Hall Ticket Number :										

Code: 4GC41

R-14

II B.Tech. II Semester Regular Examinations May 2016

Mathematics – III

(Common to EEE & ECE)

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) Evaluate $\int_0^1 x^3\sqrt{1-x}\,dx$ using $-\Gamma$ functions. 7M

   b) If $\tan(x+iy)=u+iv$ then show that $u^2+v^2-2v\coth 2y+1=0$. 7M

OR

2. a) Evaluate $\int_0^{\pi/2} \sin^5\theta \cos^{\frac{7}{2}}\theta\, d\theta$. 7M

   b) Find the general and principal values of $\log(1+i\sqrt{3})$. 7M

UNIT–II

3. a) Apply C-R conditions to $f(z)=z^2$ and show that the function is analytic everywhere. 4M

   b) If $f(z)=u+iv$ is analytic function of z and if $u-v=(x-y)(x^2+4xy+y^2)$, find $f(z)$ in terms of z. 10M

OR

4. Suppose $f(z)=u+iv$ is an analytic function.
   (i) Show that u and v satisfy Laplace's equation.
   (ii) If $u=x^2+y^2$, find harmonic conjugate $v(x,y)$ and write the corresponding complex potential $f(z)=u+iv$. 14M

UNIT–III

5. a) Evaluate $\int_C \frac{dz}{(z-1)(z-3)}$ where c is $|z|=2$ using Cauchy's integral formula 7M

   b) Expand the function $f(z)=\frac{z}{z+2}$ in a Taylor series with center $z_0=1$ then find its radius of convergence. 7M

OR

6. a) Evaluate $\int_c \frac{z-2}{z}\,dz$ where c is the semi-circle $z=2e^{i\theta}$ with $0<\theta<\pi$ 4M

   b) Find the Laurent's series expansion of $f(z)=\frac{1}{(z+1)(z+3)}$ for $1<|z|<3$ and hence, evaluate $\int_C f(z)\,dz$, where $C:|z|=1.5$. 10M

UNIT–IV

7. a) Determine the poles of the function $f(z)=\frac{1-2z}{z(z-1)}$ and find the residue at each pole. 6M

b) Evaluate the real integral $I=\int_{-\infty}^{\infty}\frac{1}{1+x^2}dx$ by the method of residue theorem. 8M

OR

8. a) State and Prove Argument principle. 7M

b) Show that one root of the equation $z^4+z+1=0$ lies in the first quadrant. 7M

UNIT–V

9. Consider the points $0,\infty,i$ in z-plane is mapped onto the points $\infty,0,-i$ in w- plane under a bilinear transformation $f(z)$.

(i) Determine the bilinear transformation $f(z)$.

(ii) Find the image of $|z|<1$ under $f(z)$.

(iii) Find the Invariant points of $f(z)$. 14M

OR

10. a) Find the bilinear transformation which maps $z=1,i,-1$ onto the point $w=i,0,-i$. 7M

b) Show that the image of the circle $\left|z-\frac{1}{2}\right|=\frac{1}{2}$ in Z-plane is the vertical line $u=1$ in W-plane under the bilinear transformation $w=\frac{1}{z}$. 7M

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Hall Ticket Number :										

Code: 4G346

R-14

II B.Tech. II Semester Regular Examinations May 2016

Pulse and Digital Circuits

(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 expression for percentage tilt for a square wave output of RC high pass circuit? 7M
   b) What is an Attenuator? Explain it with neat sketch? 7M

OR

2. a) Explain how RC low pass network act as an Integrator with neat diagram and also derive an expression for % of tilt? 7M
   b) A pulse of 5v amplitude and pulse width of 0.5msec is applied to high pass RC circuit consisting of R=22kΩ and C=0.47µF. Determine the % tilt in the output waveform? 7M

UNIT–II

3. a) Draw the circuit diagram of Slicer circuit using Zener diodes and explain its operation with the help of its transfer characteristics? 7M
   b) Draw the diode Comparator Circuit and explain the operation of it when ramp input signal is applied? 7M

