying ECE 2nd year in your college. In mid I got  
23 marks out of 25 in ECE (Electronics devices & ckt)  
but in notice board placed only 13 marks. So, please  
I requesting you to change my mid marks in notice  
board.

Thanking you Sir

Yours Sincerely,

T. Divyashree  
18X31A0471  
ECE

  
PRINCIPAL  
Sri Indo Institute of Engineering & Tech  
Sheniguda(VIII), Ibrahimpatnam  
R.R. Dist. Telangana -501 510

# Sri Indu Institute of Engineering & Technology

Sheriguda (V), Ibrahimpatnam (M), R.R. Dist-501 510

I - Mid Examinations, Sep-2019

Set - I

Year & Branch: II ECE (A, B & C)

Date: 14/09/2019 (FN)

Subject: EDC

Marks: 10

Time: 60 min

## ANSWER KEY

(This Answer paper is prepared with Course Outcome and BT's mapping)

1) a) State the expression for transition and Diffusion capacitance of PN junction Diode.

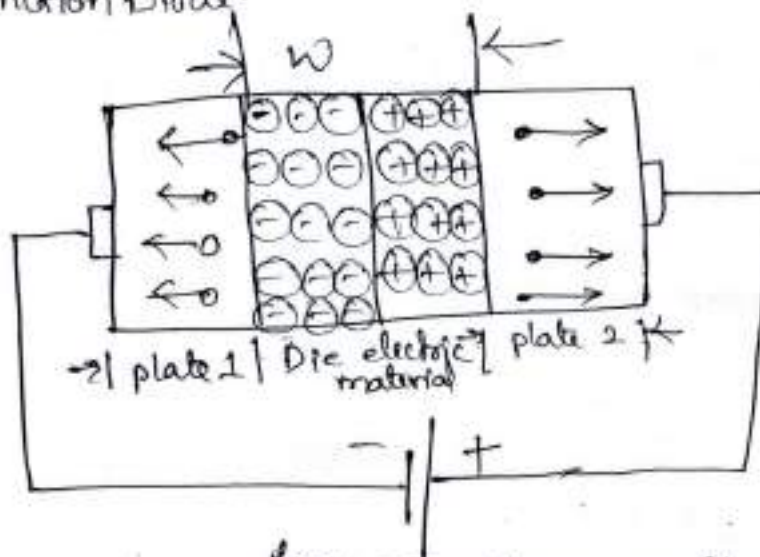


Fig: Transition capacitance → 1M

$$V = \frac{2NAw^2}{2e}$$

$$\frac{dq}{dv} = NA A 2 dw/dv \rightarrow 1M$$

$$\boxed{\frac{dq}{dv} = \frac{Ae}{w}}$$

$$C_T = \frac{Ae}{w} \rightarrow 1M$$

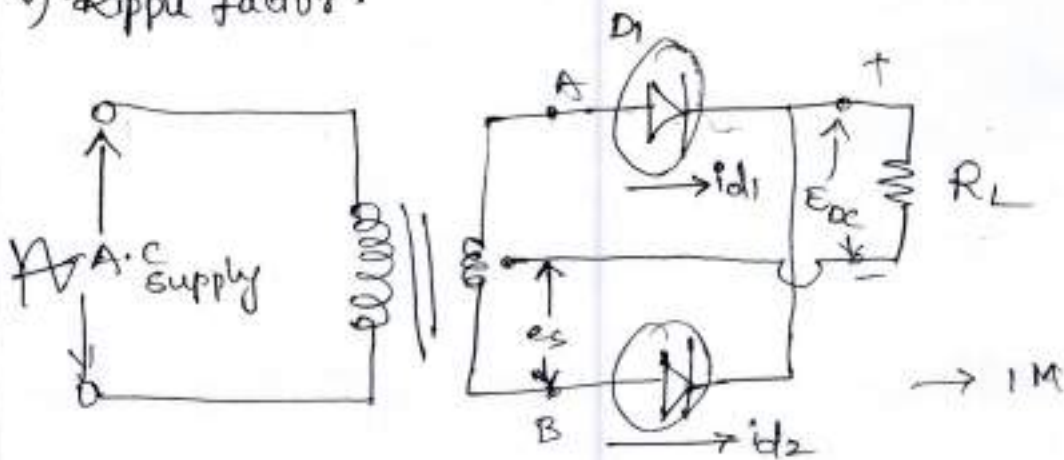
$$I = I_0 (e^{V/nV_T} - 1)$$

→ 1M

$$C_D = I \tau / n V_T$$

→ 1M

2. Draw & Explain the operation of FWK with relevant wave forms & Derive i)  $I_{DC}$  ii)  $E_{DC}$  iii)  $I_{RMS}$  iv) Efficiency v) Ripple factor.



i)  $I_{DC} = \frac{2I_m}{\pi} \rightarrow \frac{1}{2} I_m$

ii)  $E_{DC} = \frac{2I_m R_L}{\pi} \rightarrow \frac{1}{2} I_m R_L$

iii)  $I_{RMS} = \sqrt{\frac{1}{\pi} \int_0^{\pi} (I_m \sin \omega t)^2 d\omega t} = \frac{I_m}{\sqrt{2}} \rightarrow \frac{1}{\sqrt{2}} I_m$

iv)  $\eta = 81.2\%$   $\rightarrow I_m$

v)  $r = 48\%$   $\rightarrow I_m$

- 3). Explain in detail the i/p & output characteristics of CE Configuration and Derive Current relations in CE Configuration.

