GATE 2022 General Aptitude (GA)

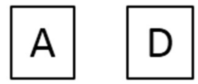
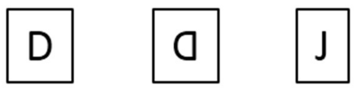
Q.1 – Q.5 Carry ONE mark each.

Q.1	The __________ is too high for it to be considered __________.
(A)	fair / fare
(B)	faer / fair
(C)	fare / fare
(D)	fare / fair

Q.2	A function $y(x)$ is defined in the interval $[0, 1]$ on the x-axis as $$y(x) = \begin{cases} 2 & \text{if } 0 \leq x < \frac{1}{3} \\ 3 & \text{if } \frac{1}{3} \leq x < \frac{3}{4} \\ 1 & \text{if } \frac{3}{4} \leq x \leq 1 \end{cases}$$ Which one of the following is the area under the curve for the interval $[0, 1]$ on the x-axis?
(A)	$\frac{5}{6}$
(B)	$\frac{6}{5}$
(C)	$\frac{13}{6}$
(D)	$\frac{6}{13}$

Q.3	Let r be a root of the equation $x^2 + 2x + 6 = 0$. Then the value of the expression $(r + 2)(r + 3)(r + 4)(r + 5)$ is
(A)	51
(B)	-51
(C)	126
(D)	-126

Q.4	Given below are four statements. Statement 1: All students are inquisitive. Statement 2: Some students are inquisitive. Statement 3: No student is inquisitive. Statement 4: Some students are not inquisitive. From the given four statements, find the two statements that **CANNOT BE TRUE** simultaneously, assuming that there is at least one student in the class.
(A)	Statement 1 and Statement 3
(B)	Statement 1 and Statement 2
(C)	Statement 2 and Statement 4
(D)	Statement 3 and Statement 4

Q.5	A palindrome is a word that reads the same forwards and backwards. In a game of words, a player has the following two plates painted with letters.  From the additional plates given in the options, which one of the combinations of additional plates would allow the player to construct a five-letter palindrome. The player should use all the five plates exactly once. The plates can be rotated in their plane.
(A)	
(B)	
(C)	
(D)	

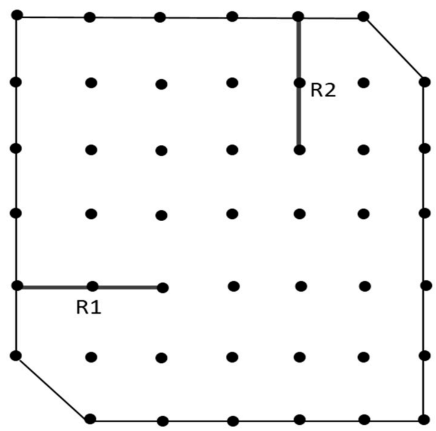
Q. 6 – Q. 10 Carry TWO marks each.

Q.6	Some people believe that "what gets measured, improves". Some others believe that "what gets measured, gets gamed". One possible reason for the difference in the beliefs is the work culture in organizations. In organizations with good work culture, metrics help improve outcomes. However, the same metrics are counterproductive in organizations with poor work culture. Which one of the following is the CORRECT logical inference based on the information in the above passage?
(A)	Metrics are useful in organizations with poor work culture
(B)	Metrics are useful in organizations with good work culture
(C)	Metrics are always counterproductive in organizations with good work culture
(D)	Metrics are never useful in organizations with good work culture

Q.7	In a recently conducted national entrance test, boys constituted 65% of those who appeared for the test. Girls constituted the remaining candidates and they accounted for 60% of the qualified candidates. Which one of the following is the correct logical inference based on the information provided in the above passage?
(A)	Equal number of boys and girls qualified
(B)	Equal number of boys and girls appeared for the test
(C)	The number of boys who appeared for the test is less than the number of girls who appeared
(D)	The number of boys who qualified the test is less than the number of girls who qualified

Q.8	A box contains five balls of same size and shape. Three of them are green coloured balls and two of them are orange coloured balls. Balls are drawn from the box one at a time. If a green ball is drawn, it is not replaced. If an orange ball is drawn, it is replaced with another orange ball. First ball is drawn. What is the probability of getting an orange ball in the next draw?
(A)	$\frac{1}{2}$
(B)	$\frac{8}{25}$
(C)	$\frac{19}{50}$
(D)	$\frac{23}{50}$

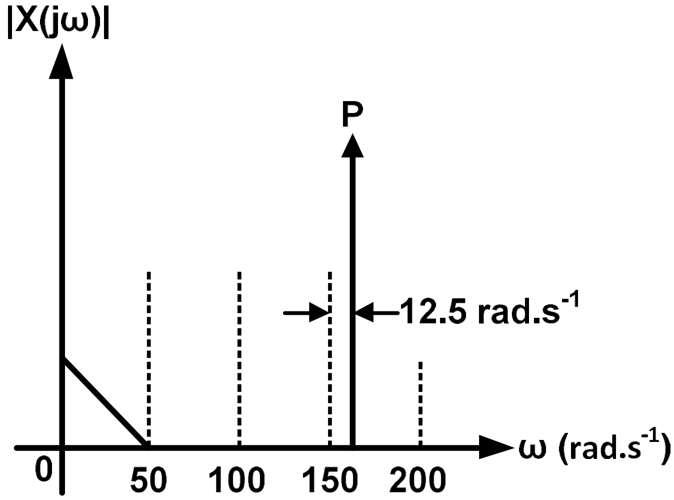
Q.9	The corners and mid-points of the sides of a triangle are named using the distinct letters P, Q, R, S, T and U, but not necessarily in the same order. Consider the following statements: • The line joining P and R is parallel to the line joining Q and S. • P is placed on the side opposite to the corner T. • S and U cannot be placed on the same side. Which one of the following statements is correct based on the above information?
(A)	P cannot be placed at a corner
(B)	S cannot be placed at a corner
(C)	U cannot be placed at a mid-point
(D)	R cannot be placed at a corner

