

**Python Programming****(Common to all Branches)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		<b>Marks</b>	<b>CO</b>	<b>BTL</b>
<b><u>UNIT-I</u></b>				
1.	a) Explain the significance of Python as a high-level programming language.	7	1	L2
	b) Discuss the use of conditional statements with examples.	7	1	L3
<b>(OR)</b>				
2.	a) Explain the role of expressions and operators in Python.	7	1	L2
	b) Write a Python program to compute the factorial of a given number.	7	1	L3
<b><u>UNIT-II</u></b>				
3.	a) Differentiate between lists, tuples, and sets with examples.	7	2	L2
	b) Explain mutable vs immutable objects with proper examples.	7	2	L3
<b>(OR)</b>				
4.	a) Explain the working of dictionaries in Python	7	2	L2
	b) Write a Python program to remove duplicate elements from a list.	7	2	L3
<b><u>UNIT-III</u></b>				
5.	a) Explain parameter passing in Python functions with examples.	7	3	L2
	b) Write short notes on different file handling modes in Python.	7	3	L2
<b>(OR)</b>				
6.	a) Explain recursion with a suitable example.	7	3	L2
	b) Write a Python program to copy the contents of one file into another.	7	3	L3
<b><u>UNIT-IV</u></b>				
7.	a) Explain the concept of namespaces in Python.	7	4	L2
	b) Discuss the process of creating and using a package	7	4	L2
<b>(OR)</b>				
8.	a) Explain the use of built-in modules like math and random.	7	4	L2
	b) Write short notes on importing modules in different ways	7	4	L2
<b><u>UNIT-V</u></b>				
9.	a) Explain the concept of inheritance in object-oriented programming.	7	5	L2
	b) Discuss the role of special methods in Python classes.	7	5	L2
<b>(OR)</b>				
10.	a) Explain regular expressions and their applications.	7	5	L2
	b) Write short notes on database connectivity in Python.	7	5	L2

**Surveying and Geomatics  
(Civil Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) What are the basic principles of surveying? Explain. 6M  
b) What are the points to be remembered while selecting a survey station? 6M

**(OR)**

2. a) Distinguish between 6M  
i) Magnetic Meridian and True Meridian  
ii) Whole circle bearing and Quadrantal bearing  
b) Following are the bearing of the sides of a closed traverse 6M

Line	Fore Bearing
AB	$107^{\circ} 15'$
BC	$22^{\circ} 00'$
CD	$318^{\circ} 30'$
DE	$189^{\circ} 15'$
EA	$124^{\circ} 45'$

Draw a neat sketch of the traverse. Work out the interior angles of the traverse and apply the check.

**UNIT-II**

3. The following staff readings were observed successively with a level. The instrument has been shifted after the second, fifth and eighth readings. 12M  
0.675, 1.230, 0.750, 2.565, 2.225, 1.935, 1.835, 3.220, 3.115 and 2.875.  
The first staff reading was taken with the staff held on a benchmark of RL 100.00. Enter the readings in a level book and calculate the RL's of all the points. Also apply the arithmetic readings in a level book and calculate the RL's of all the points. Also apply necessary checks. Use Height of Instrument method

**(OR)**

4. a) What are the different classifications of levelling? Explain. 6M  
b) What is interpolation of contours? Explain any one method of interpolation. 6M

**UNIT-III**

5. a) Explain the temporary adjustments of transit theodolite. 6M  
b) In order to determine the R.L. of the top of the chimney the Theodolite was set up at a distance of 30m from its base. The vertical angle measured to the top of chimney was  $25^{\circ} 30'$ . The back sight taken on a nearby B.M of R.L 152.260 was 1.225m. Determine the R.L of the top of the chimney. 6M

**(OR)**

6. a) How do you determine the constants of a tacheometric in the field? Explain. 6M  
b) What is total station? What are the features and uses of total station? 6M

#### **UNIT-IV**

7. a) What is the principle of stereoscopic vision? 4M  
b) Define relief. Derive an expression for displacement due to the ground relief. 8M  
(OR)
8. a) Explain briefly the aspects of flight planning for an aerial survey. 6M  
b) What are different types of aerial photographs? Explain. 6M

#### **UNIT-V**

9. a) Define remote sensing and briefly explain the principle of remote sensing. 6M  
b) What do you understand by GIS? Briefly explain. 6M  
(OR)
10. a) Explain briefly about i) energy interaction with earth ii) remote sensing platforms. 8M  
b) Write a note on application of remote sensing. 4M

2 of 2

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**Electro Magnetic Field Theory  
(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) State and explain Coulomb's Law. 6 M  
b) Derive an expression for the electric field intensity due to infinite line charge. 6 M

**(OR)**

2. a) Derive the expression for Potential gradient  $E = -\nabla V$  6 M  
b) State and explain Gauss's Law. 6 M

**UNIT-II**

3. Derive the boundary conditions for dielectric to dielectric interface for static electromagnetic fields? 12 M

**(OR)**

4. Derive the expressions for energy stored and energy density in a static electric field? 12 M

**UNIT-III**

5. a) State and explain Biot-Savart's law. 6 M  
b) Find the expression for the magnetic flux density, 'B' at a distance 'h' above the centre of a rectangular loop of wire 'b' meters on one side and 'a' meters on the other side. The loop carries a current of one ampere. 6 M

**(OR)**

6. a) In free space,  $V = 6xy^2z + 8$ . At point P (1, 2, -5), find E. 6 M  
b) Derive the equation to show that curl of magnetic field intensity is equal to current density.  $\nabla \times H = J$  6 M

**UNIT-IV**

7. a) State and explain Lorentz's force equation? 6 M  
b) Find the force on the moving charge  $Q=5C$  with a velocity  $U=2a_x+5a_y-6a_z$  m/sec due to fields  $E=10a_x+5a_y-4a_z$  V/m,  $B=7a_z+4a_y+3a_x$  T 6 M