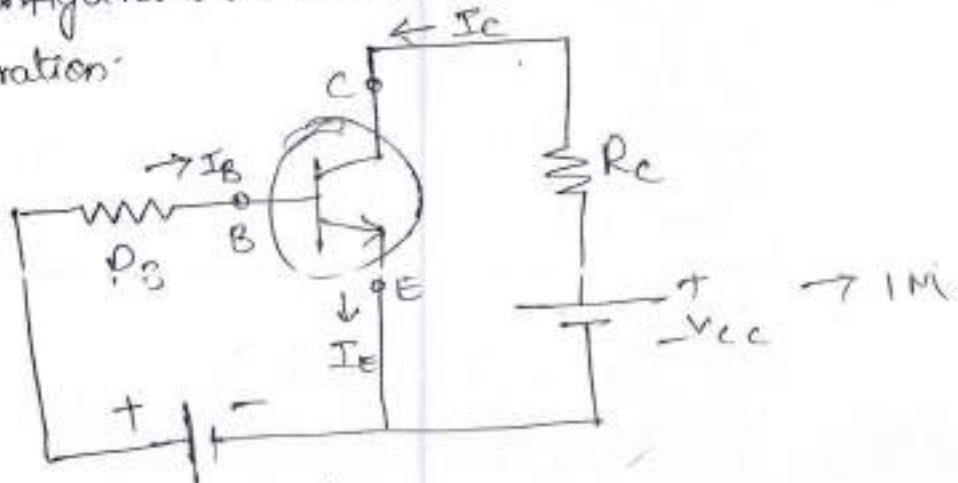


Fig: CE configuration

$$I_c = \alpha_{dc} I_e + I_{cbo} \quad \rightarrow 1/2 M$$

$$I_c = I_B \left( \frac{\alpha_{dc}}{1 - \alpha_{dc}} \right) + \left( \frac{I_{cbo}}{1 - \alpha_{dc}} \right) \rightarrow 1/2 M$$

$$\alpha = \frac{\beta}{1 + \beta}$$

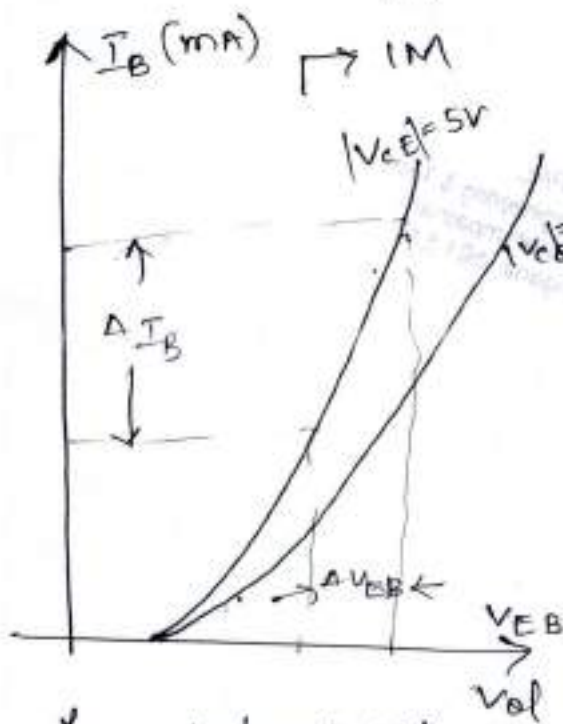


Fig: I/p characteristics

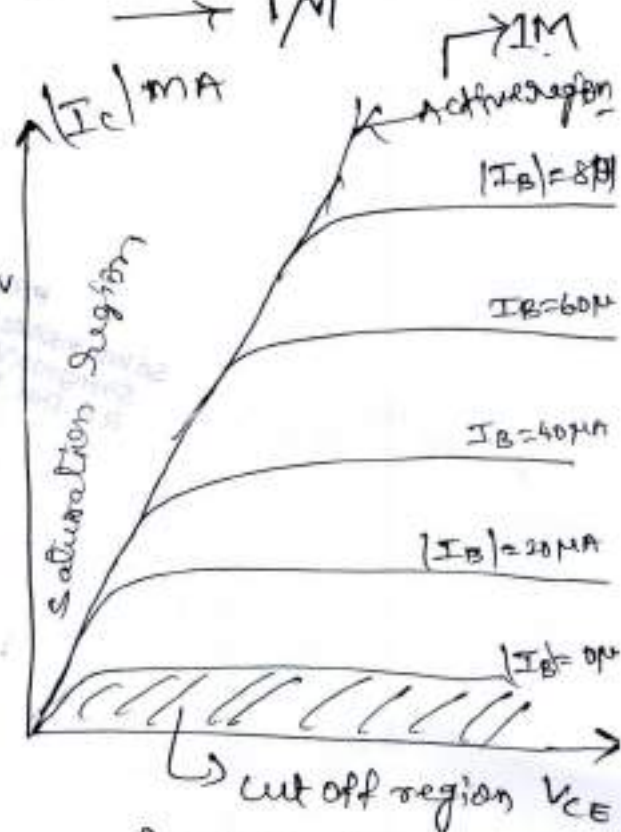


Fig: O/p characteristics

① What is bias stability? what factors affect BJT Biasing? Draw and Explain the operation of fixed Bias?