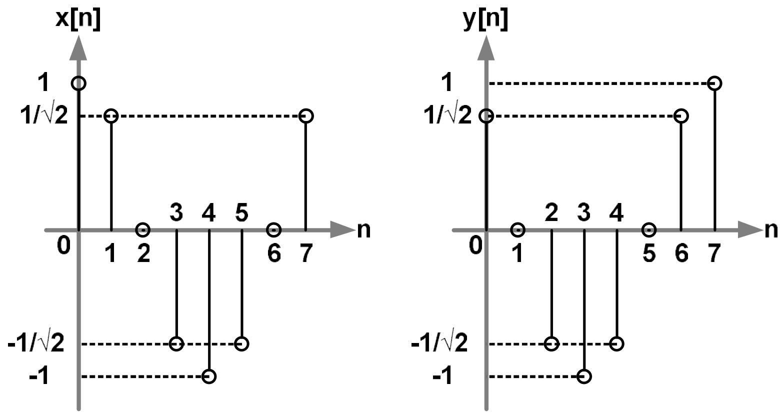
Q.10	A plot of land must be divided between four families. They want their individual plots to be similar in shape, not necessarily equal in area. The land has equally spaced poles, marked as dots in the below figure. Two ropes, R1 and R2, are already present and cannot be moved. What is the least number of **additional** straight ropes needed to create the desired plots? A single rope can pass through three poles that are aligned in a straight line. 
(A)	2
(B)	4
(C)	5
(D)	3

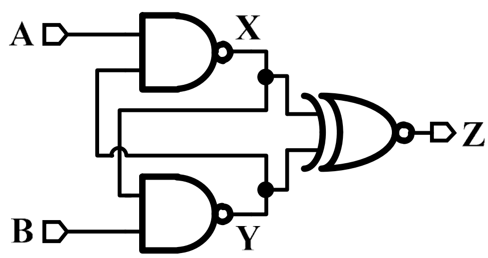
Q.11 – Q.35 Carry ONE mark Each

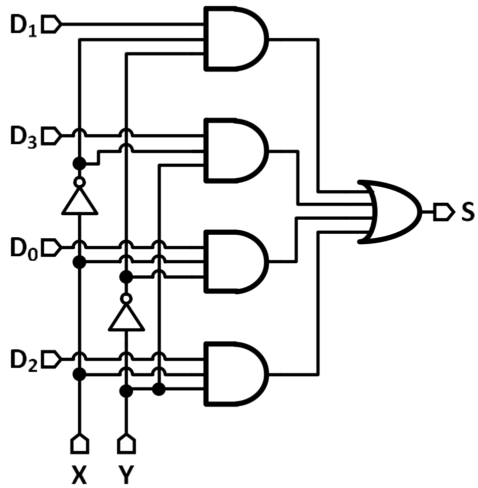
Q.11	If the given matrices $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ satisfy $A^2 = kA - 2I$, the value of coefficient k is ________.
(A)	1
(B)	2
(C)	0
(D)	4

Q.12	Evaluation of the integral $\int \frac{dx}{\sqrt{2x-x^2}}$ results in
(A)	$\sin^{-1}(x-1)+c$
(B)	$\cos^{-1}(x-1)+c$
(C)	$\sin^{-1}\left(\frac{x}{2}\right)+c$
(D)	$\cos^{-1}\left(\frac{x}{2}\right)+c$
Q.13	If $\vec{V}=a\hat{i}+b\hat{j}+c\hat{k}$, identify the INVALID operation on $\vec{V}$.
(A)	$\nabla\bullet\nabla\times(\vec{V})$
(B)	$\nabla\times\nabla\bullet(\vec{V})$
(C)	$\nabla(\nabla\bullet(\vec{V}))$
(D)	$\nabla\times\nabla(\vec{V})$

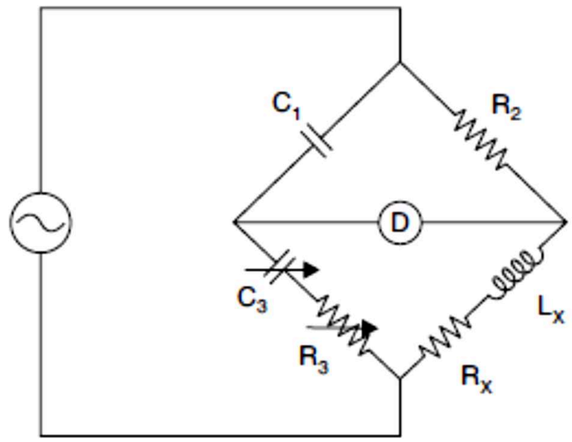
Q.14	$x(t)$ is a real continuous-time signal whose magnitude frequency response ($\|X(j\omega)\|$) is shown below. After sampling $x(t)$ at 100 rad.s^{-1}, the spectral point P is down-converted to ________ rad.s^{-1} in the spectrum of the sampled signal. 
(A)	12.5
(B)	25
(C)	6.25
(D)	37.5

Q.15	Discrete signals $x[n]$ and $y[n]$ are shown below. The cross-correlation $r_{xy}[0]$ is ______________. 
(A)	$2\sqrt{2}$
(B)	$\frac{1}{2\sqrt{2}}$
(C)	$\frac{1}{2}$
(D)	$\frac{1}{\sqrt{2}}$

Q.16	In the circuit diagram shown below, the logic gates operate with a supply voltage of 1 V. NAND and XNOR have 200 ps and 400 ps input-to-output delay, respectively. At time $t = T$, $A(t) = 0$, $B(t) = 1$ and $Z(t) = 0$. When the inputs are changed to $A(t) = 1$, $B(t) = 0$ at $t = 2T$, a 1 V pulse is observed at Z. The pulse width of the 1 V pulse is _________ ps. 
(A)	100
(B)	200
(C)	400
(D)	600

Q.17	Input bits X and Y are added by using the combinational logic as shown below. S represents the sum of the two bits. For a correct implementation of the sum, the signals D_0, D_1, D_2, D_3 are ______________, respectively. 
(A)	1, 0, 0, 1
(B)	0, 1, 0, 1
(C)	1, 0, 1, 1
(D)	0, 1, 1, 0

