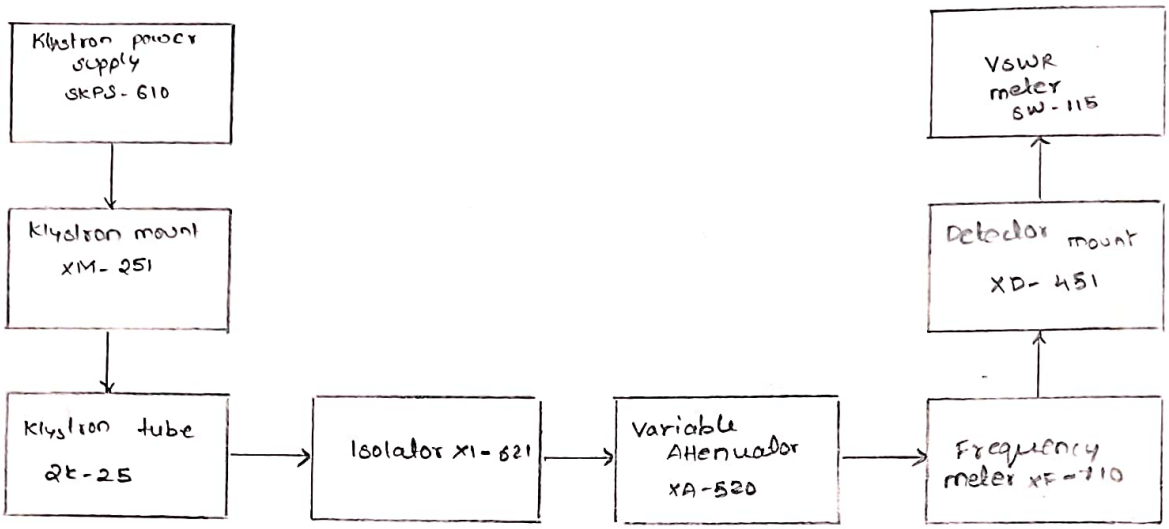
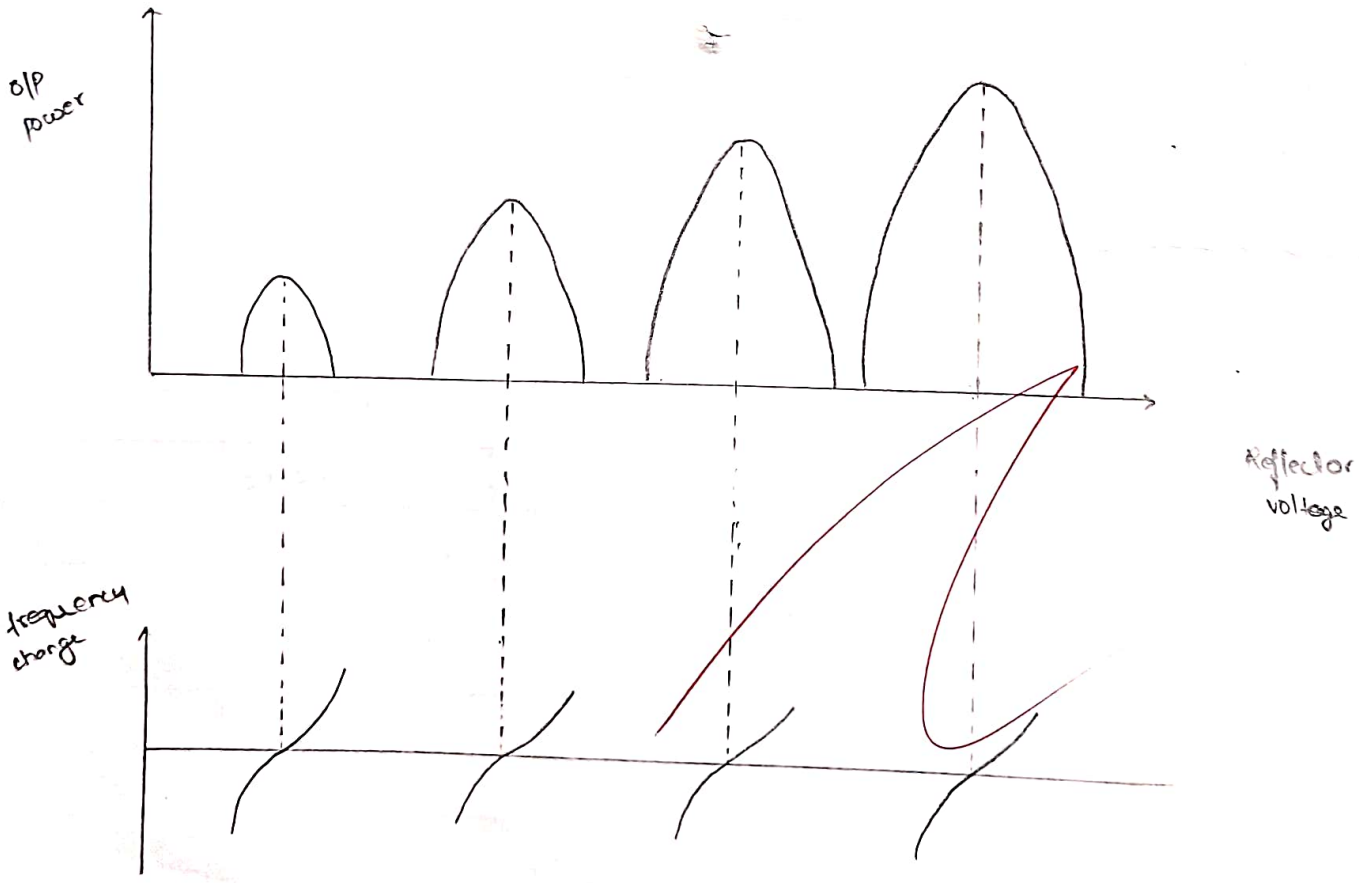