② Temperature      ③ variation of  $h_{fe}(\beta)$        $\rightarrow 1 M$

$\downarrow$   
 $I_{co}, V_{BE}, \beta$        $\rightarrow 1 M$

$$I_{cbo} = (1 + \beta) I_{cbo} \quad \rightarrow 1 M$$

$$I_c = \beta I_B + I_{CEO}$$

$$I_c = \beta I_B + I_{cbo}(\text{or}) I_{CEO} \quad \rightarrow 2 M$$

$$\beta = I_c / I_B$$



PRINCIPAL  
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Shenguda(VIII), Ibrahimpattanam,  
R.R. Dist. Tetangana -501 510

# Sri Indu Institute of Engineering & Technology

Sheriguda (V), Ibrahimpatnam (M), R.R. Dist-501 510

II- Mid Examinations, Nov-2019

Set - I

Year & Branch: II ECE-A, B, C & D

Date: 21/11/2019(FN)

Subject: PTSP

Marks: 10

Time: 60 min

## ANSWER KEY

(This Answer paper is prepared with Course Outcome and BT's mapping)

1. Define cross power density spectrum and write its properties

Sol: i)  $S_{xy}(\omega) = S_{yx}(-\omega)$

Proof: From FT relations of  $S_{xy}(\omega)$  and  $R_{xy}(\tau)$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(\tau) e^{-j\omega\tau} d\tau \quad \text{let } \tau = -\tau$$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(-\tau) e^{j\omega\tau} d\tau \quad \therefore R_{xy}(-\tau) = R_{yx}(\tau)$$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{yx}(\tau) e^{-j(-\omega)\tau} d\tau$$

$$S_{yx}(-\omega) = \int_{-\infty}^{\infty} R_{yx}(\tau) e^{j\omega\tau} d\tau = \int_{-\infty}^{\infty} R_{yx}(\tau) e^{-j(-\omega)\tau} d\tau$$

[1 marks]

$$S_{xy}(\omega) = S_{yx}(-\omega)$$

ii) The real parts of  $S_{xy}(\omega)$  and the real part of  $S_{xx}(\omega)$  are even functions of  $\omega$

Proof:  $S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(\tau) e^{-j\omega\tau} d\tau$  we know

$$e^{-j\omega\tau} = \cos \omega\tau - j \sin \omega\tau$$

$$\text{Re} [S_{xy}(\omega)] = \int_{-\infty}^{\infty} R_{xy}(\tau) \cos \omega\tau d\tau = \int_{-\infty}^{\infty} R_{xy}(\tau) \cos(-\omega)\tau d\tau$$

$$\text{Re} [S_{xy}(\omega)] = \text{Re} [S_{yx}(-\omega)] \quad [2 \text{ marks}]$$

iii) The imaginary parts of  $S_{xy}(\omega)$  and the imaginary part of  $S_{yx}(\omega)$  are odd functions

Proof:  $S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(\tau) e^{-j\omega\tau} d\tau$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(\tau) (\cos \omega\tau - j \sin \omega\tau) d\tau$$

$$\text{Im} [S_{xy}(\omega)] = \int_{-\infty}^{\infty} R_{xy}(\tau) (-\sin \omega\tau) d\tau$$

$$= - \int_{-\infty}^{\infty} R_{xy}(\tau) (\sin \omega\tau) d\tau$$

$$\text{Now } \text{Im} [S_{xy}(-\omega)] = - \int_{-\infty}^{\infty} R_{xy}(\tau) \sin(-\omega\tau) d\tau$$



$$\therefore \text{Im} [S_{xy}(\omega)] = -\text{Im} [S_{yx}(\omega)]$$

$\text{Im} [S_{xy}(\omega)]$  is an odd function of  $\omega$  [3 marks]

④  $S_{xy}(\omega) = 0$  and  $S_{yx}(\omega) = 0$  if  $x(t)$  and  $y(t)$  are orthogonal  
mod If  $x(t)$  and  $y(t)$  are orthogonal then

$$R_{xy}(\tau) = R_{yx}(\tau) = 0 \quad S_{xy} = S_{yx} = 0 \quad [4 \text{ marks}]$$

⑤ If  $x(t)$  and  $y(t)$  are uncorrelated (independent) and have constant mean values  $\bar{x}$  and  $\bar{y}$  then  $S_{xy}(\omega) = 2\pi \bar{x}\bar{y} \delta(\omega)$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} R_{xy}(\tau) e^{-j\omega\tau} d\tau$$

$$= \int_{-\infty}^{\infty} E [x(t) y(t+\tau)] e^{-j\omega\tau} d\tau$$

Since  $x(t)$  and  $y(t)$  are uncorrelated

$$E [x(t) y(t+\tau)] = E [x(t)] E [y(t+\tau)]$$

$$S_{xy}(\omega) = \int_{-\infty}^{\infty} E [x(t)] E [y(t+\tau)] e^{-j\omega\tau} d\tau$$

$$= \int_{-\infty}^{\infty} \bar{x}\bar{y} e^{-j\omega\tau} d\tau = \bar{x}\bar{y} \int_{-\infty}^{\infty} e^{-j\omega\tau} d\tau$$

$$S_{xy}(\omega) = \bar{x}\bar{y} 2\pi \delta(\omega) \quad [5 \text{ marks}]$$

2. Obtain the average power in the random process  $x(t) = A \cos(\omega_0 t + \theta)$  where  $A, \omega_0$  are real constants and  $\theta$  is a random variable uniformly distributed in the range  $(0, 2\pi)$

sol given that  $x(t) = A \cos(\omega_0 t + \theta)$

$$\text{Average power } P_{\text{avg}} = A^2 \{ E [x^2(t)] \}$$

$$x(t) = A \cos(\omega_0 t + \theta)$$

$$P_{\text{avg}} = A^2 \{ E [A^2 \cos^2(\omega_0 t + \theta)] \}$$

$$A^2 = A^2 \{ E [\cos^2(\omega_0 t + \theta)] \}$$

$$= A^2 \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T \left[ \frac{1}{2\pi} \int_0^{2\pi} \cos^2(\omega_0 t + \theta) d\theta \right]$$

$$= A^2 \cdot A \left\{ \frac{1}{2\pi} \int_0^{2\pi} \frac{1 + \cos_2(\omega_0 t + \theta)}{2} d\theta \right\}$$