Q.18	The time delay between the peaks of the voltage signals $v_1(t) = 2\cos(6t + 60°)$ and $v_2(t) = -3\sin(6t)$ is ________ s.
(A)	300π/360
(B)	10π/360
(C)	50π/360
(D)	200π/360

Q.19	For the balanced Owen-bridge circuit shown in the figure, the values of L_x and R_x are: 
(A)	$L_x = \frac{R_2 R_3}{C_3}, \quad R_x = \frac{R_2 C_1}{C_3}$
(B)	$L_x = R_2 R_3 C_1, \quad R_x = \frac{R_2 C_1}{C_3}$
(C)	$L_x = R_2 R_3 C_1, \quad R_x = \frac{R_2 C_3}{C_1}$
(D)	$L_x = R_2 R_3 C_3, \quad R_x = R_2 C_1 C_3$

Q.20	Myopia occurs when the focal point falls __________ the retina. This can be corrected using a __________ lens.
(A)	in front of, convex
(B)	behind, convex
(C)	in front of, concave
(D)	behind, concave
Q.21	Choose the correct sequence for the direction of blood flow in a healthy human being starting and ending with the left ventricle.
(A)	Left ventricle → Aorta → Systemic arteries → Systemic veins → Vena cavae → Pulmonary vein → Pulmonary artery → Right ventricle → Left ventricle
(B)	Left ventricle → Aorta → Systemic arteries → Systemic veins → Vena cavae → Right ventricle → Pulmonary artery → Pulmonary vein → Left ventricle
(C)	Left ventricle → Systemic arteries → Aorta → Systemic veins → Right ventricle → Pulmonary artery → Pulmonary vein → Left ventricle
(D)	Left ventricle → Aorta → Systemic arteries → Vena cavae → Systemic veins → Right ventricle → Pulmonary artery → Pulmonary vein → Left ventricle

Q.22	In a healthy adult, which one of the following regions of the brain contains primarily white matter?
(A)	Cerebral cortex
(B)	Basal ganglia
(C)	Limbic system
(D)	Corpus callosum
Q.23	Skeletal muscles are recruited to lift loads. If the force generated in the muscle due to contraction is not sufficient to lift the load, it is known as ______ contraction.
(A)	Isometric
(B)	Isotonic
(C)	Isokinetic
(D)	Isoinertial

Q.24	Backscattered electron detector of a scanning electron microscope is used to
(A)	study surface topography of the sample
(B)	quantify surface roughness
(C)	measure atomic number
(D)	contrast areas with different chemical compositions
Q.25	In the process of obtaining a Magnetic Resonance Image (MRI), the terms T1 and T2 time constants of the material are very crucial to decide on getting suitable weighted images. Choose the correct explanation relating to these two constants from the following options.
(A)	T1 is the spin-lattice or longitudinal relaxation time, and T2 is the spin-spin or transverse relaxation time
(B)	T1 and T2 indicate the durations that Free Induction Decay (FID) signal to be recorded in x and y axes directions, respectively
(C)	T1 and T2 refer to the durations of flipping pulses used to tilt the resultant magnetic vector into x-y plane and inverse z-direction, respectively
(D)	T1 is the spin-spin or transverse relaxation time, and T2 is the spin-lattice or longitudinal relaxation time

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Q.26	Given x is real, identify all the even-functions among the following:
(A)	$x\|x\|$
(B)	$\frac{\cos(x)}{x}$
(C)	$\sin x^2$
(D)	$e^{-\|x\|}$
Q.27	An ideal coronary stent should
(A)	be thromboresistant
(B)	promote accumulation of smooth muscle cells
(C)	be fatigue resistant
(D)	support deposition of extracellular matrix

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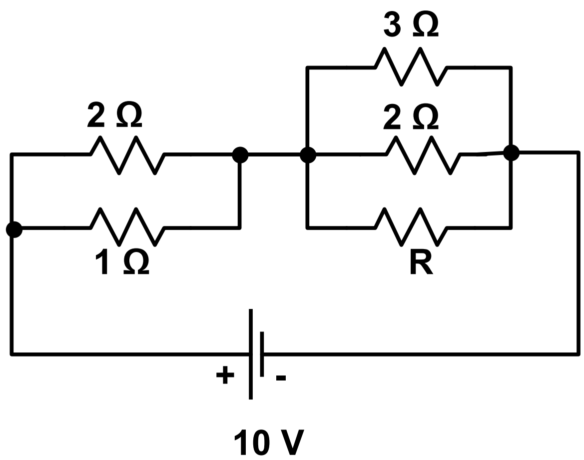
Q.28	Which of the following statements related to the safety of biomedical instruments are TRUE?
(A)	When a person is exposed to an electrical hazard, let-go current is defined as the maximum current at which the subject can withdraw voluntarily
(B)	Microshock is a physiological response resulting from an electrical current passing through heart
(C)	The patient in an intensive care unit is being exposed to the danger of microshock because of using internal conductive electrodes in the vicinity of the heart
(D)	The 50 Hz safe current limit for a microshock is greater than 50 mA
Q.29	Which of the following statements related to the operating principle of pulse oximetry are CORRECT?
(A)	Pulse oximeter can non-invasively determine arterial oxygen saturation (SpO_2) by analyzing the light transmitted through the skin during the systolic phase of the blood flow through the tissue
(B)	In a pulse oximeter, isosbestic wavelength is the wavelength at which Hb and HbO_2 have same optical absorbance
(C)	Pulse oximeter can accurately determine the SpO_2 of blood by computing the ratio of absorbances at 660 nm and 905 nm wavelengths
(D)	Pulse oximeter can accurately determine the SpO_2 of blood by computing the ratio of absorbances at 850 nm and 950 nm wavelengths

