

## Section 1 - Section 1

## Question No.1

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Bookmark 

Choose the best synonym of the italicized word. The prisoners of war signed the document under *coercion*.

- supervision
- compulsion
- confusion
- security

## Question No.2

4.00

Bookmark 

The following is true for the following partial differential equation used in nonlinear mechanics known as the Korteweg-de Vries equation

- linear; 1st order
- linear; 3rd order
- nonlinear; 1st order
- nonlinear; 3rd order

## Question No.3

4.00

Bookmark 

The efficiency of a Carnot engine working between 0°C and 100°C

- 0.5
- 1
- 100/373
- 100/273

## Question No.4

4.00

Bookmark 

If three 18 $\mu$ F capacitors are connected in series, the net capacitance is

- 18 $\mu$ F
- 54 $\mu$ F
- 0 $\mu$ F
- 6 $\mu$ F

## Question No.5

4.00

Bookmark 

Beta particles are emitted

- Due to reversion of the excited nucleus to the ground state.
- Due to conversion of neutrons into protons in the nucleus
- Due to conversion of protons into neutrons
- When outermost orbital electron leave the atom

## Question No.6

4.00

Bookmark 

Which is the most economical section for a beam

- I- Section
- Circular
- Square
- Rectangular

## Question No.7

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The frequency of damped oscillations as compared to frequency of undamped vibrations with viscous damping, is

- Same
- More
- Less
- Zero

## Question No.8

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Bookmark 

In allene, hybridization of the central and terminal carbons, respectively, are

- sp and sp<sup>2</sup>
- sp<sup>2</sup> and sp<sup>3</sup>
- sp and sp<sup>3</sup>
- sp<sup>2</sup> and sp<sup>2</sup>

## Question No.9

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A field line and an equipotential surface are

- Inclined at 210°
- Always parallel
- Always at 90°
- Inclined at 30°

## Question No.10

4.00

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The angular momentum of the electron in the hydrogen atom can be

- $h/\pi$

- $h/4\pi$
- $2h$
- $3h$

**Question No.11**

4.00

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Which one of the following gives the force required to accelerate a car of mass 2000 kg from rest to 30 m/s in 12 s, if the frictional force between the tyres and the ground is 0.2 N/kg?

- 5000 N
- 4600 N
- 400 N
- 5400 N

**Question No.12**

4.00

Bookmark

The following are the example for mobile elements

- Cu, Mg
- Fe, Ca
- Mn, Mo
- Bo, S

**Question No.13**

4.00

Bookmark

Proteins specific to sugars are called

- Lectin
- Myoglobin
- Pectin
- Chitin

**Question No.14**

4.00

Bookmark

According to MO theory, for the atomic species ' $C_2$ '

- bond order is two and it is diamagnetic
- bond order is two and it is paramagnetic
- bond order is zero and it is diamagnetic
- bond order is zero and it is paramagnetic

**Question No.15**

4.00

Bookmark

A semiconductor is known to have an electron concentration of  $8 \times 10^{19} \text{ m}^{-3}$  and a hole concentration of  $5 \times 10^{18} \text{ m}^{-3}$  (electron mobility = 2.0 and hole mobility = 0.01). The resistivity of the semiconductor is

- $0.256 \Omega \text{ m}$
- $256 \Omega \text{ m}$
- $2.56 \Omega \text{ m}$
- $25.6 \Omega \text{ m}$

**Question No.16**

4.00

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Which is NOT required for "DNA replication?"

- Polymerase
- Kinase
- Primase
- Helicase

**Question No.17**

4.00

Bookmark

Which of the following is NOT true about condensin protein complex?

- binds two sister chromatids together
- binds a single chromatid at multiple spots
- twists the chromatin into coils and loops
- it is an elongated complex of several proteins that binds and encircles DNA

**Question No.18**

4.00

Bookmark

The differential equation  $2 \frac{dy}{dx} + x^2 y = 2x + 3$ ,  $y(0) = 5$  is

- Linear with fixed constants
- Linear

- Nonlinear
- Undeterminable to be linear or nonlinear

**Question No.19**

4.00

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Let  $A$  be a Hermitian matrix. Then, which of the following statements is false?

