Hall Ticket Number :										

R-17

Code: 7G334

II B.Tech. I Semester Supplementary Examinations May 2019

Analog Electronics-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Draw the CB amplifier Circuit and derive expressions for input impedance and voltage gain. 8M

   b) Draw the circuit diagram of Direct coupled of BJT amplifier. Discuss the effect of an emitter bypass capacitor on low frequency response. 6M

OR

2. a) Draw the circuit diagram of CE and derive the expressions for voltage and current gains and input and output impedances 7M

   b) What is the use of transformer coupling in the output of multistage amplifier? 7M

UNIT–II

3. a) Draw the circuit diagram of voltage series feedback. Derive the expressions for AV, RI and R0 for the circuit. 7M

   b) Draw the frequency response of an amplifier without and with feedback and show the band width for each case. 7M

OR

4. a) An amplifier with negative feedback give an output of 13V with an input of 2 V. when feedback is removed it requires 0.25 V input for the same output. Find (i) The value of voltage gain without feedback. (ii) Value of β, if the input and output are in phase and β is real. 7M

   b) Compare the feedback topologies with respect to Rif and Rof. 7M

UNIT–III

5. a) Draw the circuit diagram of Colpitts oscillator and explain its working. Derive the Expression for frequency of oscillation. 7M

   b) In a transistorized Hartley oscillator the two inductances are 2mH and 20μH while the frequency is to be changed from 900kHz to 2100 kHz. Calculate the range over which the capacitor is to be varied. 7M

OR

6. a) Draw the circuit diagram of Wien bridge and Explain its working. Derive the Expression for frequency of oscillation. 7M

   b) Explain briefly about Frequency and Amplitude stability of an oscillator. 7M

UNIT–IV

7. a) Define conversion efficiency. Determine the maximum value of conversion efficiency for a series - fed class A power amplifier. 7M

   b) Class-A Transformer coupled power amplifier delivers maximum A.C power of 5 watts to a 4Ω load if the operating point is located for maximum symmetrical swing and VCC=20V,Calculate (i) Secondary to primary turns ratio (ii) Peak output current (iii) Operating point (iv) Efficiency 7M

OR

8. a) Compare series fed and transformer coupled class A power amplifier. 7M

   b) Draw a neat circuit diagram of push pull class-B amplifier. Explain its working. 7M

UNIT–V

9. a) Derive an expression for output of a RC differentiator circuit when its input is exponential signal. Determine the transmission error. 7M

   b) Compare and contrast series diode clipper and shunt diode clipper. 7M

OR

10. a) A 2 KHz symmetric square wave of ±20 V is applied to a RC circuit having 2 msec. time constant. Calculate and plot the output to the scale for RC configuration as i) High pass circuit ii) Low pass circuit. 7M

    b) Draw the circuit diagram for positive peak clamper circuit and explain its principle of operation. 7M

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Hall Ticket Number :										

R-17

Code: 7G231

II B.Tech. I Semester Supplementary Examinations May 2019

DC Machines

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Derive the EMF equation of DC generator. 7M

   b) A short shunt compound generator has armature, series filed and shunt field resistances of 0.06ohms, 0.03 ohms and 110ohms respectively. It supplies 100 lamps rated at 250V, 40 W. Find the generated e.m.f Assume that contact drop per brush is 1V. 7M

OR

2. a) What are the lap and wave windings and compare them. 6M

   b) A 8-pole lap wound DC. Generator has 120 slots having 4 conductors per slot. If each conductor can carry 250A and if flux per pole is 0.06Wb. Calculate the speed of the generator for giving 240V on open circuit. If the voltage drops to 220V on full load. Find the rated output of the machine. 8M

UNIT–II

3. a) With relevant diagrams explain armature reaction in D.C. generator and also give the measures to reduce it. 7M

   b) Determine the reactance voltage for a DC generator with data as follows, assuming linear commutation. self inductance of coil: 0.2mH, current per conductor: 45A, Brush span: 3 commutator segments, Number of commutator segments: 50 and speed of the machine: 700 r.p.m 7M

OR

4. a) Derive the equation for demagnetizing and cross magnetizing ampere turns per pole. 7M

   b) What is reactance voltage? Discuss how to overcome its effects. 7M

UNIT–III

5. a) Describe the procedure for drawing the OCC of a DC shunt generator with necessary sketches 7M

   b) Explain the Internal and external characteristics of D.C. 7M

OR

6. a) Write the advantages of parallel operation of DC generator 5M

   b) Two shunt generators are operating in parallel. The e.m.f. induced in one machine is 260V and that induced in the other machine is 270V.They supply together a load current of 1800A. if the each machine has an armature resistance of 0.04ohms and field resistance 50ohms.Determine (i) terminal voltage (ii) output of each machine. 9M