Q.30	Which of the following statements related to biomedical measurements are TRUE?
(A)	Electrical activity of neurons in the peripheral nervous system can be measured by ENG
(B)	Electrical activity of the retina in response to light stimulus can be measured using EOG
(C)	In a human EEG, Gamma waves are high frequency waves compared to Beta, Delta, and Theta waves
(D)	P wave in ECG manifests ventricular repolarization
Q.31	Which of the following mechanical prosthetic valves were invented as a replacement for diseased heart valves?
(A)	Globe valve
(B)	Ball and cage valve
(C)	Bi-leaflet valve
(D)	Swing check valve

Q.32	Due to the current COVID pandemic conditions, assume that positive or negative status of any individual are equally likely. There are 3 members in a family. If one of the members has tested COVID positive, the conditional probability that at least 2 members are COVID positive is _____ (rounded off to three decimal places).
Q.33	A series RLC circuit with R = 10 Ω, L = 50 mH and C = 100 μF connected to 200 V, 50 Hz supply consumes power P. The value of L is changed such that this circuit consumes same power P but operates with lagging power factor. The new value of L is _____ mH (rounded off to two decimal places).
Q.34	The thickness of piezoelectric crystal (PZT5A) used in ultrasound applications will determine the resonant frequency of the transducer. To work at a resonance frequency of 5 MHz, the thickness of a PZT5A transducer must be _______ mm (rounded off to three decimal places). Given: The velocity of sound in PZT5A is 4350 $m.s^{-1}$.

Q.35	Power consumed by the 3 Ω resistor is 12 W in the given circuit. The value of the resistor R in the circuit is ________ Ω. 

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Q.36 – Q.65 Carry TWO marks Each

Q.36	In the complex z-domain, the value of the integral $\oint_C \frac{z^3-9}{3z-i}dz$ is
(A)	$\frac{2\pi}{81} - 6i\pi$
(B)	$\frac{2\pi}{81} + 6i\pi$
(C)	$-\frac{2\pi}{81} + 6i\pi$
(D)	$-\frac{2\pi}{81} - 6i\pi$

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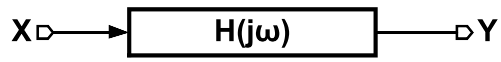
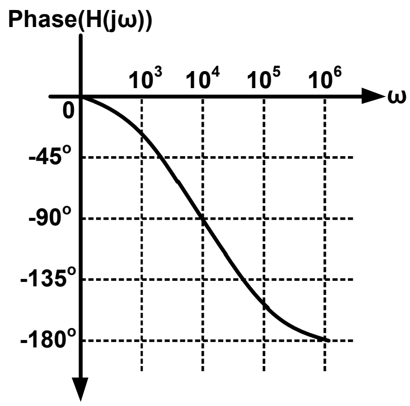
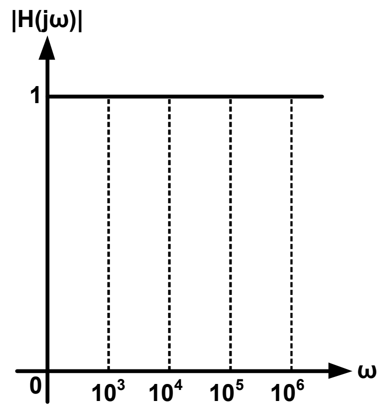
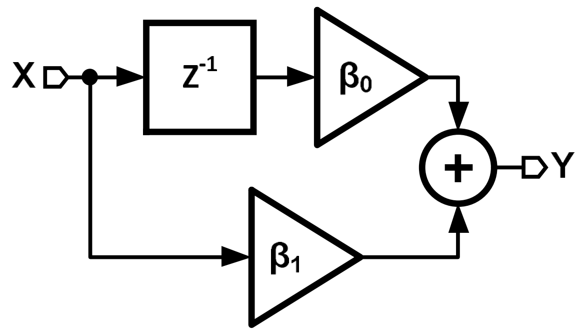
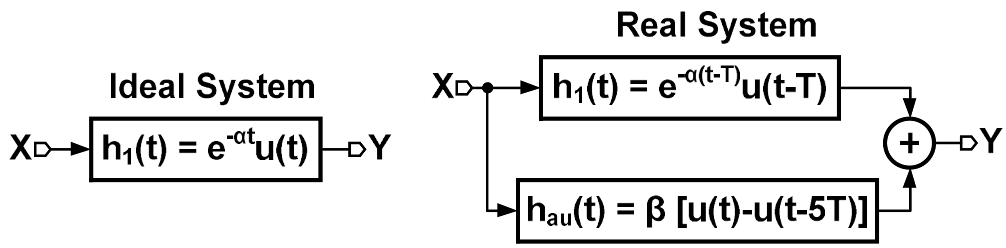
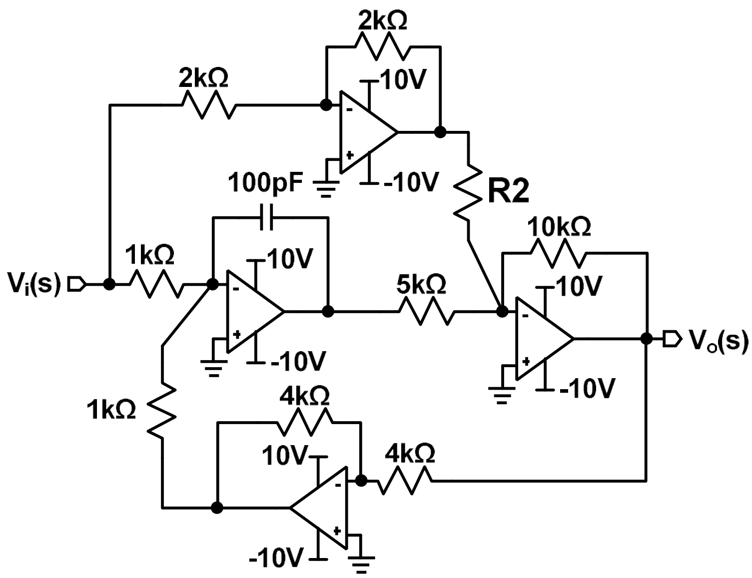
Q.37	Solution of the differential equation $\frac{dy}{dx} - y = \cos x$ is
(A)	$y = \frac{\sin x - \cos x}{2} + ce^{x}$
(B)	$y = \frac{\sin x + \cos x}{2} + ce^{x}$
(C)	$y = \frac{\sin x - \cos x}{2} + ce^{-x}$
(D)	$y = \frac{\sin x + \cos x}{2} + ce^{-x}$