- If  $A^3 = I$ , then  $A = I$ .
- The diagonal entries of  $A$  are all real.
- There exists a unitary  $U$  such that  $U A U$  is a diagonal matrix.
- If  $A^2 = I$ , then  $A = I$ .

**Question No.20**

4.00

Bookmark 

In a molecule of chlorine trifluoride,  $ClF_3$  bond angle is

- $109.5^\circ$
- $107.5^\circ$
- $78.5^\circ$
- $87.5^\circ$

**Question No.21**

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Which of the following amino acid is likely to destabilise an alpha helix?

- Histidine
- Glycine
- Proline
- Leucine

**Question No.22**

4.00

Bookmark 

If obtained solution has same number of constants as the order of the differential equation then the solution of the differential equation is

- Singular solution
- General solution
- Integrating factor
- Particular solution

**Question No.23**

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Bookmark 

If  $A+B$  means  $A$  is daughter of  $B$ ,  
 $A-B$  means  $A$  is husband of  $B$   
 $A \times B$  means  $A$  is brother of  $B$

From the statement  $P - Q + R \times S$ , how is  $Q$  related to  $S$ ?

- Niece
- Sister
- Mother
- None of these

**Question No.24**

4.00

Bookmark 

Let  $y = a \cos 4x + b \sin 4x$  is solution of a differential equation then its order must be.

- Two
- One
- Three
- Any Positive Number Could Be

**Question No.25**

4.00

Bookmark 

In a transistor \_\_\_\_\_

- $I_E = I_C + I_B$
- $I_B = I_C + I_E$
- $I_E = I_C - I_B$
- $I_C = I_E + I_B$

**Question No.26**

4.00

Bookmark 

Two weights are suspended from a string thrown over a light frictionless pulley. The mass of one weight is 0,200 kg. If a heavy weight is attached to its other end, the tension in the string is

- 0,600 kgf
- Zero
- 0,400 kgf
- 0,200 kgf

## Question No.27

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Bookmark 

If value of  $x$  for normal distribution is 35, mean of normal distribution is 65 and standard deviation is 25 then standardized random variable is

- 1.7
- 1.5
- 4
- 1.2

## Question No.28

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Which number replaces the question mark?



- 9
- 10
- 12
- 11

## Question No.29

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The unit of capacitance is

- Henry / Wb
- Coulombs / Volt
- Volts/ Coulomb
- Ohms

## Question No.30

4.00

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The carbon-14 activity of an old wood sample is found to be  $14.2 \text{ disintegrations min}^{-1}\text{g}^{-1}$ . Calculate age of oldwood sample, if for a fresh wood sample carbon-14 activity is  $15.3 \text{ disintegrations min}^{-1}\text{g}^{-1}$  ( $t_{1/2}$  carbon-14 is 5730 years), is:

- 877
- 4000
- 5000
- 617

## Question No.31

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Choose the best antonym of the italicized word.

Many snakes are actually *innocuous*.

- poisonous
- harmful
- deadly
- ferocious

## Question No.32

4.00

Bookmark 

If 5 men or 8 boys can do a work in 84 days. In how many days can 10 men and 5 boys can do the same work?

- 35
- 28
- 25
- 32

## Question No.33

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Bookmark 

The ratio of reverse resistance and forward resistance of a germanium crystal diode is about

- 100:1
- 1:1
- 40,000:1
- 1000:1

## Question No.34

4.00

Bookmark 

Set of  $(x,y)$  ordered pair that can satisfy equation is called

- solution set
- order set
- variable set
- pair set

## Question No.35

4.00

Bookmark 

If A is the amplitude of a wave from a point source at a distance R from the source,

- $A \propto 1/R^2$
- $A \propto 1/R$
- A is independent of R
- $A \propto 1/\sqrt{R}$

## Question No.36

4.00

Bookmark 

If in a certain language, GRASP is coded as BMVKN, which word would be coded as CRANE?