**(OR)****1 of 2**

8. a) Derive the expression for the force between two finite current carrying loops. 6 M  
b) Derive the expression for self-inductance of a toroid. 6 M

**UNIT-V**

9. a) Explain the terms: (i) Dynamically induced EMF (ii) Statically induced EMF 6 M  
b) State the Maxwell's four equations for time varying fields. 6 M

**(OR)**

10. State and Derive an expression for Poynting theorem. 12 M

**D.C MACHINES & TRANSFORMERS**  
**(ELECTRICAL AND ELECTRONICS ENGINEERING)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Derive the EMF equation for DC generator	5	1	2
b)	An 8 pole D.C. generator has 960 armature conductors and a flux per pole of 20m-wb. Calculate the emf generated when running at 500 rpm by these connections:	5	1	3
	(OR)			
2. a)	Differentiate between separately excited and self-excited generators.	5	1	3
b)	A D.C. shunt generator delivers 195 A at 220 V. The resistance of the shunt field is 50 $\Omega$ and that of the armature is 0.03 $\Omega$ . Calculate the: (i) Induced EMF (ii) Armature current (iii) Copper losses	5	1	3
	<u>UNIT-II</u>			
3. a)	Explain about the losses in a DC generator	5	2	2
b)	A 450 kW, 400 v, 8 pole lap wound Dc generated has 768 armature Conductors. If the brushes are given lead of electrical degree. Calculate the number of Demagnetising and Cross- magnetising Amp turn / pole at full load. shunt field may be neglected.	5	2	2
	(OR)			
4. a)	Discuss the applications of different types of D.C. generators in detail.	5	2	2
b)	A 4-pole wave-wound D.C. generator has 720 conductors on its armature. The flux per pole is 0.03 Wb and it runs at 1000 rpm. Find the generated EMF. If the generator delivers 50 A at 230 V with armature resistance of 0.05 $\Omega$ , calculate its efficiency if iron and mechanical losses total 2 kW.	5	2	3
	<u>UNIT-III</u>			
5. a)	Explain torque equation in DC motor.	5	3	2
b)	Determine the value of torque established by the armature of 4 pole motor having 774 Conductor 2 parallel path 24MWB. total armature current 50 Amp.	5	3	3
	(OR)			
6. a)	Explain the different types of D.C. motors with a neat sketch, Also write is equations?	5	3	2
b)	A 220 V D.C. shunt motor runs at 800 rpm and draws an armature current of 30 A. The armature resistance is 0.5 $\Omega$ . If the flux is reduced by 10% while the load torque remains constant, calculate the new speed of the motor.	5	3	3

#### UNIT-IV

7. a) Explain with the help of a neat sketch the principle of operation of a 3-point starter. 5 4 2
- b) A 230v dc shunt motor runs at 800 rpm and takes armature current of 50 A. find resistance, to be added to the field circuit to increase 1000 rpm at  $I_a$ : 80 A ,  $R_a = 0.15 \text{ ohm}$   $R_f = 250 \text{ ohm}$  5 4 3

(OR)

8. a) List out the advantages of 4-point starter over 3-point starter? Draw and explain the 4-point starter along with protective devices. 5 4 2
- b) Explain the armature voltage and field flux control methods for the Speed control of a DC Motor. 5 4 2

#### UNIT-V

9. a) Compare between core-type & shell-type transformers. 5 5 2
- b) A single-phase transformer supplies a load of 20 kVA at a p.f. of 0.8 (lagging). The iron loss of the transformer is 200 W and the copper losses at this load is 180 W. Calculate (i) the efficiency (ii) the new efficiency if the load is now changed to 30 kVA at a p.f. of 0.9 (lagging). 5 5 2

(OR)

10. a) In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum. 5 5 2
- b) A single phase transformer with a ratio of 440/110V takes a no-load current of 5A at 0.2 p.f lagging. If the secondary draws a current of 120A on load at 0.8 p.f lagging, calculate the primary current , Also Draw the phasor diagram. 5 5 3

#### UNIT-VI

11. a) Explain with the help of connection & phasor diagrams how a Scott connection is used to obtain two-phase supply from three-phase supply. 5 6 2
- b) Discuss about Sumpner's test on a single-phase transformer. 5 6 3

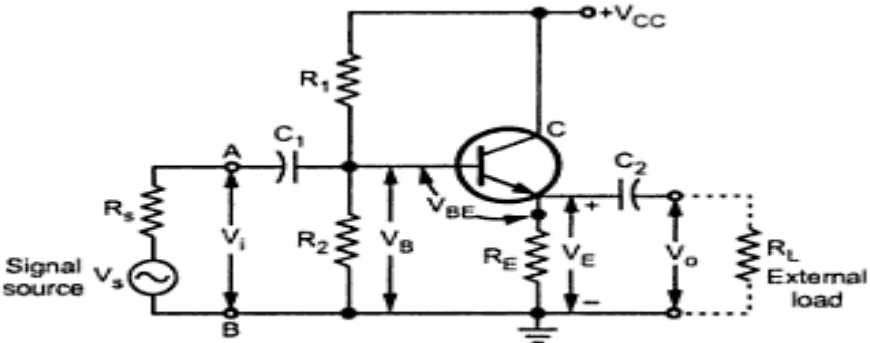
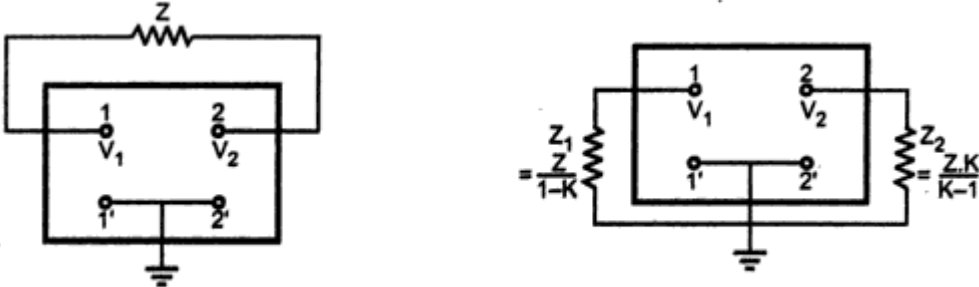
(OR)