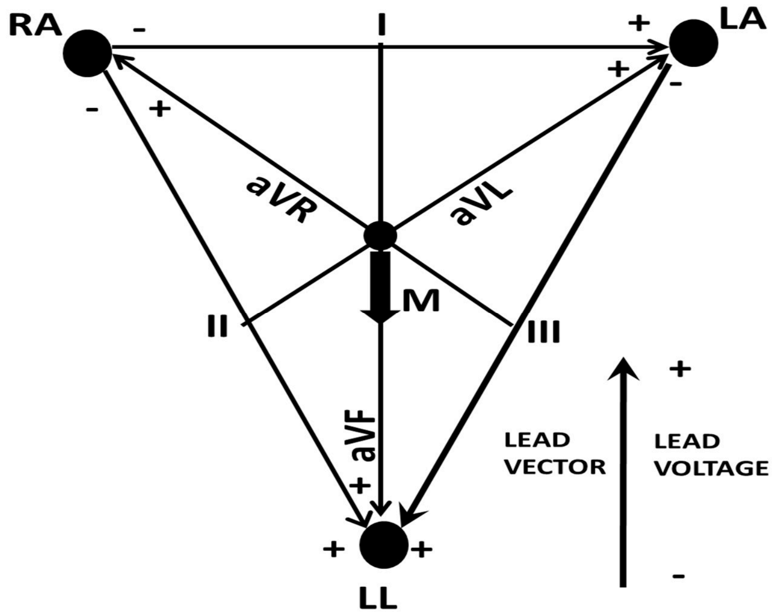
Q.38	An input $x(t)$ is applied to a system with a frequency transfer function given by H(jω) as shown below. The magnitude and phase response of the transfer function are shown below. If $y(t_d) = 0$ for $x(t) = u(t)$, the time t_d (> 0) is ______ μs.   
(A)	$100 \ln(2)$
(B)	$10 \ln(2)$
(C)	$1000 \ln(2)$
(D)	$\ln(2)$

Q.39	The block diagram of a two-tap high-pass FIR filter is shown below. The filter transfer function is given by $H(z) = Y(z)/X(z)$. If ratio of the maximum to minimum value of $H(z)$ is 2 and $\lvert H(z)\rvert_{max} = 1$, the coefficients β_0 and β_1 are _________ and ________, respectively. 
(A)	0.75, −0.25
(B)	0.67, 0.33
(C)	0.60, −0.40
(D)	−0.64, 0.36

Q.40	The block diagrams of an ideal system and a real system with their impulse responses are shown below. An auxiliary path is added to the delayed impulse response in the real system. For a unit impulse input ($x(t) = \delta(t)$) to both systems, gain β is chosen such that $y(4T)$ is same for both systems. The value of β is __________. 
(A)	$e^{-3\alpha T}\,(1 - e^{-2\alpha T})$
(B)	$-e^{-\alpha T}\,(1 - e^{-3\alpha T})$
(C)	$-e^{-3\alpha T}\,(1 - e^{-\alpha T})$
(D)	$e^{-2\alpha T}\,(1 - e^{-2\alpha T})$

Q.41	A filter is designed using opamps, resistors, and capacitors as shown below. Opamps are ideal with infinite gain and infinite bandwidth. If $V_o(s)/V_i(s)$ is an all-pass transfer function, the value of resistor **R2** is ______________ kΩ. 
(A)	1
(B)	10
(C)	5
(D)	2

Q.42	If $g(t) = \dfrac{df(t)}{dt}$, and $F(s) = \dfrac{1+s}{s^2+12s+32}$ where $F(s)$ is the Laplace transform of the function $f(t)$, then the value of $g(t)$ at $t = 0$ is _______.
(A)	-11
(B)	-5
(C)	-17
(D)	∞

Q.43	Consider the Einthoven's triangle of frontal ECG for the 3 electrodes RA, LA and LL shown in the figure. The augmented lead vectors bisect the bipolar lead vectors. At the peak of R wave, the cardiac vector M points vertically downwards with $\lvert M \rvert = 5\ mV$. The voltages on leads **I** and **II** are ______ mV and ______ mV, respectively. 
(A)	0, 4.33
(B)	2.17, 0
(C)	0, 2.17
(D)	4.33, 0