UNIT–IV

7. a) What is back EMF? Explain the significance of back EMF 7M

   b) A 4-pole 220 V shunt motor has 540 lap wound conductors. It takes 32 A from the supply mains and develops output power of 5·5 kW. The field winding takes 1 A. The armature resistance of 0 .09ohms and flux per pole is 30mWb. Calculate (i) the speed and (ii) the torque developed in Newton meter. 7M

OR

8. a) Explain the flux control method in speed control of DC shunt motor with a neat sketch. State the merits and demerits. 7M

   b) Draw a neat diagram of DC 4-point starter and label the parts. 7M

UNIT–V

9. a) Explain with diagram the brake test on a DC shunt motor 7M

   b) Explain how you will obtain the efficiency of D.C. series machine by conducting the field test. 7M

OR

10. a) Explain the method of conducting Swinburne's test. 7M

    b) Two identical D.C. motors when tested by Hopkinson's test gave the following results: field currents are 2.5A and 2A, line voltage is 220V, line current including both field currents is 10A, motor armature current is 73A. The armature resistance of each motor is 0.05 ohms; calculate the efficiency of each motor. 7M

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Hall Ticket Number :										

R-17

Code: 7G233

II B.Tech. I Semester Supplementary Examinations May 2019

Electrical Circuits – I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Discuss the concept of source transformation technique. 7M

   b) Find the equivalent resistance between the terminals Y and Z in Fig.1. 7M

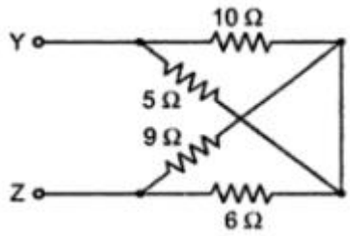

Fig.1

OR

2. a) Explain the following terms with reference to network topology with an example. 8M
   i. Twig
   ii. Link
   iii. Oriented graph
   iv. Incident matrix

   b) Write the properties of tie-set matrix and cut-set matrix 6M

UNIT–II

3. a) Show that resonant frequency ω_n of RLC series circuit is geometric mean of lower and upper half-frequencies ω_1 and ω_2 7M

   b) With respect to series resonant circuit, prove that bandwidth is inversely proportional to the Q-factor at resonance. 7M

OR

4. a) Define the following: 8M
   i) Amplitude of an alternating quantity
   ii) Instantaneous value of an alternating quantity
   iii) Frequency
   iv) Phase

   b) Discuss about Power triangle and power factor in ac circuits. 6M

UNIT–III

5. a) State and prove the superposition theorem with the help of an example. 7M

   b) Find R_{AB} in Fig.2, for maximum power transfer. Also calculate maximum power.