OR

4. a) Explain the operation of two level diode Clipper? 7M
   b) Draw the basic circuit diagram of Positive Peak Clamper circuit and explain its operation? 7M

UNIT–III

5. a) Explain the basic principles of Miller and Bootstrap time base generators? 7M
   b) Explain the principle of Synchronization and frequency division in blocking Oscillator? 7M

OR

6. a) Draw and explain Sweep circuit using UJT? 7M
   b) Derive the expression for slope error and sweep speed for the Bootstrap Sweep circuit? 7M

UNIT–IV

7. a) Explain the Schmitt trigger circuit in detail? 7M
   b) Draw a neat diagram of Bi-stable Multivibrator using transistor and explain its working with the help of timing diagrams? 7M

OR

8. a) Explain the operation of Collector Coupled Monostable Multivibrator with circuit diagram and waveforms? 7M
   b) Design an Astable Multivibrator with frequency 1kHZ, h_{fe} = 50, $I_{C(sat)}$ = 5 mA, $V_{CE(sat)}$ = 0.2v, V_{CC} = 12v. Assume R_1= R_2. 7M

UNIT–V

9. a) Explain the working of TTL-NAND with suitable circuit diagram? 7M
   b) Explain some applications of Sampling gates? 7M

OR

10. a) Draw the circuit of an Emitter Coupled Bi-directional Sampling gate and explain in detail? 7M
    b) With the help of neat circuit diagram and truth table, explain the working of diode logic AND gate and RTL AND gate? 7M

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Hall Ticket Number :										

Code: 4G241

R-14

II B.Tech. II Semester Regular Examinations May 2016

Electrical Machines-II

(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) What is the effect of variation of supply voltage and frequency on core losses?

   b) A transformer has a primary winding of 800 turns and a secondary winding of 200turns.When the load current on the secondary is 80 A at 0.8 pf lagging, the primary current is 25 A at 0.707 pf lagging. Determine the no-load current of the transformer and its phase with respect to the voltage.

OR

2. a) Explain the construction details of (**i**) Shell type and (**ii**) Core type.

   b) A 25KVA transformer has 500 turns on the primary and 50 turns on the secondary winding .The primary is connected to 3000V,50 Hz supply. Find full load primary and secondary currents, the secondary emf and the maximum flux in the core.

UNIT–II

3. a) Derive the expression for the current shared by two transformers operating in parallel with unequal voltage ratios.

   b) Two transformers have the following parameters:

	Transformers A	Transformers B
Rated Current	200A	600A
Per unit Resistance	0.02	0.025
Per unit Reactance	0.05	0.06
No load EMF	245V	240V

   Calculate the terminal voltage when they are connected in parallel and a load impedance of 0.25+j0.1 Ohms.

OR

4. a) What is an auto transformer? What is the difference between auto transformer and two winding transformer?

   b) A two-winding transformer is rated at 2400/240V, 50KVA. It is reconnected as a step-up auto-transformer, with 2400V input. Calculate the rating of the auto-transformer and the inductively and conductively transferred powers while delivering the rated output at unity power-factor.

UNIT–III

5. a) A 3-phase transformer is used to step-down the voltage of a 3-phase, 11KV feeder line. Per phase turns is 12. For a primary line current of 20A, Calculate the secondary line voltage, line current and output KVA for the following connections. a)star-delta b)delta-delta

   b) Write short notes on a three winding transformer.

OR

6. a) Two single phase furnaces working at 100V are connected to3300V three phase mains through Scott connected transformers. Calculate the current in each line of the 3 phase mains when the power taken by each furnace is 400KW at a power factor of 0.8 lag.

   b) Describe merits and demerits of various connections of three phase transformers.