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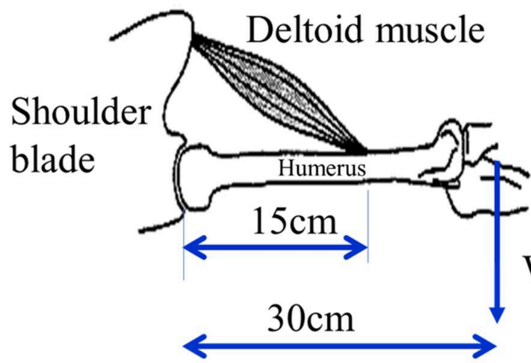
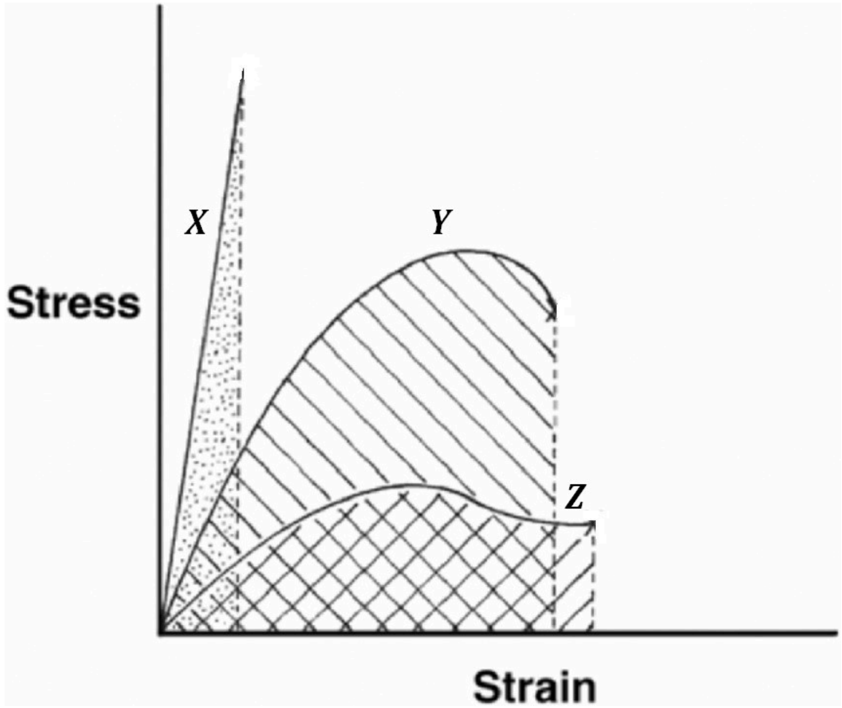
Q.44	Which one of the following statements is TRUE?
(A)	A myelinated axon has a greater ATP requirement than an unmyelinated axon of the same diameter and length
(B)	An unmyelinated axon has a greater ATP requirement than a myelinated axon of the same diameter and length
(C)	An unmyelinated axon has the same ATP requirement as a myelinated axon of the same diameter and length
(D)	An unmyelinated axon always has a greater ATP requirement than a myelinated axon irrespective of their diameter and length

Q.45	The deltoid muscle connects the humerus to the shoulder blade and facilitates out stretching of the arm as shown in the figure. The humerus is connected to the shoulder blade with a ball and socket joint. Assume the equivalent weight (W) of the arm to be 30 N and acts vertically down at a horizontal distance of 30 cm. Assume that the deltoid muscle is connected to the humerus at a distance of 15 cm and makes an average angle of 20º with the horizontal. The magnitude of tension in the deltoid muscle is ________ N. 
(A)	31.9
(B)	63.8
(C)	87.7
(D)	175.4

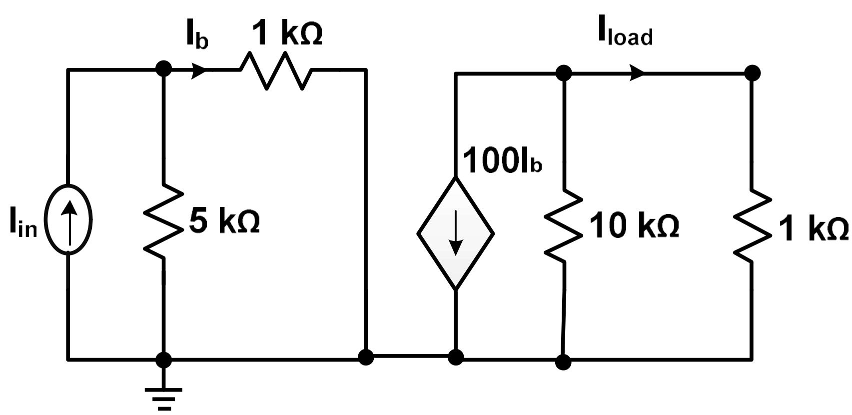
Q.46	For blood flow through arteries, which one of the following relations approximates the pulse wave propagation speed (C) as a function of the inner diameter (D) of the artery, wall thickness (t), modulus of elasticity (E), and fluid density (ρ)?
(A)	$C = \sqrt{\dfrac{E\,t}{\rho\,D}}$
(B)	$C = \sqrt{\dfrac{\rho\,D}{E\,t}}$
(C)	$C = \sqrt{\dfrac{\rho D^3\,t^3}{E}}$
(D)	$C = \sqrt{\dfrac{E\,\rho}{D\,t}}$

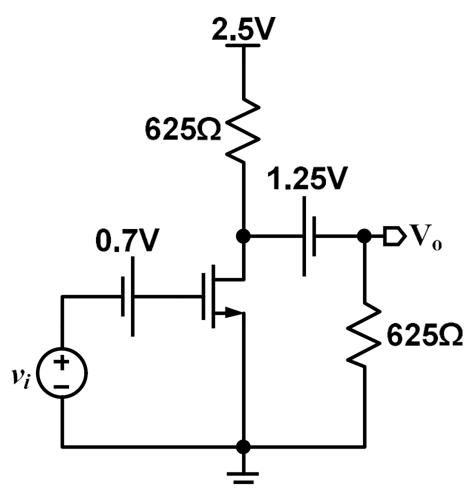
Q.47	A person has a total blood volume of 5 L. Out of this total, assume that 4 L is contained in the systemic circulation and 1 L in pulmonary circulation. The cardiac output of the person is 5 $L.min^{-1}$. Time taken for a drop of blood to go from right ventricle to left ventricle is _________ s.
(A)	60
(B)	20
(C)	15
(D)	12

Q.48	Based on the stress-strain curves of three different materials (X, Y, and Z) shown in the figure, which one of the following choices is CORRECT? 
(A)	X – Titanium, Y – Hydroxyapatite, Z – Polyethylene
(B)	X – Hydroxyapatite, Y – Titanium, Z – Polyethylene
(C)	X – Hydroxyapatite, Y – Polyethylene, Z – Titanium
(D)	X – Polyethylene, Y – Titanium, Z – Hydroxyapatite

Q.49	Consider two radionuclides P and Q. Suppose the half-life of P ($t^P_{1/2}$) is four times that of Q ($t^Q_{1/2}$). At time t = 0, there are N_0 atoms of both radionuclides. When will the radioactivity of the two radionuclides be equal?
(A)	$t = t^P_{1/2}$
(B)	$t = 0.66t^P_{1/2}$
(C)	$t = 0.75t^P_{1/2}$
(D)	$t = 1.5t^P_{1/2}$
Q.50	In a biological study, the experimental values measured from 6 subjects are given in the table below. Using this data, the linear regression coefficient for estimating the weight of the heart based on the systolic pressure is _______ (rounded off to two decimal places).