[3 marks]

$$= A^2 \cdot A \left\{ \frac{1}{4\pi} \left[ \int_0^{2\pi} d\theta + \int_0^{2\pi} \cos(2(\omega_0 t + \theta)) d\theta \right] \right\}$$

$$= A^2 A \left\{ \frac{1}{4\pi} [2\pi] + 4 \sin(2(\omega_0 t + \frac{\pi}{2})) - 4 \sin(2\omega_0 t) \right\}$$

$$= \frac{A^2}{4\pi} [2\pi - 4 \sin(2\omega_0 t)]$$

$$P_{avg} = \frac{A^2}{2} - \frac{A^2}{\pi} \sin(2\omega_0 t) \quad [5 \text{ marks}]$$

3 a. Define Gaussian random process and explain  
 Sol:- Consider a continuous random process  $x(t)$  let  $N$  random variables  $x_1 = x(t_1), x_2 = x(t_2) \dots x_N = x(t_N)$  be defined at time instants  $t_1, t_2, t_3 \dots t_N$  respectively. In these random variables are jointly Gaussian for any  $N=1, 2$  and at any time for instants  $t_1, t_2 \dots t_N$ , then the random process  $x(t)$  is called Gaussian random process. The joint density function for a Gaussian random variable is given as

$$f_N(x_1, x_2, \dots, x_N; t_1, t_2, \dots, t_N) = \frac{\exp\left[-\frac{1}{2} [x - \bar{x}]^T [C_{xx}]^{-1} (x - \bar{x})\right]}{\sqrt{(2\pi)^N |C_{xx}|}} \quad [1.5 \text{ marks}]$$

where  $\bar{x} = E\{x_i\} = E\{x(t)\}$

$[C_{xx}]$  = covariance matrix and its elements are

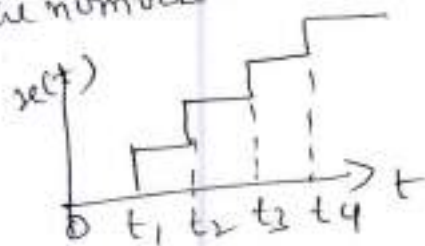
$$C_{ik} = C_{xi} x_k = E\{(x_i - \bar{x}_i)(x_k - \bar{x}_k)\}$$

$$C_{ik} = C_{xx}(t_i, t_k) \quad [2 \text{ marks}]$$

b) Define Poisson random process and explain  
 The position process  $x(t)$  is a discrete random process which represents the number of times that some events occurred as a function of time  $x(t)$  is integer valued increasing sampled functions such as check in registers arrivals of a customer arrival of vehicles at a particular point. In these functions a single event occurs at a random time counting the number of occurrences with time is a [1 mark]

Position process It is therefore also called a counting process  
 below fig (a) shows the sample function of a position counting process  
 the condition for a poisson process  $x(t)$  are

1.  $x(0) = 0$
2. only one event occurs in an infinite time interval
3. The number of events that occur in any given time interval is independent of the number events in any other non-overlapping time interval



A poisson counting process { 2 marks }

$$P(x(t) = k) = \frac{e^{-\lambda t} (\lambda t)^k}{k!} \quad k = 0, 1, 2, \dots, \infty$$

here  $\lambda$  is average occurrence  
 $k$  is exactly occurrence.

$t$  is time

$$f_x(x) = \sum_{k=0}^{\infty} \frac{(\lambda t)^k e^{-\lambda t}}{k!} \delta(x - k) \quad \text{(3 marks)}$$

9 a) define strict sense stationary process and explain

Sol: A random process  $x(t)$  is said to be strict sense stationary if its  $N$ th order joint density function does not change with time or  $t$  in time value that is

$$f_x(x_1, x_2, \dots, x_N; t_1, t_2, \dots, t_N) = f_x(x_1, x_2, \dots, x_N; t_1 + \Delta t, \dots, t_N + \Delta t)$$

for all  $t_1, t_2, \dots, t_N$  and  $\Delta t$  [1 marks]

A process that is stationary to all orders  $N = 1, 2, \dots, \infty$  is called a strict sense stationary process is also a wss process but the converse is not true. [2 marks]

b) Define joint wide sense stationary process and explain

Sol: consider two random processes  $x(t)$  and  $y(t)$  if they are jointly wide sense stationary then the cross correlation

function of  $x(t)$  and  $y(t)$  is a function of the time difference  $\tau = t_2 - t_1$  only and not absolute time that is the cross correlation function [1 mark]

$$R_{xy}(t_1, t_2) = E\{x(t_1)y(t_2)\}$$

If the time difference  $\tau = t_2 - t_1$  and  $t = t_1$  then

$$R_{xy}(t, t+\tau) = E\{x(t), y(t+\tau)\} = R_{xy}(\tau)$$

Therefore the condition for a process to be a joint wide sense stationary are [2 marks]

$$E\{x(t)\} = \bar{x} = \text{constant}$$

$$E\{y(t)\} = \bar{y} = \text{constant}$$

$$E\{x(t)y(t+\tau)\} = R_{xy}(\tau) \text{ is independent of time 't'}$$

[3 marks]

  
PRINCIPAL  
Sri Indu Institute of Engineering & Tech  
Sheriguda(VII), Ibrahimpatnam.  
R R Dist Telangana -501 510



# SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

(Formerly RVR Institute of Engineering & Technology)

( Approved by AICTE New Delhi & Affiliated to JNTUH, Hyderabad)

Sheriguda ( V), Ibrahimpatnam (M), R.R. District - 501510

## CERTIFICATE

This is to certify that this is a bonafide record of the work done by

Mr./Ms. K. Tharuni Sri bearing

Roll No. 18X34A0481 of 2<sup>nd</sup> year B.Tech/ M.Tech/MBA <sup>Electronics and Communication</sup> Engineering Branch

2-1 Semester in the Basic Simulation Laboratory during  
the academic year 2019-2020

