ERTR
EXTC

Sem III
C.B.G.S.
AM. III

27/11/15

QP Code : 5106

(Revised course)

Time :3 hours Total marks :80

N.B : (1) Question No.1 is compulsory.
(2) Answer any three questions from remaining.
(3) Assume suitable data if necessary.

1. (a) Evaluate $\int_0^\infty e^{-t}\left(\frac{\cos 3t - \cos 2t}{t}\right)dt$ 05

(b) Obtain the Fourier Series expression for $f(x) = 2x - 1$ in (0,3) 05

(c) Find the value of 'p' such that the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{py}{x}\right)$ is analytic. 05

(d) If $\bar{F} = (y\sin z - \sin x)\hat{i} + (x\sin z + 2yz)\hat{j} + (xy\cos z + y^2)\hat{k}$.
Show that $\bar{F}$ is irrotational .Also find its scalar potential. 05

2. (a) Solve the differential equation using Laplace Transform 06

$\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 3te^{-t}$, given y(0)=4 and y'(0)=2

(b) Prove that 06

$J_4(x) = \left(\frac{48}{x^3} - \frac{8}{x}\right)J_1(x) - \left(\frac{24}{x^2} - 1\right)J_0(x)$

(c) i) In what direction is the directional derivative of $\phi = x^2y^2z^4$ at (3,-1,-2) maximum. Find its magnitude. 08
ii) If $\bar{r} = x\hat{i} + y\hat{j} + z\hat{k}$
Prove that $\nabla r^n = nr^{n-2}\bar{r}$

[TURN OVER

MD-Con. 8331 -15.

3. (a) Obtain the Fourier Series expansion for the function 06

$$f(x)=1+\frac{2x}{\pi}, -\pi \le x \le 0$$

$$=1-\frac{2x}{\pi}, 0 \le x \le \pi$$

(b) Find an analytic function f(z) =u+iv where. 06

$$u-v=\frac{x-y}{x^2+4xy+y^2}$$

(c) Find Laplace transform of 08

i) $\cosh t \int_0^t e^u \sinh u$

ii) $t\sqrt{1+\sin t}$

4. (a) Obtain the complex form of Fourier series for 06

$f(x)=e^{ax}$ in (-L,L)

(b) Prove that 06

$$\int x^4 J_1(x)dx = x^4 J_1(x) - 2x^3 J_3(x) + c$$

(c) Find 08

i) $L^{-1}\left[\frac{2s-1}{s^2+4s+29}\right]$

ii) $L^{-1}\left[\cot^{-1}\left(\frac{s+3}{2}\right)\right]$

5. (a) Find the Bi- linear Transformation which maps the points 1,i,-1 of z plane onto 0,1,∞ of w-plane 06

(b) Using Convolution theorem find 06

$$L^{-1}\left[\frac{s^2}{(s^2+4)^2}\right]$$

SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDHERI (W), MUMBAI-400 058 PH:

(c) Verify Green's Theorem for $\int_C \overline{F}.\overline{dr}$ where 08

$\overline{F} = (x^2 - y^2)\hat{i} + (x+y)\hat{j}$ and C is the triangle with vertices (0,0) ,(1,1) and (2,1)

6. (a) Obtain half range sine series for 06

$f(x) = x, 0 \le x \le 2$

$= 4 - x, 2 \le x \le 4$

(b) Prove that the transformation 06

$w = \frac{1}{z+i}$ transforms the real axis of the z-plane into a circle in the w-plane.

(c) i) Use Stoke's Theorem to evaluate $\int_C \overline{F}.\overline{dr}$ where 08

$\overline{F} = (x^2 - y^2)\hat{i} + 2xy\hat{j}$ and C is the rectangle in the plane z=0,bounded by x=0,y=0,x=a and y=b.

ii) Use Gauss Divergence Theorem to evaluate $\iint_S \overline{F}.\hat{n}ds$ where $\overline{F} = 4x\hat{i} + 3y\hat{j} - 2z\hat{k}$ and S is the surface bounded by x=0,y=0,z=0 and 2x+2y+z=4

S.E. EXTC (III)(CBUS)

16/12/15

CTL

QP Code : **5262**

(3 Hours) **[Total Marks : 80**

N. B. : (1) Attempt question 1 and any **three** from remaining question.
(2) All sub questions of the same question should be answered at one place only in their serial orders and not scattered.
(3) Write every thing in inkonly. Pencil is not allowed.
(4) Assume suitable data with justification if missing.