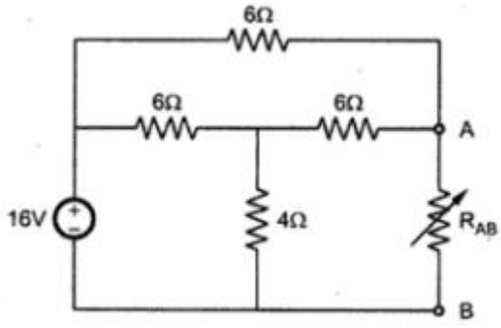

Fig.2 7M

OR

6. Find the Thevenin equivalent circuit for the circuit shown below Fig.3. 14M

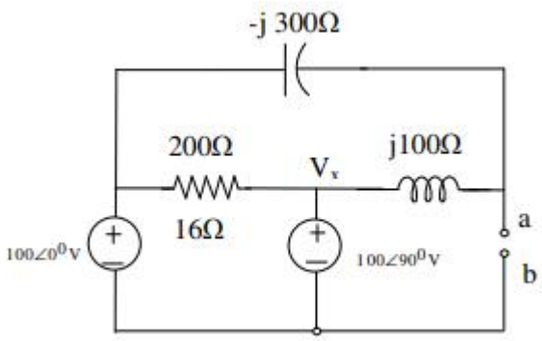

Fig.3

UNIT–IV

7. Find the Y-parameters for the two port network shown in fig.4 14M

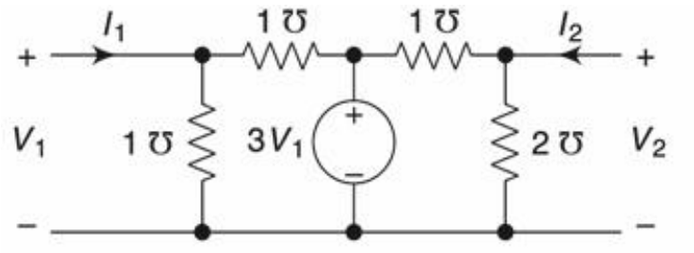

Fig.4

OR

8. a) Obtain the *z* -parameters for the network in Fig.5 8M

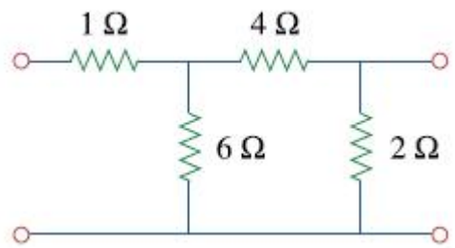

Fig.5

b) Determine the h-parameters with the following data: 6M

(i) With the output terminals short circuited, V_1=25V, I_1=1A, I_2=2A

(ii) With the input terminals open circuited, V_1=10V, V_2=50V, I_2=2A

UNIT–V

9. a) Derive the relation between self inductance, mutual inductance and coefficient of coupling. 7M

b) A magnetic circuit consists of an iron ring of mean circumference 80 cm with cross-sectional area of 12 cm2 throughout. A current of 2A in the magnetising coil of 200 turns produce a total flux of 1.2 mwb in the iron. Calculate: i) the flux density in the iron ii) the absolute and relative permeability of iron. iii) the reluctance of the circuit. 7M

OR

10. a) Explain the importance of dot convention in coupled circuits. 6M

b) Define: (i) Flux (ii) m.m.f (iii) Reluctance (iv) Magnetic field intensity. 8M

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Hall Ticket Number :										

R-17

Code: 7G536

II B.Tech. I Semester Supplementary Examinations May 2019

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) The space between two square flat parallel plates is filled with an oil of specific gravity 0.95. Each side of the plate is 600 mm. The thickness of the oil film is 12.5 mm. The upper plate moves with a speed of 2.5 m/s by a force of 100 N. Determine the dynamic and kinematic viscosity of the oil. 7M

   b) A U-tube differential manometer connects two pipes A and B. Pipe A contains Carbon Tetra-chloride of specific gravity 1.594 under a pressure of 11.772 N/cm^2 and pipe B contains oil of specific gravity 0.8 under a pressure of 11.772 N/cm^2. The pipe A lies 2.5 m above the pipe B. Determine the pressure difference in the U-tube, and express the same in terms of Mercury head. 7M

OR

2. a) Give the physical meaning of the following. (i) Pathline (ii) Streamline (iii) Streak line (iv) Stream tube. Under what case, streamline, streakline and path line will coincide with each other? 7M

   b) Sketch the streamlines represented by $\psi = X^2 + Y^2$. Determine the magnitude and direction of velocity at (1, 2). 7M

UNIT–II

3. a) A vertical Venturi meter has an inlet and throat diameter of 150 mm and 75 mm respectively, and carries a liquid of specific gravity 0.8. The pressure at the throat is 150 mm higher that of the inlet. If the discharge of liquid is 40 lit/s, and coefficient of discharge, C_d is 0.96, determine the pressure difference between the inlet and outlet of Venturi meter. Convert this value in terms of Mercury head. 7M

   b) Give the physical significance of the friction factor. Derive the Darcy-Weisbach equation for determination of head loss due to friction. 7M

OR

4. a) A reservoir is connected with two pipes each of 400 mm long to maintain a flow rate of 0.10 m^3/s. The diameter of the two pipes is 0.3 m and 0.15 m respectively. Determine the ratio of the head loss when the pipes are connected in series to the head loss when the pipes are connected in parallel. Neglect the minor losses. 10M

   b) A horizontal pipe is suddenly expanded from diameter d_1 to d_2. Determine the ratio of diameter d_1/d_2 for which the differential pressure on either side of the expansion will be the maximum. 4M

UNIT–III

5. a) In a hydroelectric power plant, 100 m^3/s of water flow from an elevation of 120 m to a turbine, where electric power is generated. The overall efficiency of the turbine-generator is 80%. Disregarding the frictional losses in the pipeline, estimate the electric power output of the plant. 7M

   b) How do you select a Hydroelectric power plant? Give its broad classification. Explain the detailed construction and working principle of the Hydroelectric plant. 7M