UNIT–IV

7. a) Discuss in detail about the Double cage induction motor on the following Points
   i) Construction ii) Equivalent circuit iii) Applications

   b) A 3-phase induction motor having a 6-pole, star-connected stator winding runs on 240V,50Hz supply. The per phase rotor resistance and per phase standstill reactance are 0.12 Ω and 0.85 Ω respectively. The ratio of stator to rotor turns is 1.8.Full load slip is 4%.Calculate the developed torque at full load, maximum torque and speed at maximum torque.

OR

8. a) What is the condition for maximum torque of IM? Find the equation for maximum torque .What is the condition for maximum torque at starting?

   b) An18.65KW,4-pole ,50HZ,3-phase induction motor has friction and windage losses of 2.5 per cent of the output. The full load slip is4%. Compute for full load **i**) the rotor Cu loss **ii**) the rotor input **iii**) the shaft torque **iv**) the gross mechanical torque.

UNIT–V

9. a) Draw the circle diagram for a 5.6 KW, 400 V, 3-Φ, 4-pole, 50Hz, slip-ring induction motor from the following data:
   No load reading: 400 V, 6 A, $\cos\Phi_0$=0.087; Short-circuit test:100 V,12 A, 720 W;
   The ratio primary to secondary turns is 2.62, stator resistance per phase is 0.67 Ω and of the rotor resistance is 0.185 Ω, Calculate (**i**) Full load current (**ii**) full load power factor (**iii**) full load slip (**iv**) maximum torque /full load torque (**v**) Maximum output power.

   b) Discuss on different methods of Stator speed control and Rotor speed control of Induction motor in detail with suitable diagrams.

OR

10. a) Explain the procedure of drawing the circle diagram of an induction motor. What information can be drawn from the circle diagram?

    b) A 3-Ø squirrel cage induction motor has maximum torque equal to twice the full-load torque. Determine the ratio of motor starting torque to its full-load torque, if it is started by
    (**i**) direct-on-line starter,
    (**ii**) star-delta starter,
    (**iii**) auto-transformer starter with 70 % tapping
    The per phase rotor resistance and per phase standstill reactance referred to stator are 0.2 Ω and 2 Ω respectively. Neglect stator impedance.

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Hall Ticket Number :										

R-14

Code: 4G242

II B.Tech. II Semester Regular Examinations May 2016

Electrical Circuits-II

(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 current and voltage relationships between the line and phase values of 3-phase delta connected system.

   b) A star connected load of $10\angle 0^\circ$; $10\angle 60^\circ$ and $10\angle -60^\circ$ is receiving power from a 3-phase, 3-wire 200 volts ABC system. Find the voltages across the load impedances.

OR

2. a) Derive the relationships between phase and line to line quantities of a 3-phase star system.

   b) Two watt-meters are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if the two watt-meters read (**i**)1000w each, both positive (**ii**) 1000w each, but of opposite sign.

UNIT–II

3. a) Find the Laplace transform of the following wave form shown in Fig.1 :

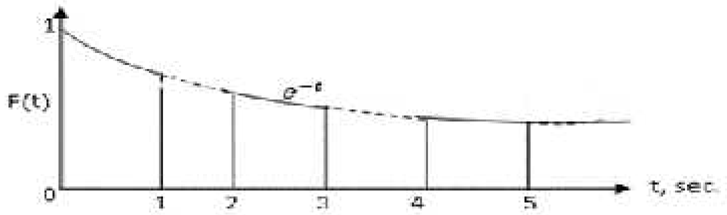

Fig. 1

   b) Find the Laplace inverse of the following functions:

   i. $\frac{1}{1-e^{-sT}}$ **ii)** $\frac{1}{s^2(s^2+1)^2}$

OR

4. a) Find the Laplace transform of the following wave form shown in Fig.2 :