Systolic pressure (in mm Hg)	120	90	100	110	140	130
Weight of the heart (in g)	500	300	420	390	490	450

Q.51	Using divergence theorem, evaluate the integral $\iint_S \vec{F}\cdot\vec{n}\,dA$, where S is the surface of the cone $x^2+y^2\le z^2, 0\le z\le 3$. If $\vec{F}=4x\hat{i}+3z\hat{j}+5y\hat{k}$ is vector function with outer unit normal vector $\vec{n}$, the value of the integral is ________ (rounded off to the nearest integer).
Q.52	The magnitude of the current gain $\frac{\text{I}_{\text{load}}}{\text{I}_{\text{in}}}$ in the circuit below is _______ (rounded off to two decimal places). 
Q.53	The linear temperature coefficient of the material of a wire is $x\times 10^{-4}\ ^\circ\text{C}^{-1}$. The resistance of this wire increased from 50 Ω at 25 °C to 60 Ω at 75 °C. The value of x is __________ (rounded off to two decimal places).

Q.54	A series RLC circuit is connected to 220 V, 50 Hz supply. For a fixed value of R and C, the inductor L is varied to deliver the maximum current. This value is 0.4 A and the corresponding potential drop across the capacitor is 330 V. The value of the inductor L is _________ H (rounded off to two decimal places).
Q.55	In the circuit diagram shown below, the MOSFET is biased in saturation region. The MOSFET has a threshold voltage $V_{th} = 0.5\ V$, width $W = 100\ \mu m$, length $L = 0.1\ \mu m$, and $\mu_n C_{ox} = 100\ \mu A.V^{-2}$. Assuming $v_i = 1\ mV$ as a small-signal input to MOSFET, the magnitude of the output voltage V_o is ______ mV (accurate to two decimal places). Ignore channel-length modulation for the MOSFET. 

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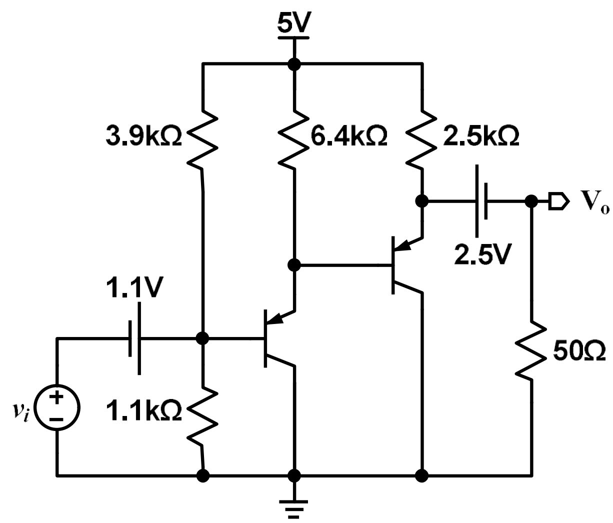
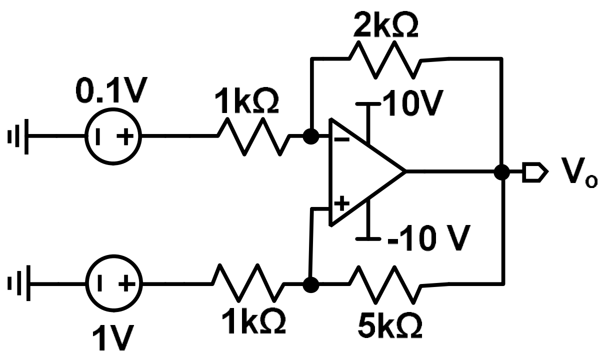
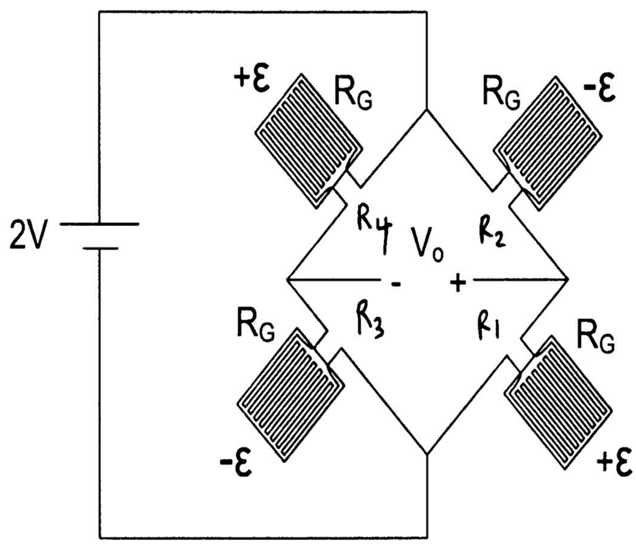
Q.56	In the circuit diagram shown below, BJTs are biased with $V_{EB} = 0.7\ V$. Neglect the base current for operating point calculations. Assume infinite input and output impedance for the BJTs. The output voltage V_o with small input voltage $v_i = 10\ mV$ is ________ mV (rounded off to one decimal place). The thermal voltage $V_T = 25\ mV$ at room temperature. 

Q.57	An ideal opamp with an infinite gain and infinite bandwidth is connected in feedback as shown below. The output voltage V_o for the given input voltages in the circuit is _______ V (accurate to one decimal place). 
Q.58	Independent voltage measurements ($\mu \pm \sigma$) of three sensors where μ and σ are the mean and standard deviation of the measurements, respectively are as follows: $v_1 = 4.52 \pm 0.02\ V$, $v_2 = 4.21 \pm 0.20\ V$, $v_3 = 3.96 \pm 0.15\ V$. The measurement uncertainty in $v_1 + v_2 + v_3$ is ____ V (rounded off to two decimal places).
Q.59	A moving coil voltmeter has an internal resistance of 50 Ω. The scale of the meter is divided into 100 equal divisions. When a potential of 1 V is applied to terminals of voltmeter, a deflection of 100 divisions is obtained. However, it is desired that when a potential of 500 V is applied to the terminals, a deflection of 100 divisions should be obtained. The value of resistance that needs to be connected in series to achieve this is ________ Ω.