12. a) Derive an expression for saving of copper in it when compared to ordinary two winding transformer? 5 6 2
- b) With neat diagram, explain the Sumpner's test on two identical transformers. State its advantages. 5 6 2

Answer ONE Question from each Unit

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<u>UNIT-I</u>			M a r k s
1.	a)	<p>Draw the CC amplifier and derive the expression for <math>A_i</math>, <math>R_i</math>, <math>A_v</math>, <math>Y_o</math></p> <p>Circuit Diagram -2M</p>  <p style="text-align: center;"><b>Common collector circuit</b></p> <p>Expressions 3 M</p>	5
	b)	<p>A CE amplifier is drawn by a voltage source of internal resistance <math>R_S = 800</math> ohms load impedance <math>R_L = 1000</math> ohms.</p> <p><math>h_{ie} = 1.0</math> K ohms, <math>h_{re} = 2 \times 10^{-4}</math>, <math>h_{fe} = 50</math> and <math>h_{oe} = 25 \mu A/V</math>.</p> <p>Calculations of <math>A_i</math>, <math>R_i</math>, <math>A_v</math>,s.</p>	5
2	a)	<p>State and Prove Millers Theorem</p>  <p style="text-align: center;"><b>(a)</b> <span style="margin-left: 200px;"><b>(b)</b></span></p>	4

**Proof:**

From the circuit:

$$I_1 = \frac{V_1 - V_2}{Z'}$$

$$V_2 = KV_1$$

$$\Rightarrow I_1 = \frac{V_1 - KV_1}{Z'} \Rightarrow I_1 = \frac{V_1(1-K)}{Z'}$$

$$\Rightarrow Z_1 = \frac{V_1}{I_1} = \frac{Z'}{1-K}$$

Similarly:

$$I_2 = \frac{V_2 - V_1}{Z'}$$

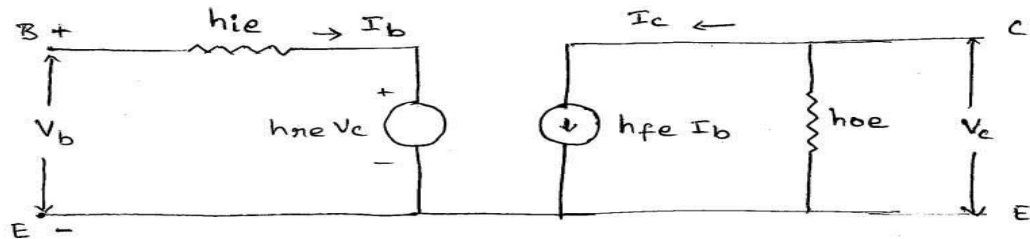
$$\Rightarrow I_2 = \frac{V_2 \left[1 - \frac{V_1}{V_2}\right]}{Z'} \Rightarrow I_2 = \frac{V_2 \left[1 - \frac{1}{K}\right]}{Z'} \Rightarrow I_2 = \frac{V_2 \left[\frac{K-1}{K}\right]}{Z'}$$

$$\Rightarrow Z_2 = \frac{V_2}{I_2} = \frac{KZ'}{K-1}$$

b) Analyze the common emitter (CE) amplifier circuit by deriving  $A_i$ ,  $R_i$ ,  $A_v$ ,  $Y_o$

6

h-parameter model for common emitter configuration is shown in figure below.



$$V_b = h_{ie} I_b + h_{re} V_c$$

$$I_c = h_{fe} I_b + h_{oe} V_c$$

Current Gain (or) Current Amplification  $A_i$  :

For a transistor amplifier the current gain  $A_i$  is defined as the ratio of output current to input current.

$$A_i = \frac{I_L}{I_1} = \frac{-I_2}{I_1}$$

From the circuit  $I_2 = h_f I_1 + h_o V_2 \rightarrow (1)$

$$V_2 = I_L Z_L = -I_2 Z_L \rightarrow (2)$$

Sub (2) in (1)

$$I_2 = h_f I_1 - I_2 Z_L h_o$$

$$I_2 + I_2 Z_L h_o = h_f I_1$$

$$I_2 (1 + Z_L h_o) = h_f I_1 \Rightarrow \frac{I_2}{I_1} = \frac{h_f}{1 + Z_L h_o}$$

$$A_i = \frac{-I_2}{I_1} = \frac{-h_f}{1 + Z_L h_o}$$

$A_i$   $\frac{CE}{-h_{fe}} \frac{1 + Z_L h_{oe}}$

$\frac{CB}{-h_{fb}} \frac{1 + Z_L h_{ob}}$

$\frac{CC}{-h_{fc}} \frac{1 + Z_L h_{oc}}$



### Input Impedance $z_i$

In the circuit  $R_s$  is the signal source resistance the impedance seen when looking in to the amplifier terminals ( $1, 1'$ ) is the amplifier input impedance  $z_i$

$$z_i = \frac{V_1}{I_1}$$

From figure  $V_1 = h_i I_1 + h_{re} V_2$

so  $z_i = \frac{h_i I_1 + h_{re} V_2}{I_1} = h_i + h_{re} \frac{V_2}{I_1} \rightarrow \textcircled{1}$

$$V_2 = -I_2 Z_L = A_I I_1 Z_L \quad \left[ \because A_I = \frac{-I_2}{I_1} \right]$$