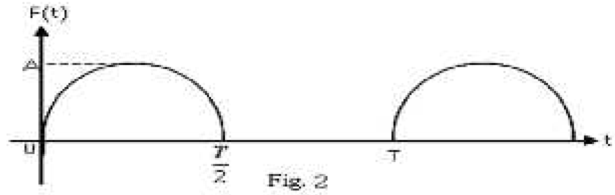

Fig. 2

   b) Find the Laplace inverse of the following functions:

   i) $\frac{10}{s(s^2+2s+4)}$ ii) $\frac{s^2}{(s^2+1)^2}$

UNIT–III

5. a) An unchanged 80 μF capacitor is connected in series with a 1 kΩ resistor and is switched across a 110V supply. Determine the time constant of the circuit and the initial value of current flowing. Determine also the value of current flowing after (**i**) 40 ms and (**ii**) 80 ms.

b) Refer to the circuit shown in Fig.3, the switch is closed at $t = 0$. (**i**) determine equations for i_L and v_L.(**ii**) At $t = 300$ ms, open the switch and determine equations for i_L and v_L during the decay phase. (**iii**) Determine voltage and current at $t = 100$ ms and at $t = 350$ ms. (**iv**) Sketch i_L and v_L.

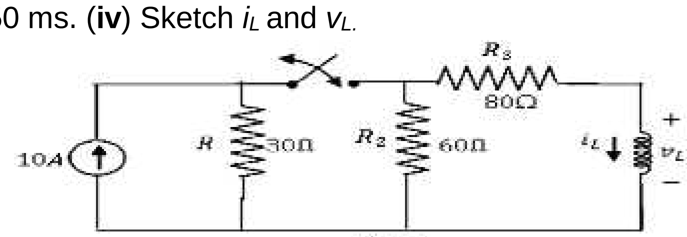

Fig. 3

OR

6. a) The switch in the Fig.4 has been in position '*a*' for a long time, until $t = 4$ s when it is moved to position *b* and left there. Determine $v(t)$ at $t = 10$ s.

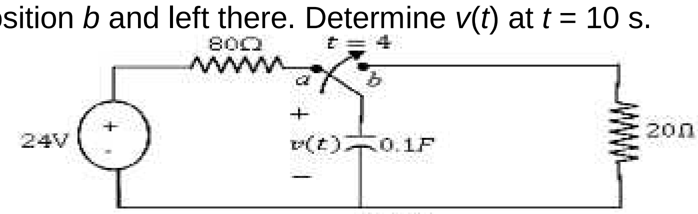

Fig. 4

b) The switch in Fig.5 was open for a long time but closed at $t = 0$. Determine: (***i***) $i(0+)$, $v(0+)$ and (***ii***) $i(\infty)$, $v(\infty)$.

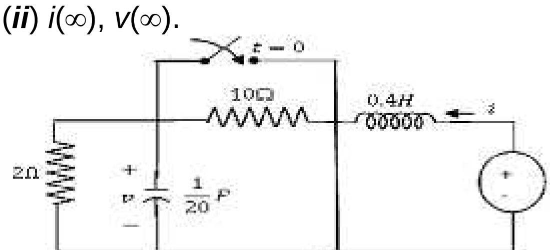

Fig. 5

UNIT–IV

7. a) Find the trigonometric Fourier series of the waveform shown in fig.6

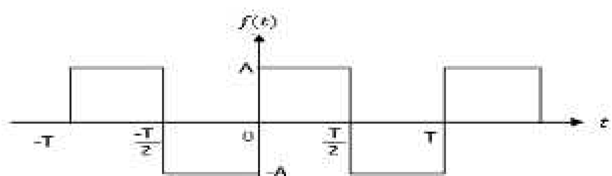

Fig. 6

b) Find the trigonometric Fourier series of the waveform shown in fig.6.

OR

8 a) Find the trigonometric Fourier series of the waveform shown in fig.7

Fig. 7

b) Find the exponential Fourier series of the waveform shown in fig.7

UNIT–V

9 a) State and explain the necessary and sufficient conditions for positive real functions.

b) Calculate the driving point admittance of the network shown in Fig.8.