Number of experiments conducted: 15

Staff member In-charge

Internal Examiner

H.O.D

External Examiner



# SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

Sheriguda (V), Ibrahimpatnam (M), R.R. District - 501510

DEPARTMENT OF Electronics and Communication ENGINEERING

## INDEX

S.No	Name of the Experiment	Date	Page.No	Remarks
	Introduction to MATLAB	16/7/19	1-2	Hrs 20/7/19
1.	Basic Operations on matrices	30/7/19	3-8	Hrs 20/7/19
2.	Generation of - Basic Signals and Sequences such as:	06/08/19	9-24	Hrs 4/08/19
	a) Sine Signal			
	b) Ramp Signal			
	c) Unit Step Signal			
	d) Square Signal			
	e) Saw tooth signal			
	f) Sinc Signal			
	g) Triangular wave form			
	h) Impulse Signal			
3.	Operations of Signals and Sequences	13/08/19	25-39	Hrs 27/08/19
	a) Addition Operation			
	b) Subtraction Operation			
	c) Multiplication Operation			
	d) Division Operation			
	e) Scaling Operation			
	f) Time reversal Operation			
	g) Shifting Operation			
4.	Finding the even and odd parts of a signal or sequences and real and imaginary parts of the signals.	20/08/19	40-44	Hrs 28/08/19
5.	Convolution for signals and Sequence	20/08/19	45-46	Hrs 28/08/19



# SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

Sheriguda ( V), Ibrahimpatnam (M), R.R. District - 501510

DEPARTMENT OF Electronics and Communication ENGINEERING

## INDEX

S.No	Name of the Experiment	Date	Page.No	Remarks
6.	Auto correlation and Cross correlation for Signals and Sequences	27/08/19	47-48	Ans/27/08/19
7.	Verification of linearity and time invariance properties of a given continuous and discrete system	27/08/19	49-56	Ans/27/08/19
8.	Computation of unit sample, unit step and sinusoidal response of given LTI system and Verifying its physical reliability and stability properties	12/09/19	53-59	Ans/12/09/19
9.	Gibbs phenomenon Simulation	17/09/19	60-61	Ans/17/09/19
10.	finding the fourier transform of a given signal and plotting its magnitude and phase spectrum	24/09/19	62-63	Ans/24/09/19
11.	Locating the zero's and poles and plotting the pole-zero maps in S-plane and z-plane.	24/09/19	64-65	Ans/24/09/19
12.	Verification of sampling theorem	01/10/19	66-68	Ans/01/10/19
13.	Removal of noise by auto correlation and cross correlation.	01/10/19	69-74	Ans/01/10/19
14.	Extraction of periodic signal masked by noise using correlation	22/10/19	75-77	Ans/22/10/19
15.	Verification of wiener-kinchin relation.	05/11/19	78-79	Ans/05/11/19







ATTENDANCE		
Sl No.	Roll No.	NAME
1	401	A. Shyam Kumar Reddy
2	402	A. Anandesh
3	403	Asha - Savitha
4	404	Aliparamala Paul Kumar
5	405	Ala Keerthi
6	406	Anna Jeevansathi Reddy
7	407	Bainoja Ratini Prabhath
8	408	Besukuntla Varunraj
9	409	Bhatnagar Jaya
10	410	Bhaya Anjaneeesh Kumar
11	411	Bhaya Poorna
12	412	Ch. Anand Raj
13	413	Chakrapani Hanishtha
14	414	Chanda Vanishi
15	415	Chattaparthi Sankhi
16	416	Chikoori Manideep Reddy
17	417	Chirangi Sreedhar
18	418	Ch. Shrinath Reddy
19	419	Bhatnagar Jaya
20	420	Chinna Hanika
21	421	Chitbalani Usha
22	422	Chittaju Megaradh
23	423	Ch. Anand Reddy
24	424	Danda Soukya Reddy
25	425	Dasu Gajathri
26	426	Daveth Gireesh Patil
27	427	Daulatabad Sushma
28	428	Dandipala Kartik Reddy
29	429	Duduru Praveena
30	430	Ethkala Nouna

Department - 11/11/20/2020 Department - 10/11/20

ATTENDANCE											
Sl No.	Roll No.	NAME	01	02	03	04	05	06	07	08	09
1	401	A. Shyam Kumar Reddy	5	5	5	5	5	5	5	5	5
2	402	A. Anandesh	5	5	5	5	5	5	5	5	5
3	403	Asha - Savitha	5	5	5	5	5	5	5	5	5
4	404	Aliparamala Paul Kumar	5	5	5	5	5	5	5	5	5
5	405	Ala Keerthi	5	5	5	5	5	5	5	5	5
6	406	Anna Jeevansathi Reddy	5	5	5	5	5	5	5	5	5
7	407	Bainoja Ratini Prabhath	5	5	5	5	5	5	5	5	5
8	408	Besukuntla Varunraj	5	5	5	5	5	5	5	5	5
9	409	Bhatnagar Jaya	5	5	5	5	5	5	5	5	5
10	410	Bhaya Anjaneeesh Kumar	5	5	5	5	5	5	5	5	5
11	411	Bhaya Poorna	5	5	5	5	5	5	5	5	5
12	412	Ch. Anand Raj	5	5	5	5	5	5	5	5	5
13	413	Chakrapani Hanishtha	5	5	5	5	5	5	5	5	5
14	414	Chanda Vanishi	5	5	5	5	5	5	5	5	5
15	415	Chattaparthi Sankhi	5	5	5	5	5	5	5	5	5
16	416	Chikoori Manideep Reddy	5	5	5	5	5	5	5	5	5
17	417	Chirangi Sreedhar	5	5	5	5	5	5	5	5	5
18	418	Ch. Shrinath Reddy	5	5	5	5	5	5	5	5	5
19	419	Bhatnagar Jaya	5	5	5	5	5	5	5	5	5
20	420	Chinna Hanika	5	5	5	5	5	5	5	5	5
21	421	Chitbalani Usha	5	5	5	5	5	5	5	5	5
22	422	Chittaju Megaradh	5	5	5	5	5	5	5	5	5
23	423	Ch. Anand Reddy	5	5	5	5	5	5	5	5	5
24	424	Danda Soukya Reddy	5	5	5	5	5	5	5	5	5
25	425	Dasu Gajathri	5	5	5	5	5	5	5	5	5
26	426	Daveth Gireesh Patil	5	5	5	5	5	5	5	5	5
27	427	Daulatabad Sushma	5	5	5	5	5	5	5	5	5
28	428	Dandipala Kartik Reddy	5	5	5	5	5	5	5	5	5
29	429	Duduru Praveena	5	5	5	5	5	5	5	5	5
30	430	Ethkala Nouna	5	5	5	5	5	5	5	5	5