$\textcircled{1} \Rightarrow z_i = h_i + h_{re} \frac{A_I I_1 Z_L}{I_1}$

$$z_i = h_i + h_{re} A_I Z_L$$

$$z_i = h_i - h_{re} Z_L \frac{h_f}{1 + h_o Z_L} \quad \left[ \because A_I = \frac{-h_f}{1 + h_o Z_L} \right]$$

$$z_i = h_i - \frac{h_f h_{re}}{\frac{1}{Z_L} + h_o}$$

$$z_i = h_i - \frac{h_f h_{re}}{Y_L + h_o} \quad \left[ \because Y_L = \frac{1}{Z_L} \right]$$

$$z_i \quad \begin{array}{c} \text{CE} \\ h_{ie} - \frac{h_{fe} h_{re}}{Y_L + h_{oe}} \end{array}$$

$$\begin{array}{c} \text{CB} \\ h_{ib} - \frac{h_{fb} h_{rb}}{Y_L + h_{ob}} \end{array}$$

$$\begin{array}{c} \text{CC} \\ h_{ic} - \frac{h_{fc} h_{rc}}{Y_L + h_{oc}} \end{array}$$

### voltage gain ( $A_V$ ) :

The ratio of output voltage  $V_2$  to input voltage gives the voltage gain of the transistor

$$A_V = \frac{V_2}{V_1}$$

substituting  $V_2 = -I_2 Z_L = A_I I_1 Z_L$

$$\Rightarrow A_V = \frac{A_I I_1 Z_L}{V_1} = \frac{A_I Z_L}{V_1 / I_1} = \frac{A_I Z_L}{z_i}$$

$$A_V \quad \begin{array}{c} \text{CE} \\ \frac{A_I Z_L}{z_i} \end{array}$$

$$\begin{array}{c} \text{CB} \\ \frac{A_I Z_L}{z_i} \end{array}$$

$$\begin{array}{c} \text{CC} \\ \frac{A_I Z_L}{z_i} \end{array}$$

output Admittance ( $Y_o$ ) :

$$Y_o = \frac{I_2}{V_2} \quad \text{with } V_s = 0 \quad \text{and } R_L = \infty$$

From the circuit  $I_2 = h_f I_1 + h_o V_2$

Dividing by  $V_2$ ,  $\frac{I_2}{V_2} = h_f \frac{I_1}{V_2} + h_o \rightarrow \text{①}$

With  $V_s = 0$ , by KVL in input circuit

$$R_s I_1 + h_i I_1 + h_{re} V_2 = 0$$

$$I_1 (R_s + h_i) + h_{re} V_2 = 0$$

Hence  $\frac{I_1}{V_2} = -\frac{h_{re}}{R_s + h_i}$

Now Eq ①  $\Rightarrow \frac{I_2}{V_2} = -\frac{h_f h_{re}}{R_s + h_i} + h_o$

$$\Rightarrow Y_o = h_o - \frac{h_f h_{re}}{R_s + h_i}$$

	CE	CB	CC
$Y_o$	$h_{oe} - \frac{h_{fe} h_{re}}{R_s + h_{ie}}$	$h_{ob} - \frac{h_{fb} h_{rb}}{R_s + h_{ib}}$	$h_{oc} - \frac{h_{fc} h_{rc}}{R_s + h_{ic}}$

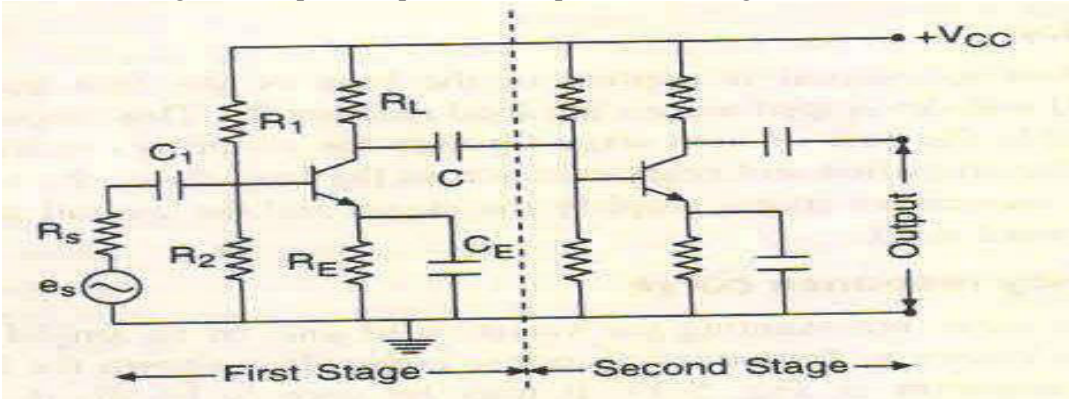
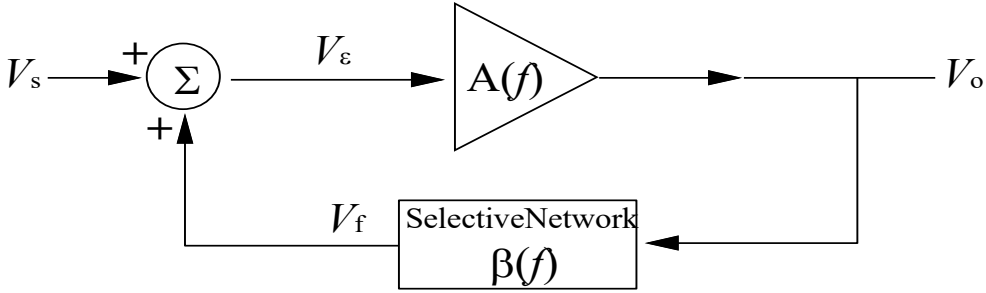
3. a) Draw the circuit of Darlington pair and derive the expression for voltage gain