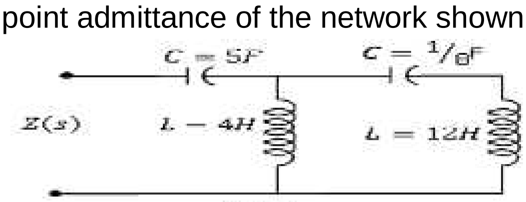

Fig. 8

OR

10 a) State and explain the necessary and sufficient conditions for driving point functions.

b) Synthesize the impedance function $Z(s) = \frac{s^3+4s}{s^2+2}$.

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Hall Ticket Number :										

R-14

Code: 4G243

II B.Tech. II Semester Regular Examinations May 2016

Generation of Electric Power

(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) Sketch the typical layout of a thermal power plant and show the basic components of it. 7M

   b) How utilization factor affect the economy of power system? Explain briefly. 7M

OR

2. Explain the following components with relevant diagrams

   (i) Economizer (**ii**) Super heater (**iii**) condenser (**iv**) fuel handling system

   (**v**) Coal and ash handling plant (**vi**) Cooling towers 14M

UNIT–II

3. a) Briefly explain the factors to be considered for selection of site for hydro power station. 8M

   b) With neat sketch explain the function of pumped storage plants 6M

OR

4. a) Write short notes on:

   (i) Draft-tube (**ii**) Cavitations (**iii**) Water Hammer. 6M

   b) Calculate the power generation capacity for a hydropower station with the following details: Catchment area = 80 sq-m , Run off = 85% , available head=350m, average rainfall =120cm/annum and overall efficiency = 83% 8M

UNIT–III

5. a) What are the merits and demerits of nuclear power plants? 7M

   b) Draw a neat diagram of a liquid metal cooled reactor and explain it. Give its advantages and disadvantages. 7M

OR

6. a) Enumerate and explain essential components of a nuclear reactor. 7M

   b) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant. 7M

UNIT–IV

7. The daily demands of three consumers are given below:

Time	Consumer 1	Consumer 2	Consumer 3
12 mid night to 8 A.M.	→ No load	200 W	No load
8 A.M. to 2 P.M.	→ 600 w	No load	200 W
2 P.M. to 4 P.M.	→ 200 W	1000 W	1200 W
4 P.M. to 10 P.M.	→ 800 W	No load	No load
10 P.M. to Mid night	→ No load	200 W	200 W

Plot the load curve and find :

(i) Maximum demand of individual consumer

(ii) Load factor of individual consumer

(iii) Diversity factor (iv) Load factor of the station 14M

OR

8. A generating station has a maximum demand of 20 MW, a load factor of 60%, a plant capacity factor of 40% and a plant use factor of 80%. Find **i**) The daily energy produced **ii**) The reverse capacity of the plant **iii**) The maximum energy that could be produced daily if the plant were running all the time **iv**) The maximum energy that could be produced daily if the plant (when running according to operation schedule) were fully loaded. 14M

UNIT–V

9. Discuss the disadvantages of having low power factor and discuss the various methods for power factor improvement. 14M

OR

10. The equipment in a power station costs Rs. 15,60,000 and has a salvage value of Rs. 60,000 at the end of 25 years. Determine the depreciated value of the equipment at the end of 20 years on the following methods:

i) Straight line method **ii**) Diminishing value method **iii**) Sinking fund method at 5% compound interest annually. 14M

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Hall Ticket Number :										

Code: 4G244

R-14

II B.Tech. II Semester Regular Examinations May 2016

Linear Control Systems

(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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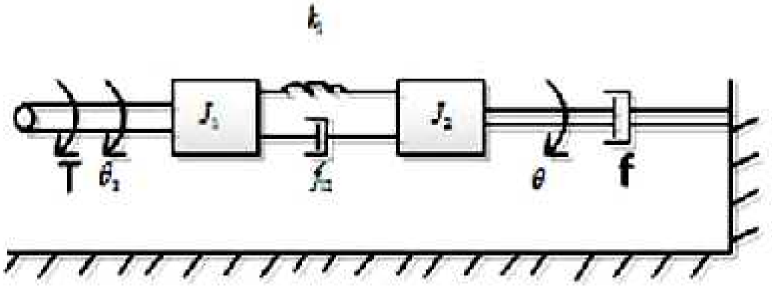
UNIT–I

1. a) Discuss the effect of feedback on stability. 6M

b) Determine the transfer function $\frac{\overline{\ }(s)}{T(s)}$ for the mechanical rotational system shown below.