Lab Internal marks

Dates: 1/11/20, 2/11/20, 3/11/20, 4/11/20, 5/11/20

Roll No.	SESSIONAL MARKS				Total
	(1)	(2)	(3)	(4)	
1	10	5	5	5	25
2	10	5	2	5	22
3	AB	AB	AB	AB	AB
4	10	5	3	5	23
5	6	5	8	9	28
6	8	5	5	5	23
7	10	5	5	5	25
8	6	5	2	4	17
9	6	5	3	5	19
10	AB	AB	AB	AB	AB
11	10	5	4	5	24
12	10	5	3	5	23
13	10	5	3	5	23
14	10	5	3	5	23
15	10	5	5	5	25
16	10	5	3	5	23
17	AB	AB	AB	AB	AB
18	10	5	3	5	23
19	10	5	3	5	23
20	10	5	3	5	23
21	AB	AB	AB	AB	AB
22	10	5	3	5	23
23	10	5	3	5	23
24	8	5	5	5	23
25	AB	AB	AB	AB	AB
26	6	5	4	4	19
27	10	5	3	5	23
28	10	5	3	5	23
29	10	5	3	5	23
30	10	5	3	5	23
31	6	5	4	4	19
32	10	5	3	5	23
33	10	5	3	5	23

**ATTENDANCE**

E.No.	Roll No.	NAME
436	EVSAAD	ETAKUNI
437		S. Shiva Sai
438		Gaddam Devendhar
439		Gaddam Jayanth Reda
440		Gaddam Sandhya
441		Galapati Jyothika
442		Galugu Divya Raj
443		Goka Dala Vikas
444		Gubba bhavana
445		Guddevarani Lakshmi
446		Gurajapati
447		Gunda pradeep Reddy
448		Gundugani Geetha
449		Jakkala prasad
450		Jalabathi madhu
451		Jasraj mounika
452		Jayini srinidhi
453		Jetha haresh
454		Jiganti Krishna Lakshmi
455		K. Niharika
456	EVSAAD	A. vanshi
457		B. Giridhar
458		D. Nivetha
459		E. Anavinda Sai
460		F. praneeeth
461		G. Naveen
462		G. Lingam
463		G. maghana
464		G. praneeeth
465		G. Nagaraju

Experiment-1  
Days to Day

Day	20	21	22	23	24	25	26	27	28
1	5	5	5	5	5	5	5	5	5
2	4	4	4	4	4	4	4	4	4
3	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5
14	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5
16	5	5	5	5	5	5	5	5	5
17	5	5	5	5	5	5	5	5	5
18	5	5	5	5	5	5	5	5	5
19	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5
21	5	5	5	5	5	5	5	5	5
22	5	5	5	5	5	5	5	5	5
23	5	5	5	5	5	5	5	5	5
24	5	5	5	5	5	5	5	5	5
25	5	5	5	5	5	5	5	5	5
26	5	5	5	5	5	5	5	5	5
27	5	5	5	5	5	5	5	5	5
28	5	5	5	5	5	5	5	5	5
29	5	5	5	5	5	5	5	5	5
30	5	5	5	5	5	5	5	5	5
31	5	5	5	5	5	5	5	5	5
32	5	5	5	5	5	5	5	5	5
33	5	5	5	5	5	5	5	5	5
34	5	5	5	5	5	5	5	5	5
35	5	5	5	5	5	5	5	5	5
36	5	5	5	5	5	5	5	5	5
37	5	5	5	5	5	5	5	5	5
38	5	5	5	5	5	5	5	5	5
39	5	5	5	5	5	5	5	5	5
40	5	5	5	5	5	5	5	5	5
41	5	5	5	5	5	5	5	5	5
42	5	5	5	5	5	5	5	5	5
43	5	5	5	5	5	5	5	5	5
44	5	5	5	5	5	5	5	5	5
45	5	5	5	5	5	5	5	5	5
46	5	5	5	5	5	5	5	5	5
47	5	5	5	5	5	5	5	5	5
48	5	5	5	5	5	5	5	5	5
49	5	5	5	5	5	5	5	5	5
50	5	5	5	5	5	5	5	5	5