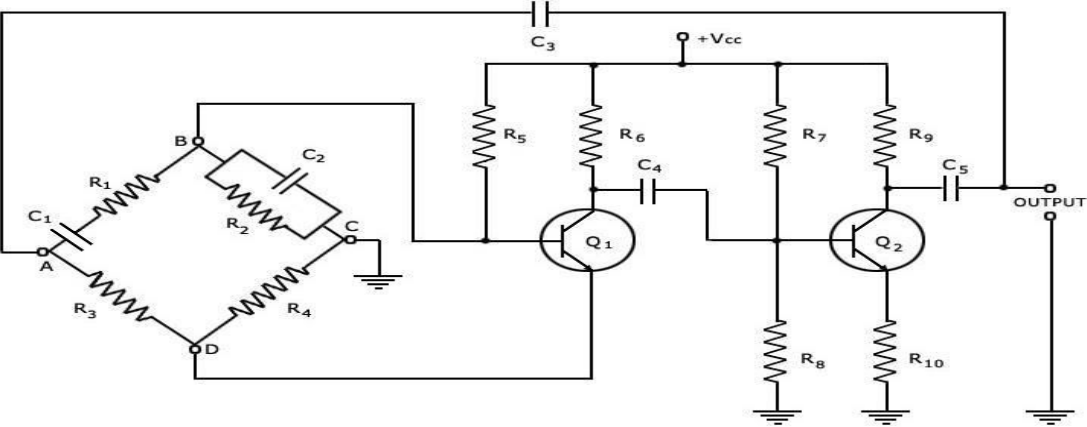
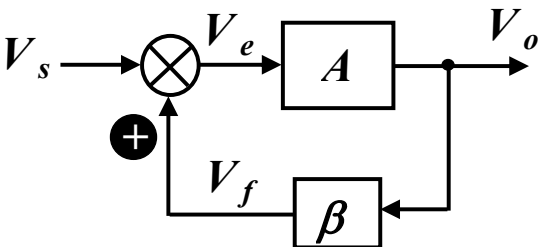
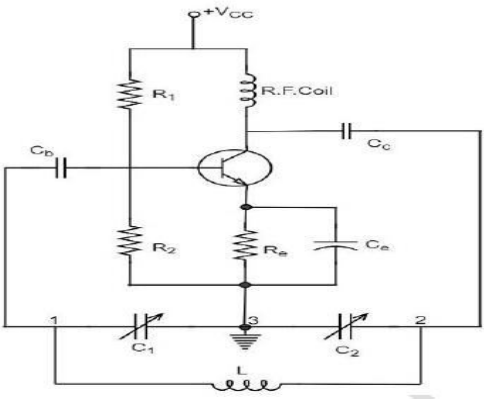
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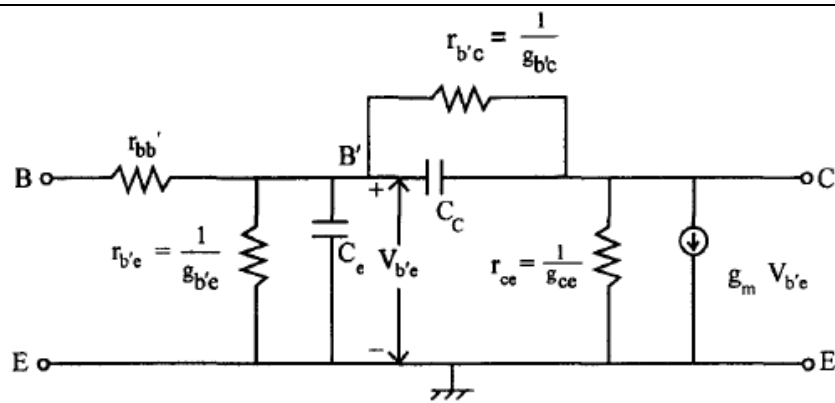
b) Compare different coupling Mechanisms.

4

Parameter	RC Coupled	Transformer Coupled	Direct Coupled
Coupling Components	Resistor and Capacitor	Impedance matching transformer	-
Block DC	Yes	Yes	No
Frequency response	Flat at middle frequencies	Not uniform, high at resonant frequency and low at other frequencies	Flat at middle frequencies and improvement in the low frequency response
Impedance matching	Not achieved	Achieved	Not achieved
DC amplification	No	No	Yes
Weight	Light	Bulky and heavy	
Drift	Not present	Not present	Present
Hum	Not present	Present	Not present
Application	Used in all audio small signal amplifiers. Used in record players, tape recorders, public address systems, radio receivers and television receivers.	Used in amplifier where impedance matching is an important criteria. Used in the output stage of the public address system to match the impedance of loudspeaker. Used in the RF amplifier stage of the receiver as a tuned voltage amplifier.	Used in amplification of slow varying parameters and where DC amplification is required.

4	<p>a) Sketch two stage RC coupled Amplifier and explain its working.</p>  <p>Operation and Analysis ---4M</p> <p><b>At low frequencies:</b> At low frequencies the gain decreases with decreasing frequency due to coupling capacitor <math>C</math>, because at low frequencies the reactance of this capacitor is very high and increases with decrease in frequency, i.e. net input voltage reaching from one stage to the next stage decreases and hence the voltage gain decreases.</p> <p><b>At mid frequencies:</b> In the middle frequency range the voltage gain of the amplifier is uniform because resistor values are independent of frequency changes.</p> <p><b>At high frequencies:</b> At high frequency the gain of the amplifier again decreases due to collector capacitance of transistor and stray wiring capacitance. These capacitances exhibit low resistance path to ground at high frequencies, i.e. most part of output is bypassed to earth. Consequently the output voltage of the amplifier decreases and hence the voltage gain falls at higher frequencies.</p>	7
5	<p>b) Discuss the method to select the transistor configuration in implementing cascading principle.</p>	3
5	<p>a) Define Barkhausen criterion</p>  $V_{\epsilon} = V_s + V_f \quad (1) \quad V_f = \beta V_o$ $V_o = A V_{\epsilon} = A(V_s + V_f)$ $\Rightarrow \frac{V_o}{V_s} = \frac{A}{1 - A\beta}$ <p>If <math>V_s = 0</math>, the only way that <math>V_o</math> can be nonzero is that <b>loop gain <math>A\beta=1</math></b> which implies that</p> $ A\beta  = 1 \quad (\text{Barkhausen Criterion})$ $\angle A\beta = 0$	2

	b)	<p>Draw the circuit of Weinbridge Oscillator and derive the expression for frequency of oscillations</p>  <p>Derivation of <math>f_o =</math></p>	8
6	a)	<p>Discuss the feedback applied in oscillators and derive the expression for gain of the oscillators</p> 	3
	b)	<p>Draw the circuit diagram of Colpitt's Oscillator and derive the expression for frequency of oscillations</p> <p><b>COLPITTS OSCILLATOR:</b></p>  <p>Derivation of <math>f_o =</math></p>	7
7.	a)	<p>Draw the circuit of Hybrid pi model of CE amplifier and explain role of each hybrid pi component (hybrid pi resistances and capacitances).</p>	5



**Hybrid -  $\pi$  C.E BJT Model**

Analysis of this circuit gives satisfactory results at all frequencies not only at high frequencies but also at low frequencies. All the parameters are assumed to be independent of frequency.