Klystron power supply SKPS-610
Klystron mount XM-251
Klystron tube 2K-25
Isolator XI-621
Variable Attenuator XA-520
Frequency meter XF-710
Detector mount XD-451
VSWR meter SW-115


o/p power
Reflector voltage
frequency change

28/01/24

EXP:1

REFLEX KLYSTRON CHARACTERISTICS

Aim:

To study the characteristics of the reflex Klystron tube and to determine its electronic tuning range.

Apparatus

(i) Klystron power supply SKPS - 610
(ii) Klystron tube 2K25
(iii) Klystron mount XM-251
(iv) Isolator XI - 621
(v) Frequency meter XF-710
(vi) Variable attenuator XA-520
(vii) Detector mount XD-451
(viii) Waveguide stands X4-535
(ix) VSWR meter SW-215

Tabulation

Repeller voltage	o/p voltage	Frequency (GHz)
-10	0	0
-15	1	8.44
-20	0	0
-25	0	0
-30	2	8.45
-40	0	0
-45	0	0
-50	4	8.45
-60	0	0

Procedure

(i) Connect the components and equipments as shown.

(ii) Set the variable attenuator at minimum position.

(iii) Switch 'ON' the power supply, VSWR meter and cooling fan.

(iv) Put 'ON' the beam voltage switch and rotate the beam voltage knob clockwise in supply slowly and watch VSWR meter set the voltage for maximum deflection on the meter.

(v) Change the repeller voltage slowly & watch the VSWR meter. Set the voltage for maximum deflection on the meter.

(vi) Rotate the knob of frequency meter between two horizontal fine marks.

(vii) Change the repeller voltage and read the power and frequency for each repeller voltage.

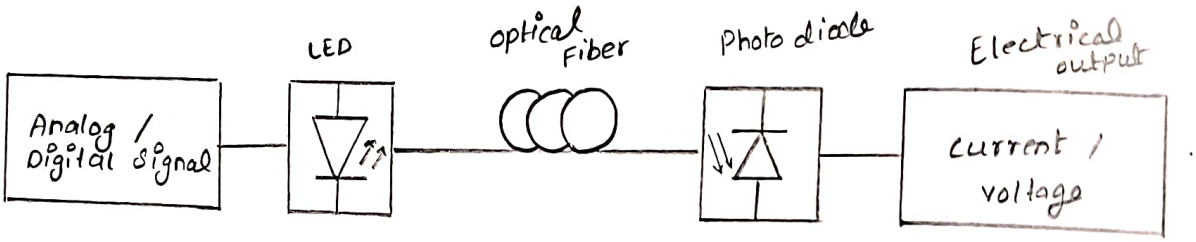
Result:

Hence the characteristics of the reflex-klystron has been studied.

The tuning range of $1\frac{3}{4}$ mode is

Inferences:

The power o/p is high in the first mode of operation of the reflex klystron. Tuning range is achieved for different modes of operation as the repeller voltage increases the power output also increases.


LED
optical Fiber
Photo diode
Electrical output
Analog / digital signal
current / voltage

12/03/24

EXP - 8

DC characteristic of LED

Aim: To study the V-I and P-I characteristics of LED.

Materials Required:

(i) VOFT - 07A Trainer - 01

(ii) Digital multimeter - 02

(iii) Power meter (optional) - 01

Tabulation

V_D (V)	I_D (mA)	P=VI
1.8	1	1.8
2.2	4.2	9.24
2.8	9	25.2
8.2	12.1	88.72
8.8	17.2	65.36
4.2	20.3	85.26
4.4	21.9	96.36

Procedure:

(i) construct the equipment

(ii) switch ON the power supply using IR switch

(iii) set SPDT switch in OFF position.

(iv) Turn the POT 1 to minimum level.

(v) Now measure the diode series resistance at P1 and P3

Diode series resistance R = Total resistance - 660Ω

(vi) switch on the SPDT switch and measure series voltage across resistor (V_R) at P1 and P3.