1. (a) Determine the ABCD parameter of the network shown in fig. No. 1(a) **5**

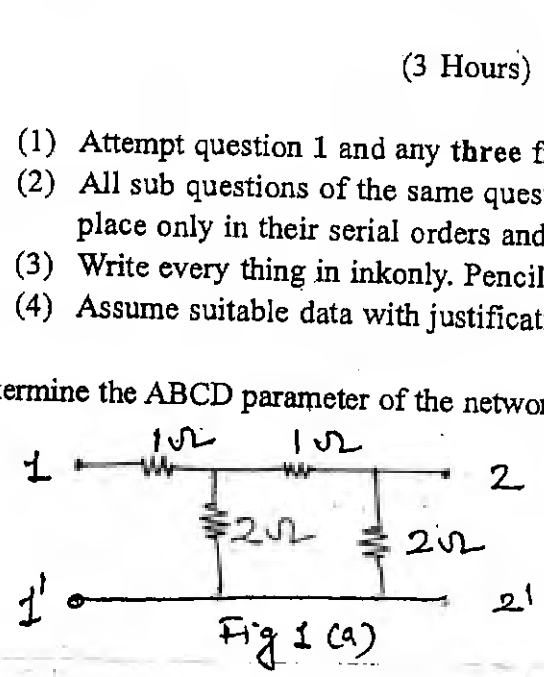


Fig 1 (a)

(b) Test whether $P(s) = S^5 + 12S^4 + 45S^3 + 60S^2 + 44S + 48$ is Hurwitz polynomial. **5**

(c) The combined inductance of two coils connected in series is 0.6 H or 0.1 H depending on relative directions of currents in the two coils. If one of the coils has a self inductance of 0.2 H. Find (a) Mutual inductance (b) Coefficient of coupling. **5**

(d) Find Foster I and II and Cauer I and II Circuits for the driving point admittance **5**

$$y(s)=\frac{S^2+1}{S}$$

2. (a) Find the current in the 10Ω resistor using Thevenin's theorem for the network shown in fig. 2(a) **10**

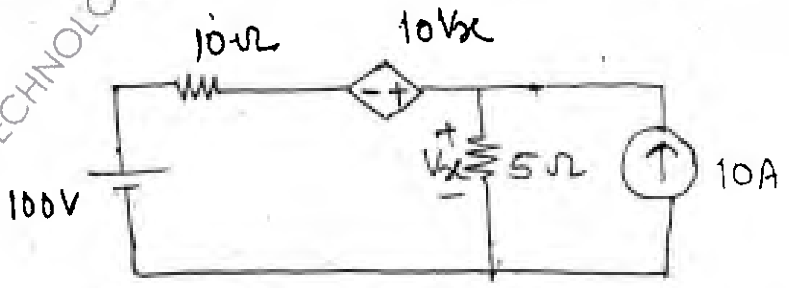


Fig. 2(a)

SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDHERI (W)

(b) Find the value of Vx in the network shown in fig 2(b) using nodal analysis. 5

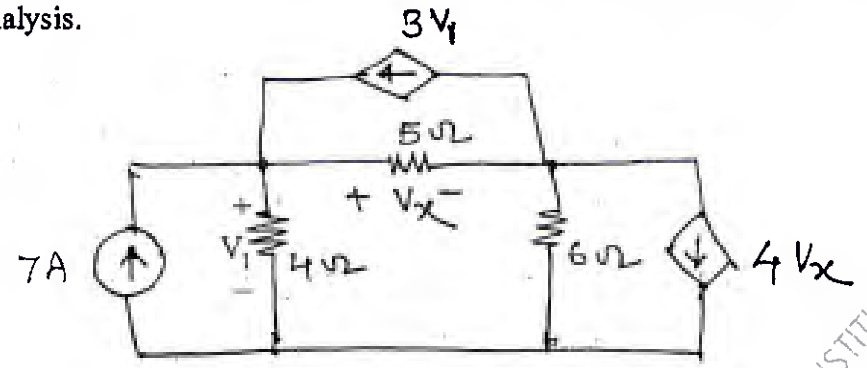


Fig 2 (b)