Where

$B'$  = internal node in base

$r_{bb'}$  = Base spreading resistance

$r_{b'e}$  = Internal base node to emitter resistance

$r_{ce}$  = collector to emitter resistance

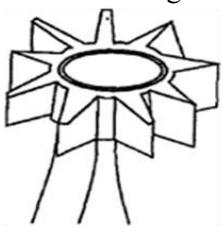
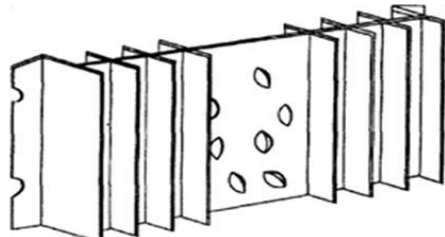
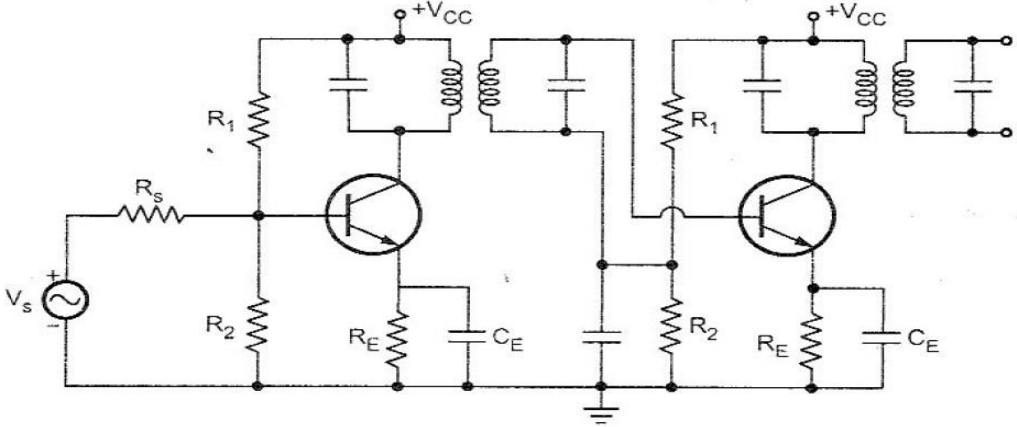
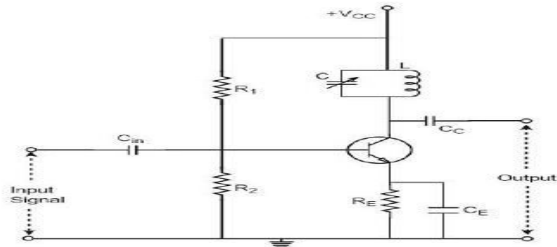
$C_c$  = Diffusion capacitance of emitter base junction

$r_{b'c}$  = Feedback resistance from internal base node to collector node

$g_m$  = Transconductance

$C_c$  = transition or space charge capacitance of base collector junction

	b)	Derive the expression for hybrid pi conductance.	5
8	a)	What is the relationship between $f_T$ and $f_\beta$ ? Discuss the significance of $f_T$ .	4
	b)	Determine the hybrid $-\pi$ parameters of a Transistor operating at Collector Current $I_C(Q)=2\text{mA}$ , $V_{CE}(Q)=20\text{V}$ and $I_B(Q)=20\mu\text{A}$ .  Transistor specifications are $\beta=100$ , unity gain frequency $f_T=50\text{MHz}$ , $C_c=3\text{pF}$ , $h_{ie}=1.4\text{K}\Omega$ , $h_{re}=2.5 \times 10^{-4}$ , $h_{oe}=25\mu\text{mhos}$ . Assume that the Operating temperature is $3000\text{K}$ .	6
9.	a)	circuit of series fed Class A power amplifier –3M  Expression for efficiency -3M	6
	b)	Different categories power amplifiers  Class A: It is one, in which the active device conducts for the full $360^\circ$ . Class B: Conduction for $180^\circ$ . Class C: Conduction for $< 180^\circ$ . Class AB :Conduction angle is between $180^\circ$ . and $360^\circ$ . Class D: These are used in transmitters because their efficiency is high: 100%. Class S:Switching regulators are based on class'S' operation	4
10.	a)	Derive the expression for efficiency of Class B Push pull power amplifier	6
	b)	Discuss the concept of heat sink <ul style="list-style-type: none"> <li>The metal sheet that serves to dissipate the additional heat from the power transistor is known as <b>heat sink</b>.</li> <li>The purpose of heat sinks is to keep the operating temperature of the transistor low, to prevent thermal breakdown.</li> <li>Almost the entire heat in a transistor is produced at the collector-base junction. If the temperature exceeds the permissible limit, this junction is destroyed and the transistor is rendered useless.</li> </ul>	4