Experiment-2

R - Record, P - practical, T - Total

Day	29	30	31	32	33	34	35	36	37	38
1	5	5	5	5	5	5	5	5	5	5
2	4	4	4	4	4	4	4	4	4	4
3	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5	5
14	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5
16	5	5	5	5	5	5	5	5	5	5
17	5	5	5	5	5	5	5	5	5	5
18	5	5	5	5	5	5	5	5	5	5
19	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5
21	5	5	5	5	5	5	5	5	5	5
22	5	5	5	5	5	5	5	5	5	5
23	5	5	5	5	5	5	5	5	5	5
24	5	5	5	5	5	5	5	5	5	5
25	5	5	5	5	5	5	5	5	5	5
26	5	5	5	5	5	5	5	5	5	5
27	5	5	5	5	5	5	5	5	5	5
28	5	5	5	5	5	5	5	5	5	5
29	5	5	5	5	5	5	5	5	5	5
30	5	5	5	5	5	5	5	5	5	5
31	5	5	5	5	5	5	5	5	5	5
32	5	5	5	5	5	5	5	5	5	5
33	5	5	5	5	5	5	5	5	5	5
34	5	5	5	5	5	5	5	5	5	5
35	5	5	5	5	5	5	5	5	5	5
36	5	5	5	5	5	5	5	5	5	5
37	5	5	5	5	5	5	5	5	5	5
38	5	5	5	5	5	5	5	5	5	5
39	5	5	5	5	5	5	5	5	5	5
40	5	5	5	5	5	5	5	5	5	5
41	5	5	5	5	5	5	5	5	5	5
42	5	5	5	5	5	5	5	5	5	5
43	5	5	5	5	5	5	5	5	5	5
44	5	5	5	5	5	5	5	5	5	5
45	5	5	5	5	5	5	5	5	5	5
46	5	5	5	5	5	5	5	5	5	5
47	5	5	5	5	5	5	5	5	5	5
48	5	5	5	5	5	5	5	5	5	5
49	5	5	5	5	5	5	5	5	5	5
50	5	5	5	5	5	5	5	5	5	5

ATTENDANCE

S.No	Roll No	NAME
436	436	E. Lakshmi Nandan
437		G. shiva Sai
438		Goddam Devaridhas
439		Goddam Jayanthi Reddy
440		Goddam Sandhya
442		Gopalapadi Jagitha
443		Gobalugu Vikas Raj
444		Goka Bala Vikas
446		Gubba Khawana
447		Guddeavuri Veerani Gow
448		Gujja pavani
449		Gunda pradeep Reddy
450		Gundagani Gopi
451		Jakkula pradeep
455		Jatavathi madhu
456		Javaji manika
457		Jayini saichasutha
458		Jella haresh
459		Jigosa Krishna Lakshmi
460		K. Niharika
461		A. vanchi
462		B. Giridhar
463		D. Nirasha
464		E. Anurinda Sai
465		Y. pranavith
466		C. Naveen
467		G. Lingam
468		G. meghana
469		G. praveesh
470		G. Nagaraju

Department-5

2nd ATTENDANCE									
30	40	41	42	43	44	45	46	47	48
P/A	P	V	%	P/A	P	V	%		
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
1	1	1	1		1	1	1	1	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	2	4		5	5	2	4	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
1	1	1	1		1	1	1	1	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	

Department-6

ATTENDANCE									
49	50	51	52	53	54	55	56	57	58
P/A	P	V	%	P/A	P	V	%		
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
1	1	1	1		1	1	1	1	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	2	4		5	5	2	4	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
1	1	1	1		1	1	1	1	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
4	4	1	3		4	4	1	3	
1	1	1	1		1	1	1	1	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	
5	5	5	5		5	5	5	5	
5	5	2	4		5	5	2	4	
5	5	5	5		5	5	5	5	

ATTENDANCE		
R.No	Roll No	Name
444		
445		
446		
447		
448		
449		
450		
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Experiment - 9, 11, 12, 13, 14

ATTENDANCE											
R.No	11				12				13		
	P	A	A	A	P	A	A	A	P	A	A
444											
445											
446											
447											
448											
449											
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492											
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496											
497											
498											
499											
500											

Lab. Internal Marks

Date: 3/10/20

Roll No	SESSIONAL MARKS				
	Dim (m)	Rift (m)	Sea (m)	Depth (m)	Total (m)
26	6	5	2	5	18
27	6	5	3	5	19
28	10	10	10	10	40
29	10	10	10	10	40
30	10	5	4	5	24
31	10	5	3	4	22
32	6	5	2	4	17
33	10	10	10	10	40
34	10	5	3	5	23
35	5	5	2	4	16
36	10	5	3	5	23
37	10	10	10	10	40
38	6	5	2	4	17
39	10	10	10	10	40
40	10	5	3	5	23
41	6	5	2	3	16
42	10	10	10	10	40
43	10	5	4	5	24
44	10	5	2	4	21
45	10	5	3	5	23
46	10	5	2	4	21
47	10	5	2	5	22
48	10	5	4	5	24
49	10	5	2	4	21
50	10	5	3	5	23

## BASIC OPERATIONS ON MATRICES.

>> Creating Vector/matrices :-

To create a matrix in MATLAB, use the brackets. Variables inside the brackets can be represented by ",", " ", space, semicolons where ",", " " and spaces are row separations where as ";" are column separations.

-for Example:- >> a = [2, 5, 7]

a = [2 5 7]

>> b = [3, 4, 2, 5, 7]

b = [3 4 2 5 7]

>> c = [2, 3, 4, 5]

c = 2 3

4 5

>> colon operation:

MATLAB colon operator is a compact way using to create vector.

-for Example:- >> A = 1:0.1:5

A = 1.0000 1.1000 1.2000 1.3000

1.4000 1.5000

while 0.1 is the increment.