(c) Check if the following polynomials are Hurwitz polynomials 5

(i) $S^5 + S^3 + S$

(ii) $S^4 + S^3 + 2S^2 + 3S + 2$

3. (a) Synthesize the driving point function 10

$$F(s)=\frac{(S^2+1)\ (S^2+3)}{S(S^2+2)}$$ when F(s) is a driving point (i) Impedence (ii) Admittance

Test if the circuit obtained are canonic.

(b) State and prove initial value theorem. 5

(c) The parameters of a transmissionlines are R = 6Ω/km, L = 2.2 mH/km G = 0.25×10^{-6} ℧/km, C = 0.005×10^{-6} F/km. Determine the characteristics impedence and propagation constant at a frequency of 1 GHz. 5

4. (a) Determine z and y parameters of the network shown in fig 4(a). 10

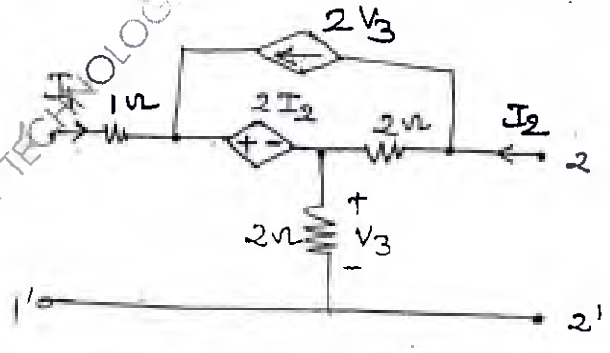


fig 4 (a)

[TURN OVER

SARDAR PATEL INSTITUTE OF TECHNOLOGY ANDHERI (W) 21/8/2015 2:03:17 PM SARDAR PATEL INSTITUTE OF TECHNOLOGY, AN

(b) Determine the voltage transfer function $\frac{V_2}{V_1}$ for the network shown in fig. 4(b). 5

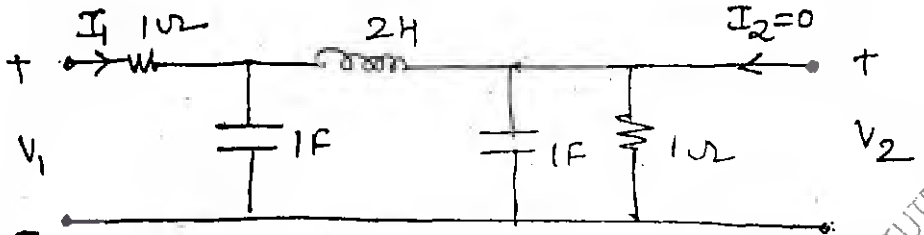


Fig 4(b)

(c) Test whether $F(s)=\frac{2S^3+2S^2+3S+2}{S^2+1}$ is a positive Real Function. 5

5. (a) The network shown in fig 5(a), a steady state is reached with the switch open. At t=0 the switch is closed. Determine $V_C(0^-)$, $i_1(0^+)$ $i_2(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{di_2}{dt}(0^+)$ 10

Fig 5 (a)

(b) Find the voltage across the 5Ω resistor in network shown in fig. 5(b). 5

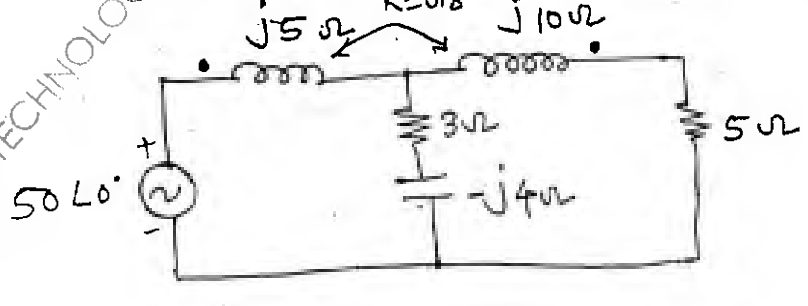


Fig 5 (b)