OR

6. A jet of water having a velocity of 36 m/s strikes a series of radial curved vanes mounted on a wheel which is rotating at 240 rpm. The jet makes an angle of 20º with the tangent to the wheel at the inlet and leaves the wheel with a velocity of 6 m/s at an angle of 130º to the tangent to the wheel at the outlet. Water is flowing from the outward in a radial direction. The outer and inner radii of the wheel are 500 mm and 250 mm respectively. Determine the following.
   (i) Vane angles at inlet and outlet
   (ii) Work done per second per N of water
   (iii) The efficiency of the wheel 14M

UNIT–IV

7. An inward flow reaction turbine is working under a head of 15 m with a speed of 300 rpm. The inner and outer diameter of the runner is 500 mm and 750 mm respectively. The runner internal width at the inlet is 70 mm and blade occupies 10% of runner passage. The radial component of the fluid velocity is constant from the inlet to the outlet and is equal to $0.2\sqrt{2gh}$, where 'h' is the head of the turbine. Water leaves the wheel radially. The blade efficiency is 95% and the overall efficiency of the turbine is 85%. Calculate the following.
   (i) The angle of guide vanes
   (ii) Angles of moving vanes at the inlet and outlet
   (iii) Water flow rate
   (iv) The width of runner at the outlet 14M

OR

8. The hub diameter of a Kaplan turbine, working under a head of 12 m is 0.35 times the diameter of the runner. The turbine is running at 100 rpm. If the vane angle of the extreme edge of the runner at the outlet is 15º and the flow ratio 0.6. Determine the following.
   (i) The diameter of the runner
   (ii) The diameter of the boss
   (iii) Discharge through the runner

   The velocity of whirl at the outlet is assumed to be zero. 14M

UNIT–V

9. The outer diameter of the impeller of a pump is 400 mm and the outlet width is 50 mm. The pump is running at 800 rpm and working against a head of 15 m. The vane angle at the outlet is 40° and the manometric efficiency is 75%. Determine the following.
   (i) Flow velocity at the outlet
   (ii) The velocity of water leaving the vane
   (iii) Angle made by the absolute velocity with the direction of motion at the outlet
   (iv) Discharge of pump 14M

OR

10. a) A single acting reciprocating pump running at 40 rpm discharges 1 m^3 of water per minute. The pump has a stroke of 400 mm, the bore of 200 mm. The delivery and suction heads are 20 m and 5 m respectively. Determine slip of the pump and the power required to drive the pump. 7M

    b) A double acting reciprocating pump runs at 90 rpm. The diameter and stroke of the pump are 100 mm and 250 mm respectively. The suction pipe is of 100 mm diameter and 5 m long. Calculate the maximum permissible suction lift assuming no air vessel is fitted o the pump and separation occur at 2 m of water at the absolute. 7M

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Hall Ticket Number :										

R-17

Code: 7G232

II B.Tech. I Semester Supplementary Examinations May 2019

Switching Theory and Logic Design

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Convert the following numbers into decimal:
   i. 100100111000.0111(BCD)
   ii. $(11001101.111)_2$
   iii. $(CF.5)_{16}$
   iv. $(234)_5$ 10M

   b) Explain with examples, how Hamming code is useful for detecting and correcting errors in digital data transmission. 4M

OR

2. a) i.) Perform the **45+(-17)** subtraction using 1's complement and 2's complement method. Find the result in sign-magnitude.
   ii.) What is the radix called in case of Decimal, binary, octal and hexadecimal number system? 7M

   b) Find the Excess-3 code and its 9's complement for the following decimal numbers: i. 56, ii. 812 7M

UNIT–II

3. a) Simplify the following function using K-map and implement it using basic gates only. $f(A,B,C,D) = \sum_m (2,3,5,13,14) + d(8,9,10,11)$ 7M

   b) Simplify the following Boolean function to POS form.
   $f(w,x,y,z) = \sum (0,1,2,5,8,10,13)$ 7M

OR

4. a) Minimize the given expression using K-map and also show the essential prime implicants and selective prime implicants on the K-map.
   $Y(A,B,C,D) = \sum_m (4,5,7,12,14,15) + \sum d(3,8,10)$ 7M

   b) Use the tabular procedure to simplify the given expression
   $f(v,w,x,y,z) = \sum_m (0,4,12,16,19,24,27,28,29,31)$ 7M

UNIT–III

5. a) Implement the following function using an 8:1 MUX
   $F(A,B,C) = \overline{A}B + C\overline{D} + A\overline{C}.$ 7M

   b) Realize two outputs F1 and F2 using 4X2 PROM
   $F_1(A_1, A_0) = \sum_m (0,2)$
   $F_2(A_1, A_0) = \sum_m (0,5,6,7)$ 7M