		<ul style="list-style-type: none"> <li>Most of power is dissipated at the collector-base junction.</li> </ul> <p>This is because collector-base voltage is much greater than the base-emitter voltage, although currents through the two junctions are almost the same</p> <div>   </div>	
11.	a)	<p>What is a tuned amplifier and how do you classify tuned amplifier. Briefly explain.</p> <p>Tuned amplifiers are the amplifiers that are employed for the purpose of <b>tuning</b>. Tuning means selecting. Among a set of frequencies available, if there occurs a need to select a particular frequency, while rejecting all other frequencies, such a process is called <b>Selection</b>. This selection is done by using a circuit called as <b>Tuned circuit</b>.</p> <p>When an amplifier circuit has its load replaced by a tuned circuit, such an amplifier can be called as a <b>Tuned amplifier circuit</b>. The basic tuned amplifier circuit looks as shown below.</p>	5
	b)	<p>Discuss the operation of stagger tuned amplifiers with neat diagram.</p> 	5
12.	a)	<p>Derive the expressions for Bandwidth and Q-factor of single tuned, capacitively coupled amplifiers. List the assumptions made for the derivation</p> 	8
	b)	<p>Define selectivity in tuned amplifiers.</p>	2

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		<b>Marks</b>	<b>CO</b>	<b>BTL</b>
<b><u>UNIT-I</u></b>				
1.	a) Explain about expression evaluation with an example.	5	1	2
	b) Write a program to find smallest of three numbers.	5	1	3
<b>(OR)</b>				
2.	a) Explain about if statements with syntax.	5	1	2
	b) Write a program to check the given number is Armstrong or not.	5	1	3
<b><u>UNIT-II</u></b>				
3.	a) Distinguish between mutable and immutable data types.	5	2	2
	b) Explain various built-in functions.	5	2	2
<b>(OR)</b>				
4.	a) Differentiate between List and Tuple in Python.	5	2	2
	b) List out Dictionary methods and explain any four.	5	2	2
<b><u>UNIT-III</u></b>				
5.	a) Explain how a function is defined with syntax and example.	5	3	2
	b) Write a Python program to find factorial of a given number using function.	5	3	3
<b>(OR)</b>				
6.	a) Describe the different access modes of the files with an example.	5	3	2
	b) Write a program to read and display the content of a file.	5	3	3
<b><u>UNIT-IV</u></b>				
7.	a) What is a Module? How to import Module attributes in Python?	5	4	1
	b) How does Python handle namespaces to avoid variable conflicts?	5	4	1
<b>(OR)</b>				
8.	a) How to create Package and sub-package in Python explain with an example.	5	4	2
	b) Write a Python program to define a module to find Fibonacci numbers and import the module to another program.	5	4	3
<b><u>UNIT-V</u></b>				
9.	a) Explain about Principles of Object Oriented Programming.	5	5	2
	b) Discuss the steps to create a Class consists of attributes and methods in Python.	5	5	2
<b>(OR)</b>				
10.	a) Define Inheritance and Explain Multiple Inheritance with an example.	5	5	2
	b) Describe the database connectivity with Python program by using an example.	5	5	2
<b><u>UNIT-VI</u></b>				
11.	a) Write about special symbols and characters in Python Regular expressions.	5	6	2
	b) Discuss the following methods. i) search( ) ii) split( ) iii) match( )	5	6	2
<b>(OR)</b>				
12.	a) Write a Python program to check that a string contains only a certain set of characters (in this case a-z, A-Z and 0-9).	5	6	3
	b) Write a Python program that extracts all lowercase characters from a string using Regular Expressions.	5	6	3

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

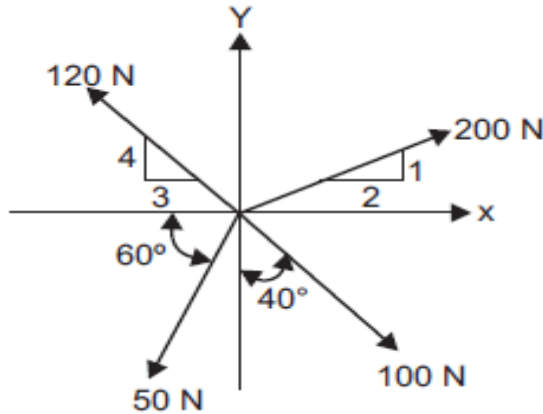
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

Marks	CO	Blooms Level
8M	1	L3

1. a) A system of four forces acting on a body is shown in Figure, Determine the resultant force.

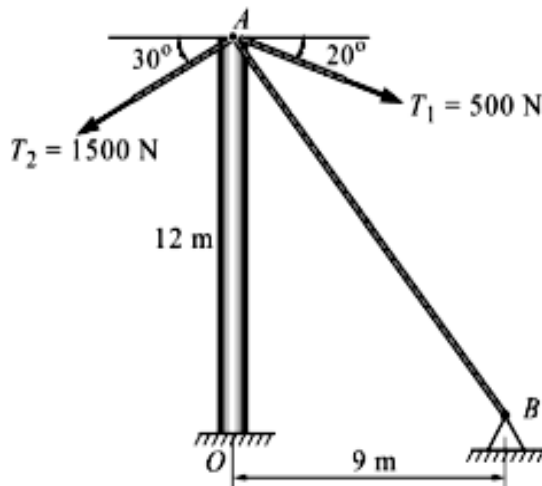


- b) State the law of parallelogram of forces.

2M	1	L2
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(OR)

2. a) The top end of a vertical post is connected by two cables having tension  $T_1 = 500\text{N}$  and  $T_2 = 1500\text{N}$  as shown in figure. The third cable AB is used as a guy wire. Determine the tension in cable AB if the resultant of the three concurrent forces acting at A is vertical. Also find the resultant.



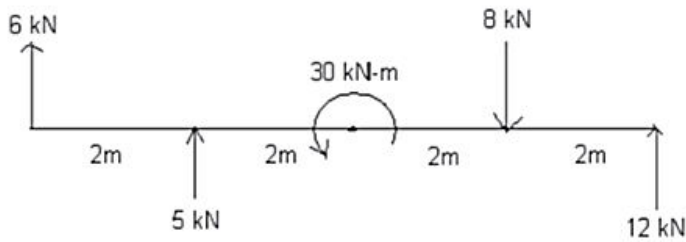
- b) Write the two equilibrium equations for a coplanar force system.