SARDAR PATEL INSTITUTE OF TECHNOLOGY AND

(c) Find the function v(t) using the pole-zero plot of the following function. 5

$$V(s) = \frac{(S+2)\ (S+6)}{(S+1)\ (S+5)}$$

6. (a) A unit impulse applied to two terminal black box produces a voltage $V_o(t) = 2e^{-t} - e^{-3t}$. Determine the terminal voltage when a current pulse of 1A height and a duration of 2 seconds is applied at the terminal. 10

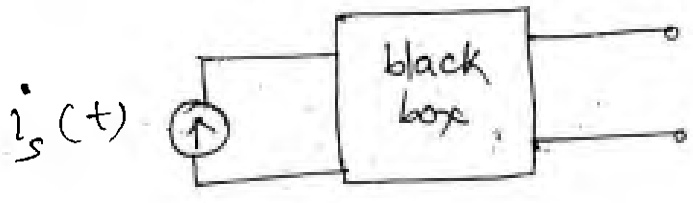


fig 6.(a)

(b) Determine the driving point impedence of the network shown in fig. 6(b) 5

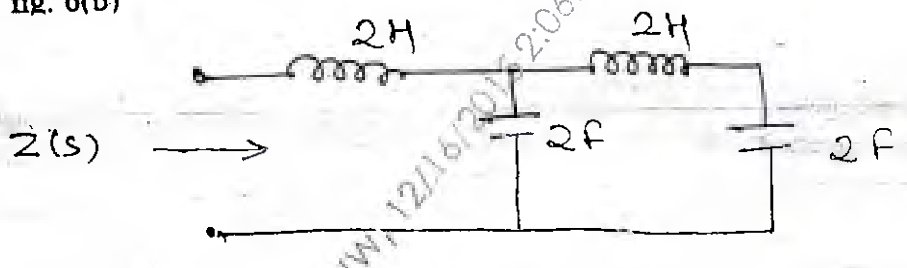


fig 6 (6)

(c) Draw the following normalized quantities on the smith chart. 5

(i) $(2 + j2)\ \Omega$ (ii) $(4 - j2)\ \Omega$

(iii) $(1.0)\ \Omega$ (iv) $(j1.0)\ \Omega$

SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDHERI (W) 12/16/2016 2:06:03 PM SARDAR PATEL INSTITUTE OF TECHNOLOGY AND

S.E. EXTC Sem III (CBSJ). 3/12/15

Digital Electronics

QP Code : 5174

(3 Hours) Total Marks: 80

N.B. (1) Question No. 1 is **Compulsory**
(2) Out of remaining questions, attempt **any three**
(3) **Assume** suitable data if required
(4) Figures to the right indicate **full marks**

1. **(a)** Compare SRAM and DRAM [5]
(b) Compare Mealy and Moore machine [5]
(c) Compare TTL and CMOS Logic [5]
(d) Design a full adder using 3:8 decoder [5]

2. **(a)** State and Prove DeMorgan's Laws [10]
(b) Explain carry look ahead adder. What is its advantage over a simple adder [10]

3. **(a)** Design a 4 bit Grey to Binary code converter [10]
(b) Implement the given function using 8:1 Multiplexer [10]
$F(A, B, C, D) = \sum m(0,1,4,5,6,8,10,12,13)$

4. **(a)** Explain the working of Bidirectional Shift register with proper timing diagram [10]
(b) Write a VHDL program to design a 1:8 Demux using Data flow modeling [10]

5. **(a)** Minimize the following expression using Quine McClusky Technique [10]
$F(A,B,C,D) = \sum m(1,2,5,7,9,15) + d(0,3,11)$
(b) Convert D FF to T FF and SR FF to JK FF [10]

6. **(a)** Design synchronous counter to count the sequence 0-1-2-3-4-5-0 [10]
(b) Compare PAL with PLA with suitable examples of logic expressions [10]

SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDH

S.E. EXTC (III) (CBGS)

9/12/15

EIM

QP Code : 5223

Time: 3 Hours MM: 80 Marks

Note: 1. Attempt four questions, question no 1 is compulsory.
2. Assume suitable data where ever required.
3. Answers to the questions should be grouped together.
4. Figure to the right of question indicates full marks.