(vii) calculate the diode current $I = V_R / R$

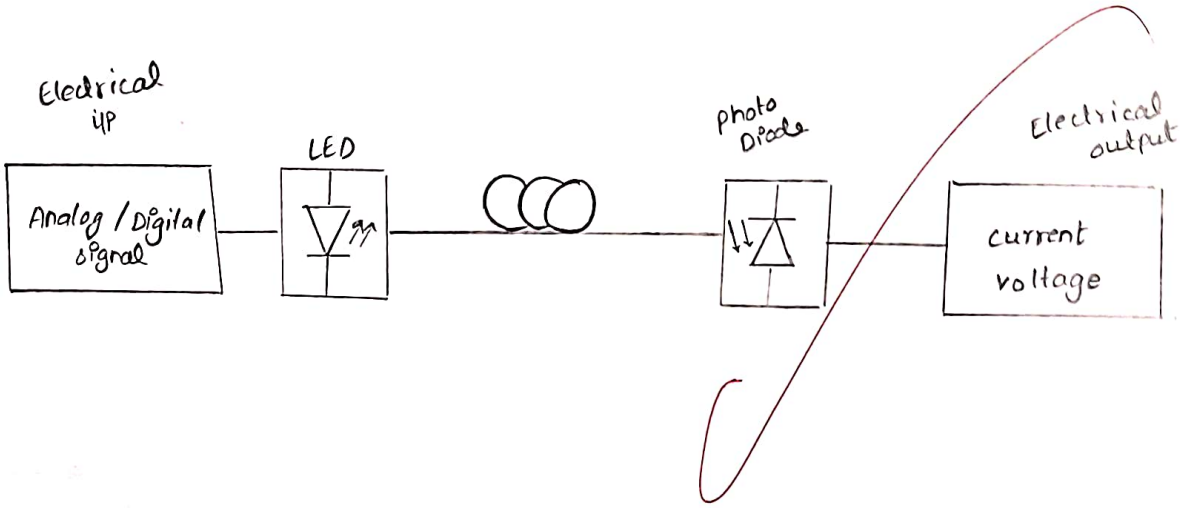
(viii) Measure the voltage across diode.

(ix) Now step by step vary POT 1 minimum level to maximum level and note down the corresponding readings.

(x) Now plot the graph for voltage across diode V_D Vs current.

Result:

Thus the VI and PI characteristics of LED is plotted in the graph.


Electrical i/p
Analog / Digital signal
LED
photo Diode
Electrical output
current voltage

19/03/24

EXP - 9.1

DC CHARACTERISTICS OF PIN PHOTODIODE

Aim

To study the characteristic of the given Photo Detector at zero-bias, Forward bias and reverse bias conditions.

Hardware Needed.

OFT power supply, A digital multi-meter, PD Module, Benchmark Fibre Optic Power source, Benchmark fibre optic power meter, 1m Patch cord (PS TO - PC - 1), 1 M, 10k resistors, 10k, 6.8k, 4.7 k, 8.3k, 3.9k, & 2.2k resistors, Ambient light arrester.

Vout (V)	Iout (μA)	P = V I
0.11	1.1	0.121
0.54	5.5	2.97
1.22	12.4	15.128
1.67	17.0	28.39
2.4	24.6	59.04
2.8	29.3	82.04
3.09	81.4	97.026

Procedure:

(i) Photo detector at zero bias

* Put 1M ohm resistor across V_L.
* connect the ST connector end of the patch cord supplied with the module to the power source.
* Vary the optional power P from -18dBm approx. in steps of 5dBm. To reduce the power more than what the power source can attenuate remove the ST connector to the patch cord. sightly is connected to the power source.

(ii) Photo detector at FB

* Put 10K resistor across V_L.
* Adjust the potentiometer and fix the bias voltage at 10V.
* Connect the ST connector end of the patch cord supplied with the module power source.
* Plot the graph P vs I_L.
* Now fix the power launched as -20dB
* Tabulate the values & plot the graph V_{BIAS} vs I_L.

(iii) Photodetector at RB

(i) Put 10 K resistor across V_L.

(ii) Adjust the potentiometer and fix the bias voltage at 10V.

(iii) connect the ST connector end of the patch cord supplied with the module to the power source.

(iv) $R\lambda = V_L / (R_L * P_s)$ A/W

where P_s is the power in W

(v) Avg of $R\lambda$

$$\eta = R\lambda \, h\gamma / e \times 100\%$$

$h = 6.624 \times 10^{-34}$ Js

$\gamma = c/\lambda = 3 \times 10^8 / 850 \times 10^{-9}$ Hz

$e = 1.6 \times 10^{-19}$ C

(vi) Repeat the above steps for various R_L = 0.8K, 4.7K, 3.9K, 22K.

Result: Thus the V-I characteristic of PIN photodiode has been studied and following parameters are determined.

$R\lambda$ =

η =