OR

6. a) Implement the following logic function using an 8X1 MUX
$F(AB,C,D) = \sum_m (1,3,4,11,12,13,14,15)$. 7M

   b) Compare the three combinational PLDs. 7M

UNIT–IV

7. a) What are the applications of flip-flops? 2M

   b) Design a mod-7 synchronous counter using S-R flip-flops. 12M

OR

8. a) What is twisted ring counter? Write the advantages and disadvantages of ring counter compared to ripple counter 4M

   b) Design 3-bit counter which counts in the following sequence
$0 \to 2 \to 5 \to 3 \to 4 \to 0 \to 2 \to .....etc$ 10M

UNIT–V

9. a) What are the capabilities and limitations of finite state machines? 2M

   b) Find the equivalence partition and corresponding reduced machine in standard form for the machine given below.

PS	NS,Z	
	X=0	X=1
A	***E,0***	***D,1***
B	***F,0***	***D,0***
C	***E,0***	***B,1***
D	***F,0***	***B,0***
E	***C,0***	***F,1***
F	***B,0***	***C,0***

12M

OR

10. a) Define the “State equivalence and machine equivalence” with reference to sequential machines. 2M

   b) What are the conditions for two machines to be equivalent? for the machine given in table, find the equivalence partition and corresponding reduced machine in standard form.

PS	NS,Z	
	X=0	X=1
A	***F,0***	***B,1***
B	***G,0***	***A,1***
C	***B,0***	***C,1***
D	***C,0***	***B,1***
E	***D,0***	***A,1***
F	***E,1***	***F,1***
G	***E,1***	***G,1***

12M

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Hall Ticket Number :										

R-17

Code: 7GC32

II B.Tech. I Semester Supplementary Examinations May 2019

Engineering Mathematics – III

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Find a real root of the equation $x^3 - 2x - 5 = 0$ using bisection method correct to three decimal places. 7M

   b) Find the real root of the equation $\sin^2 x + 1 = x^2$ using Newton-Raphson method. 7M

OR

2. a) Employ Euler's method to obtain the approximate value of y at $x = 1.0$ for the differential equation $\frac{dy}{dx} = x - y^2,\ y(0) = 1.$ 7M

   b) Apply Runge-Kutta method of order 4, compute $y(0.2)\ and\ y(0.4)$ from the equation $\frac{dy}{dx} = x + y,\ y(0) = 1.$ 7M

UNIT–II

3. a) The population of a town in the decennial census was given below

Year : x	1891	1901	1911	1921	1931
Population: y (in thousands)	46	66	81	93	101

   Estimate the population for the year 1925. 7M

   b) Use Lagrange's interpolation formula to find the value of y when $x = 3.5$ from the following table

x	0	1	3	4
y	-12	0	12	24

7M

OR

4. a) Find the first and second derivatives of the function tabulated below at the point $x = 1.5$

x	1.5	2.0	2.5	3.0	4.0
y	3.375	7.0	13.625	38.875	59

7M

   b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using

   (i)Trapezoidal rule (ii)Simpson's $\frac{1}{3}$ rule and (iii)Simpson's $\frac{3}{8}$ rule with $h = 0.5\ and\ 0.125$ 7M

UNIT–III

5. a) Determine the values of a and b by the method of least squares such that $y = ae^{bx}$ fits the following data

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

7M

b) Solve $\left(p^2 + q^2\right)y = qz$ using Charpit's method. 7M

OR

6. a) Fit a second degree polynomial to the following data by the method of least squares

x	10	12	15	23	20
y	14	17	23	25	21

7M

b) Using the method of separation of variables,

solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, *when* $u(0, y) = 8e^{-3y}$ 7M

UNIT–IV

7. Prove that $x^2 = \frac{®^2}{3} + 4\sum_{n=1}^{\infty}(-1)^n \frac{\cos nx}{n^2}$, $-® < x < ®$ by using Fourier series and hence show that $\sum_{n=1}^{\infty}\frac{1}{n^2} = \frac{®^2}{6}$ 14M

OR

8. Obtain a half range cosine series for $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$

and deduce the sum of the series is $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{®^2}{8}$ 14M

UNIT–V

9. Find the Fourier sine and cosine transforms of $e^{-ax}\,(a > 0)$. Hence Evaluate the integrals $\int_0^{\infty}\frac{x\sin ax}{x^2 + a^2}dx$ and $\int_0^{\infty}\frac{\cos ax}{x^2 + a^2}dx$ 14M

OR

10. Obtain the Fourier sine transfromation of

$$f(x) = \begin{cases} 4x, & for\ 0 < x < 1 \\ 4 - x, & for\ 1 < x < 4 \\ 0, & for\ x > 4 \end{cases}$$

14M

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