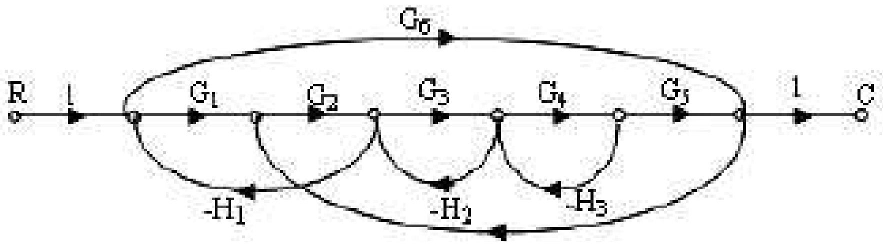


8M

OR

2. a) Derive the transfer function of armature controlled dc servo motor. 7M

b) For the system illustrated by the signal flow graph shown Figure, Obtain the transfer function by means of Mason's formula.



7M

UNIT–II

3. a) Sketch the unit step response of a prototype second order system and show that the percentage over shoot is a function of a damping factor alone. 7M

b) For a unity feedback system the open loop transfer function is given by $G(s) = \frac{10}{s(s+4)}$.

Determine: **i**) maximum overshoot **ii**) rise time **iii**) settling time and **iv**) steady state error if the input is a unit step. 7M

OR

4. a) Illustrate the effects of proportional derivative control on transient performance of feedback control systems. 7M

b) Evaluate the error series for a unity feedback system having a forward path transfer function $G(s) = 50/s(s+10)$. Estimate the steady state error of the system for the input r(t) given by $r(t)=1+2t+t^2$. 7M

UNIT–III

5. a) For the system whose characteristic equation is given by

$$F(s) = s(s+5)(s+6)(s^2+4s+25)+K(S+3)=0.$$

Determine the values of K which will cause sustained oscillations in the closed-loop system using Routh Criterion. What are the corresponding oscillations of frequency? 6M

b) Sketch the root locus for the unity feedback system having open loop transfer function $G(s)=\dfrac{K}{s(s+4)(s^2+4s+40)}$ 8M

OR

6. a) State the applications of root focus. 5M

b) Sketch the root focus for the system with $G(s)H(s)=\dfrac{K}{s(s^2+6s+13)}$ 9M

UNIT–IV

7. A unity feedback control system has forward path transfer function as $G(s)=\dfrac{36}{(s+1)(s+3)^2}$. Construct Bode plots and find the following:

i) Gain crossover and phase crossover frequencies.

ii) Gain margin and phase margin 14M

OR

8. Plot the Nyquist plot for $G(s)H(s)=\dfrac{K(s+1)}{s(s+1)}$. For K > 0 find the number of closed loop poles in the right half s-plane and comment on stability. 14M

UNIT–V

9. a) Design a lag compensator that will provide a phase lag of 50^0 and alternation of 15 dB at 2 rad/sec. Also determine the transfer function. 7M

b) Write the transfer function of a lag compensator and draw its pole zero and frequency response plots. 7M

OR

10. a) What are the advantages of state space representation? 4M

b) Find the transfer function of the system whose state space representation is given by

$\dot{x}=Ax+Bu, y=Cx$ with

$$A=\begin{bmatrix}-1 & -4 & -1\\ -1 & -6 & -2\\ -1 & -2 & -3\end{bmatrix}, B=\begin{bmatrix}0\\1\\1\end{bmatrix} \text{ and } c=\begin{bmatrix}1 & 1 & 1\end{bmatrix}$$

10M

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