Q.60	A Hall effect flow meter is used to measure the volumetric flow through a blood vessel. The flow meter induces a magnetic field across the vessel and uses a voltmeter to measure the voltage across the vessel which is normal to both magnetic field and blood flow. A caliper is used to measure the vessel diameter. The system calculated the flow rate to be 100 $cm^3.s^{-1}$ using the known magnetic field, and measured values of voltage and vessel diameter. After the measurement, a calibration is performed, and it is discovered that the voltmeter was measuring 40% larger than the actual value and the caliper was measuring the diameter 10% smaller than the actual value. Assuming a uniform flow profile along the vessel and ignoring viscosity, the actual blood flow is ________ $cm^3.s^{-1}$ (rounded off to two decimal places).

Q.61	A catheter based arterial blood pressure measurement device uses a flexible diaphragm mounted with four identical strain gauges in a Wheatstone bridge configuration as shown in the figure. Assume that the strain gauges have a nominal resistance value of $R_G = 10$ kΩ, Gauge Factor G = 40 and Young's Modulus E = 10 MPa. Blood pressure variations results in small finite change in strain ϵ ($\epsilon > 0$). If V_o is the output voltage of the Wheatstone bridge and σ is the stress in MPa, the sensitivity $\frac{V_o}{\sigma}$ is _______ V.MPa^{-1}. 
Q.62	A patient has a breathing rate of 18 breaths per minute, with a tidal volume of 500 mL, having an anatomical dead space of 150 mL. If the person has a heart rate of 120 beats per minute and a stroke volume of 50 mL, the alveolar ventilation to perfusion ratio is _____________ (accurate to two decimal places).

Q.63	Assume that the ratio of total blood volume in liters to total body weight in kg is 0.07 and the blood consists of plasma and RBCs only. The plasma volume of a 70-kg man with 52% hematocrit is ______ L (rounded off to two decimal places).
Q.64	The 1st generation (1G) CT scanner uses a point X-ray source and a detector. The source detector assembly can move linearly at a speed of 0.5 $m.s^{-1}$ and that it takes 0.5 s for source-detector assembly to rotate one angular increment, regardless of the angle. This scanner is expected to collect 360 projections over 180° of span. The field of view used for data collection has a diameter of 0.5 m. The scan time required is _______ s.
Q.65	The inverse square law has a very practical use in radiography. While taking an acceptable chest radiograph of a subject at a distance of 0.75 m from the X-ray generator, X-ray source settings were kept at 50 kVp, 50 mA.s. If the subject is moved to a distance of 1 m, and the kVp is kept the same, the new value of mA.s to obtain the same exposure will be _____ mA.s (rounded off to two decimal places).

Q. No.	Session	Question Type	Subject Name	Key/Range	Mark
1	1	MCQ	GA	D	1
2	1	MCQ	GA	C	1
3	1	MCQ	GA	D	1
4	1	MCQ	GA	A	1
5	1	MCQ	GA	B	1
6	1	MCQ	GA	B	2
7	1	MCQ	GA	D	2
8	1	MCQ	GA	D	2
9	1	MCQ	GA	B	2
10	1	MCQ	GA	D	2
11	1	MCQ	BM	A	1
12	1	MCQ	BM	A	1
13	1	MCQ	BM	B	1
14	1	MCQ	BM	D	1
15	1	MCQ	BM	B	1
16	1	MCQ	BM	B	1
17	1	MCQ	BM	A	1
18	1	MCQ	BM	C	1
19	1	MCQ	BM	B	1
20	1	MCQ	BM	C	1
21	1	MCQ	BM	B	1
22	1	MCQ	BM	D	1
23	1	MCQ	BM	A	1
24	1	MCQ	BM	D	1
25	1	MCQ	BM	A	1
26	1	MSQ	BM	C, D	1
27	1	MSQ	BM	A, C	1
28	1	MSQ	BM	A, B, C	1
29	1	MSQ	BM	A, B, C	1
30	1	MSQ	BM	A, C	1
31	1	MSQ	BM	B, C	1
32	1	NAT	BM	0.570 to 0.572	1
33	1	NAT	BM	152.01 to 152.99	1
34	1	NAT	BM	0.434 to 0.436	1
35	1	NAT	BM	6 to 6	1
36	1	MCQ	BM	A	2
37	1	MCQ	BM	A	2
38	1	MCQ	BM	A	2
39	1	MCQ	BM	A	2
40	1	MCQ	BM	C	2
41	1	MCQ	BM	B	2
42	1	MCQ	BM	A	2
43	1	MCQ	BM	A	2
44	1	MCQ	BM	B	2

45	1	MCQ	BM	D	2
46	1	MCQ	BM	A	2
47	1	MCQ	BM	D	2
48	1	MCQ	BM	B	2
49	1	MCQ	BM	B	2
50	1	NAT	BM	3.27 to 3.31	2
51	1	NAT	BM	111 to 114	2
52	1	NAT	BM	75.49 to 76.01	2
53	1	NAT	BM	44.35 to 44.55	2
54	1	NAT	BM	2.59 to 2.70	2
55	1	NAT	BM	6.25 to 6.25	2
56	1	NAT	BM	6.2 to 6.8	2
57	1	NAT	BM	4.6 to 4.6	2
58	1	NAT	BM	0.25 to 0.26	2
59	1	NAT	BM	24950 to 24950	2
60	1	NAT	BM	78.71 to 79.91	2
61	1	NAT	BM	8 to 8	2
62	1	NAT	BM	1.05 to 1.05	2
63	1	NAT	BM	2.29 to 2.41	2
64	1	NAT	BM	538 to 542	2
65	1	NAT	BM	88.86 to 88.92	2