If omitted it is assumed to be one >> B = 1:5

B = 1 2 3 4 5



$$\gg a = [1, 2, 3, 4; 5, 4, 5, 6; 7, 8, 9, 10]$$

$$a = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 4 & 5 & 6 \\ 7 & 8 & 9 & 10 \end{bmatrix}$$

$$\gg b = [2, 3, 4, 5; 5, 6, 2, 1; 2, 3, 3, 4]$$

$$b = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 5 & 6 & 2 & 1 \\ 2 & 3 & 3 & 4 \end{bmatrix}$$

$$\gg c = [a + b]$$

$$c = \begin{bmatrix} 3 & 5 & 7 & 9 \\ 8 & 10 & 7 & 7 \\ 9 & 11 & 12 & 14 \end{bmatrix}$$

$$\gg d = [a - b]$$

$$d = \begin{bmatrix} -1 & -1 & -1 & -1 \\ -2 & -2 & 3 & 5 \\ 5 & 5 & 6 & 6 \end{bmatrix}$$

$$\gg a = [1, 2, 3; 3, 4, 5; 7, 8, 9]$$

$$a = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\gg b = [2, 3, 4; 5, 6, 2; 2, 3, 3]$$

$$b = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 2 \\ 2 & 3 & 3 \end{bmatrix}$$

Note :-

- Use 'who' command to list the currently active variables.
- Use 'clear' command to delete variables from computer memory.
- Suppress will print the result for of every assignment [operator] operations unless Expressions, on right hand side is terminated with a semicolon.
- Create some basic matrices using MATLAB building functions

ones, zeroes, eye

```
>> a = zeroes (2,2)
```

```
a = 0 0
     0 0
```

```
>> b = ones (1,1)
```

```
b = 1
```

```
>> c = eye (2)
```

```
c = 1 0
     0 1
```

Determine size of matrix:-

```
>> size (b)
```

```
ans = 2
```

```
>> length (b)
```

```
ans = 2
```

Note:- You can use the same techniques to create the multi-dimensional arrays that you use for 2 matrices.





>> c = a \* b

$$c = \begin{bmatrix} 18 & 24 & 17 \\ 36 & 48 & 35 \\ 72 & 96 & 71 \end{bmatrix}$$

>> d = a / b

$$d = \begin{bmatrix} -0.3333 & -0.2333 & 1.6667 \\ 2.3333 & 0.3333 & -1.6667 \\ 7.6667 & 1.6667 & -2.3333 \end{bmatrix}$$

>> sin(0)

ans = 0

>> sin(pi/4)

ans =  
0.7071

>> exp(0)

ans = 1

>> exp(1)

ans =  
2.7183

>> log(0)

ans =  
-Inf

>> ln(0)

undefined function or variable 'ln'

>> a = 2 + 3i

a =  
2.0000 + 3.0000i

>> real(a)

ans =  
2

### Indexing Vectors (or) Matrices:

Once a vector/a matrix is created you might need to create ~~extra~~ only a subset of the data, and this is done through indexing. To index, use parenthesis after the name of the included in parenthesis.

```
Ex:- >> c = eye(3)
      >> c(1:2, 2:3)
      ans = 0 0
            1 0
```

Indexing matrices using colon operator returns all elements of the indexed place.

```
>> c = eye(5);
>> c = (1,:)
ans = 10000
```

### Matrix Operations and Elements by Element Operators.

We can compute matrix +, -, \*, inverse (inv) easily in MATLAB.

```
for Example: >> A = [2 3 4 5]
              >> B = ones(2, 2);
              >> C = B * inv(A);
ans C = -0.5000    0.5000
         -0.5000    0.5000
```



>> imag(a)

ans = 3

>> b = ones(2, 2)

$b = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

>> b = zeros(2, 2)

$b = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

>> c = eyes(2, 2)

$c = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

>> 2^16 syst(16)

ans = 16

>> a = [1, 2; 3, 4]

$a = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

>> sum(a)

ans = [4 6]

>> size(a)

ans = [2 2]

>> length(a)

ans = 2



Sometimes it is useful to perform algebraic operations on all of the entries of the matrix. This is done in matlab by using the Element by Element operations, which is usually preceded by a dot, Except for +, - Specially they are +, -, \*, /, \.

Example:-

```
>>a = [1:2:3]
>>b = [4:5:6]
>>a .* b;
ans = 4
      10
      18
```

>> programming in matlab:-

Soon after you become interactively you will probably grow tired of typing the same sequence of commands in order to perform routine tasks. when this happens you will be ready to start programming in matlab, There are 2 types of matlab programmes these are scripts and functions.

> Scripts:-

These are nothing more than a sequence of commands stored as a text file with in extension such writing is usually done in matlab built in editor. some useful functions that are often used in scripts for loops.



>>b = a'

$$b = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$$

>>c = diag(a)

$$c = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$$

>>a = [1, 2, 3, 4; 3, 4, 2, 2; 3, 3, 3, 6]

$$a = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 2 & 2 \\ 3 & 3 & 3 & 6 \end{bmatrix}$$

>>b = a(:, 2:4)

$$b = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 2 & 2 \\ 3 & 3 & 6 \end{bmatrix}$$

>>c = a(1:2, 3:4)

$$c = \begin{bmatrix} 3 & 4 \\ 2 & 2 \end{bmatrix}$$

>>d = a(2:3, :)

$$d = \begin{bmatrix} 3 & 4 & 2 & 2 \\ 3 & 3 & 3 & 6 \end{bmatrix}$$



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→ for loops.  
while loops.  
if - else - end structure...

You can check the syntax for matlab help menu.

Advices:

write comments in your scripts. Note the comments must be followed by %.

Running scripts:-

Save the scripts in the present working direction then it can be run simply by typing its name at MATLAB command prompt or press run icon on the m bar of the script.

> functions:-

MATLAB has lots of built-in function which allows you can call them directly.

Besides you can write functions files by yourself. function files also have in expression. The biggest difference b/w scripts & functions is that functions have input & output parameters.



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Functions declaration should start with the word, 'FUNCTION' and the following syntax.

Function Output:-

Function name (input 1, input 2) - here 'output' is the name of function 'input' variables.

$c(1, :)$   $c(:, 3)$

1	2	3
4	5	6
7	8	9

Result:- I've verified the Basic Operations on matrices using matlab.

ARE @  
ostosteg



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