2M	1	L2
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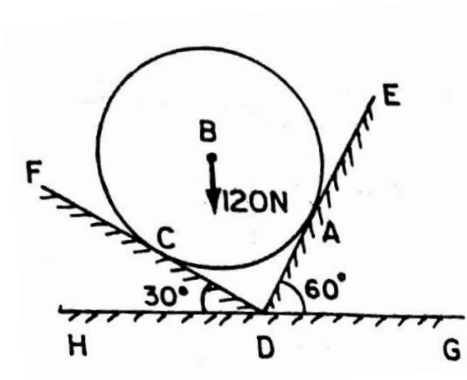
## UNIT-II

3. State Varignon's theorem. Determine and locate the resultant  $R$  of the forces and couple acting on the beam as shown in diagram 10 M 2 L3



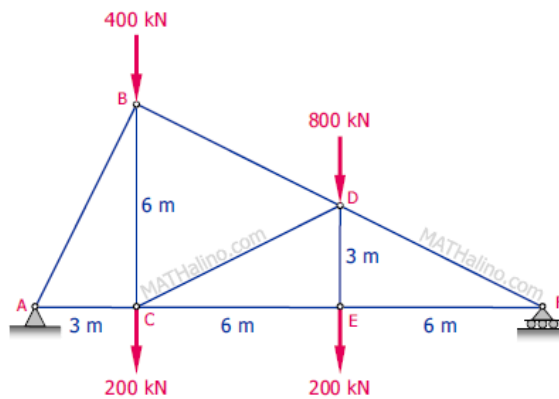
(OR)

4. A ball of weight 120 N rests in a right-angled groove, as shown in figure. The sides of the groove are inclined to an angle of  $30^\circ$  and  $60^\circ$  to the horizontal. If all the surfaces are smooth then determine the reactions at all contact points. 10 M 2 L3



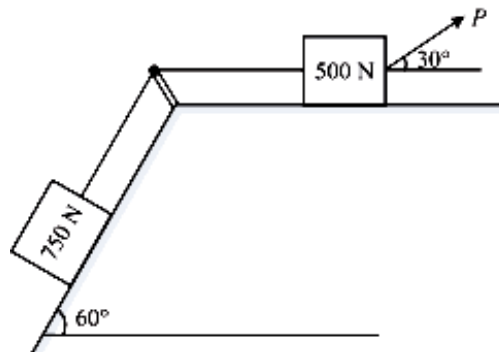
## UNIT-III

5. Find the forces in all the members of the truss as shown in Figure and tabulate the results. 10 M 3 L3



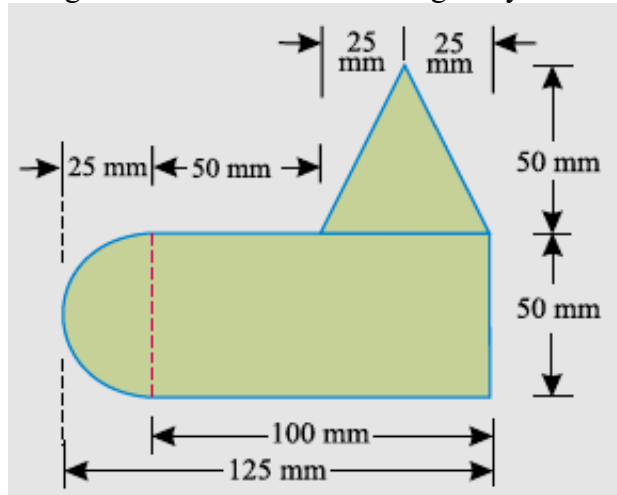
(OR)

6. What is the value of  $P$  in the system shown in figure to cause the motion of 500 N block to the right side? Assume the pulley is smooth and the coefficient of friction between other contact surfaces is 0.2. 10 M 3 L3



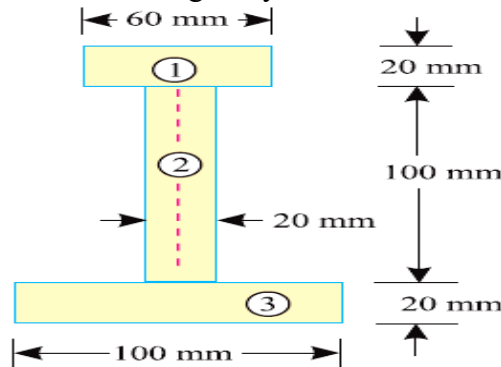
### UNIT-IV

7. A uniform lamina shown in Figure consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. 10 M    4    L3



(OR)

8. An I-section is made up of three rectangles as shown in Figure. Find the moment of inertia of the section about the horizontal axis passing through the centre of gravity of the section. 10 M    4    L3



### UNIT-V

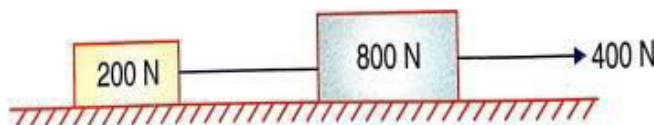
9. A ball is dropped from the top of a tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15 m/sec. When and where do they cross and with what relative velocity? 10 M    5    L3

(OR)

10. The velocity of particle moving in a straight line is given by the expression  $V = t^3 - t^2 - 2t + 2$ . The particle is found to be at a distance of 4 meters from station A after 2 seconds. Determine the (1) Acceleration and (2) Displacement 10 M    5    L3

### UNIT-VI

11. Two blocks of weights 800 N and 200 N are connected by a string and move along a rough horizontal surface when force of 400 N is applied to the block of 800 N weight as shown figure. Apply D'Alembert's principle to determine the acceleration of the blocks and tension in the string. Assume that coefficient of friction between the sliding surface of the blocks and the plane is 0.3. 10 M    6    L3



(OR)

12. Write a short notes on (a) De Alembert's Principle (b) Work Energy principle 10 M    6    L2