Q1) Attempt any four: (20)

a) Significance of four and half digit display
b) Discuss Megger for measurement of very high resistance.
c) Explain working of strain gauge and its application in load measurement
d) Explain working of thermocouple and mention its range
e) Explain error in measurement and methods of error minimization
f) A galvanometer, with a 1 mA full scale deflection and an internal resistance of 500 Ω, is to be used as voltmeter, find series resistance for 1V and 10 v ranges.

Q2 a) Draw and explain working of capacitive transducer for level measurement. (10)
b) Draw neat block diagram of CRO and explain its functioning, comment on role of delay line in CRO. (10)

Q3 a) Discuss DSO with the help of block diagram along with various modes of operation also explain its applications. (10)
b) Explain LVDT and define its application in displacement measurement. (10)

Q4 a) Explain Hetrodyne type waves analyser and its applications. (10)
b) Draw and explain Weighted resistor network type DAC for 3 bits input taking suitable example. (10)

Q5 a) Draw and explain Schering bridge and drive expression for measurement of capacitance. (10)
b) Define power and energy and explain working of a single phase energy meter. (10)

Q6 a) Draw and explain Wheatstone bridge and drive expression for measurement of resistance. (10)
b) Explain Flash type 3 bit ADC with the help of block diagram and comment on its speed. (10)

MD-Con. 10472-15.

SARDAR PATEL INSTITUTE OF TECHNOLOGY, ANDHERI (W) 29/2015 2:03 PM

S.E. Sem III (CBGS) (EXTC) 20/11/15

A-E-I

Q.P. Code : **5079**

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **three** questions out of the remaining **five** questions.
(3) Assume suitable **data** wherever required

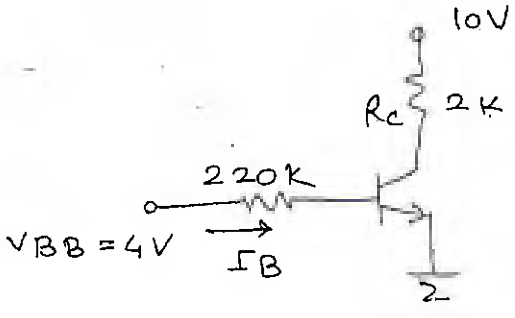
1. Attempt any **four**. 20

(a) Draw Input and Output characteristics of BJT in common emitter configuration.

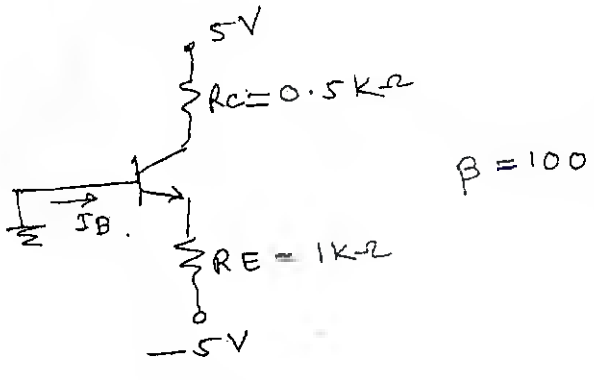
(b) Draw small signal hybrid π equivalent circuit for npn transistor.

(c) Explain effect of temperature on JFET and derive equation for zero current drift.

(d) Calculate I_B, I_C & V_{CE} for common emitter circuit.



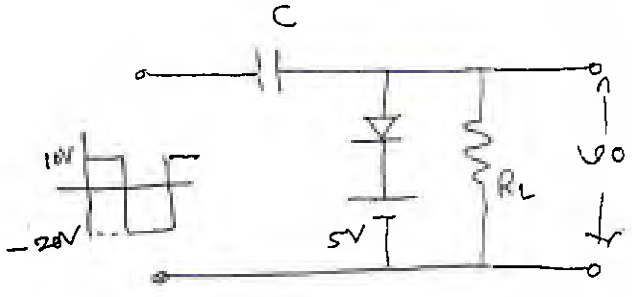
(e) Find I_B, I_C & V_{CE} for following circuit.



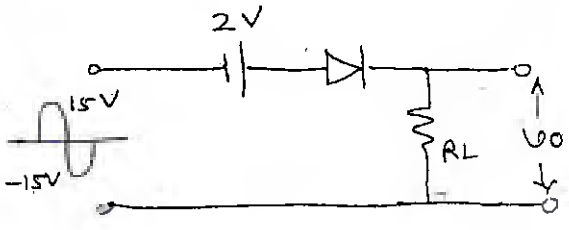
[TURN OVER

2. (a) Draw output waveform for clamper and clipper circuits. 10

(i)

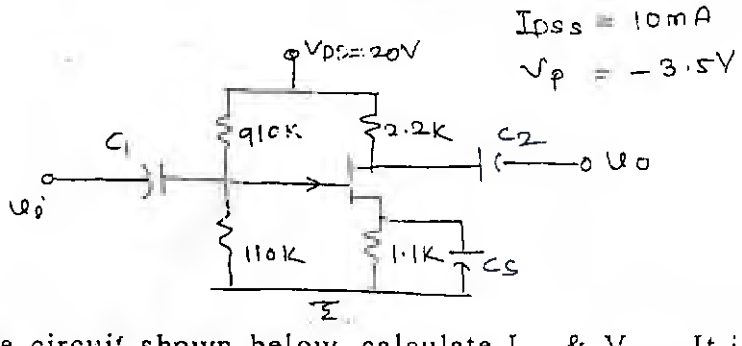


(ii)

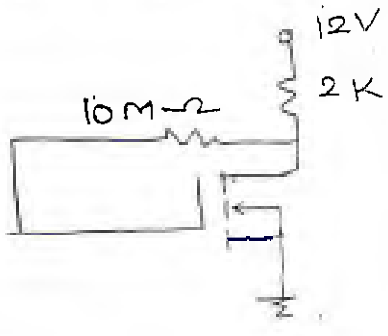


(b) Explain construction & characteristics of n channel Ehancement MOSFET. Draw transfer characteristics & drain characteristics. 10

3. (a) For JFET-amplifier shown below, Calculate Av, Zi, Zo 10



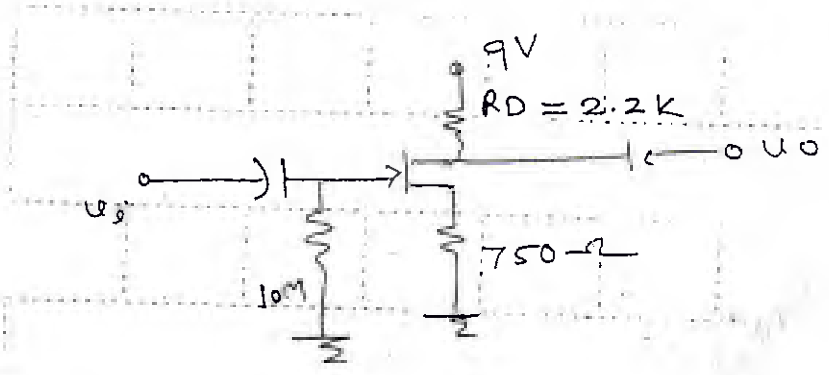
(b) For the circuit shown below, calculate I_{DQ} & V_{DSQ}. It is given that $I_{D(ON)}$ = 6 mA, $V_{GS(ON)}$ = 8V. Vth = 3V 10



[TURN OVER

4. (a) Explain the working of Wein Bridge Oscillator. Derive the expression for frequency of oscillation for sustained oscillations. 10

   (b) Calculate voltage gain of FET amplifier. 10



$Y_{os} = 40\mu s$
$I_{DSS} = 8$ mA
V_{GS} off = -4V

5. (a) Draw & explain energy band diagram of MOS capacitor operating in 10
   (i) Accumulation
   (ii) Depletion
   (iii) Inversion mode

   (b) Draw emitter follower circuit and derive an expression for voltage gain Av. 10

6. (a) Draw circuit diagram for phase shift oscillator & derive an expression for frequency of oscillation. 10

   (b) Write short notes on any two. 10
   (i) Photodiodes
   (ii) LC oscillators
   (iii) Transistor as a switch
   (iv) Schottky diode.