- BQZMD
- XMVIZ
- HWFSJ
- FUDQH

## Question No.37

4.00

Bookmark 

The geometries of  $\text{Ni}(\text{CO})_4$  and  $[\text{NiCl}_4]^{2-}$ , respectively, are

- Square planar and tetrahedral
- Tetrahedral and tetrahedral
- Tetrahedral and square planar
- Square planar and square planar

## Question No.38

4.00

Bookmark 

Which among the following is NOT an omega-3 fatty acid?

- Alpha-linolenic acid
- Docosahexaenoic acid
- Eicosapentaenoic acid
- Linoleic acid

## Question No.39

4.00

Bookmark 

A dielectric material must be

- Resistor
- Semi conductor
- Insulator
- Good Conductor

## Question No.40

4.00

Bookmark 

Choose the correct meaning of the italicized idiom.

Those who work by *fits and start* seldom show good results.

- Regularly
- Rarely
- Disinterestedly
- Irregularly

## Question No.41

4.00

Bookmark 

These boys need some new books, \_\_\_\_\_?

- is it?
- isn't it?
- do they?
- don't they?

## Question No.42

4.00

Bookmark 

A two digit number is three times the sum of its digits. If 45 is added to it, the digits are reversed. The number is

- 32
- 35
- 27
- 31

## Question No.43

4.00

Bookmark 

As per the kinetic theory of ideal gases, which of the following statements is NOT correct?

- Particles are in a Brownian motion between collisions
- Particles exert same force per unit area on all sides of the container
- Gas molecules have mass but no volume
- During the collision, the system does not lose energy

## Question No.44

4.00

Bookmark 

"Silent spring" written by Rachel Carson deals with

- Excessive use of pesticides
- Deforestation
- Air pollution

- Air pollution
- Water pollution

Question No.45

4.00

Bookmark

Which of the following equations are solutions to the partial differential equation?

$$\frac{\partial^2 u}{\partial x^2} = 9 \frac{\partial^2 u}{\partial y^2}$$

- $\sin(3x - 3y)$
- $\cos(3x - y)$
- $x^2 + y^2$
- $e^{-3\pi x} \sin(\pi y)$

Question No.46

4.00

Bookmark

Study the following information carefully and answer the question below it:

Aasha, Bhuvnesh, Charan, Danesh, Ekta, Farhan, Ganesh and Himesh are sitting around a circle, facing the centre. Aasha sits fourth to the right of Himesh while second to the left of Farhan. Charan is not the neighbour of Farhan and Bhuvnesh. Danesh sits third to the right of Charan. Himesh never sits next to Ganesh.

Who among the following sits between Ganesh and Danesh?

- Bhuvnesh
- Ekta
- Aasha
- Charan

Question No.47

4.00

Bookmark

In a silicon transistor  $\alpha_{dc} = 100$ ,  $V_{CC} = 30V$ ,  $R_C = 1.5 \text{ k}\Omega$ . The saturation collector current of the transistor is

- 30mA
- 20mA
- 10mA
- 100mA

Question No.48

4.00

Bookmark

Since the \_\_\_\_\_ of the motor car, road accidents have increased dramatically.

- inception
- advent
- inauguration
- initiation

Question No.49

4.00

Bookmark

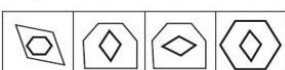
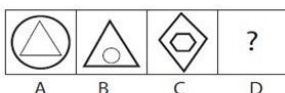
In Simpson's (1/3)rd rule the number of intervals is \_\_\_\_\_.

- Odd
- Even
- multiple of 6
- multiple of 3

Question No.50

4.00

Bookmark



- (1)
- (2)
- (3)
- (4)

- 2
- 3
- 4

**Question No.51**

4.00

Bookmark

In a single-component condensed system, if degree of freedom is zero, maximum number of phases that can co-exist \_\_\_\_\_.

- 1
- 2
- 0
- 3

**Question No.52**

4.00

Bookmark

Which among the following is a C4 plant?

- Paddy
- Sugarcane
- Red gram
- Wheat

**Question No.53**

4.00

Bookmark

Correct sequence flow of reaction in bioethanol production

- Distillation- Enzyme hydrolysis- Fermentation- - bioethanol
- Enzyme hydrolysis- Fermentation-distillation- bioethanol
- Enzyme hydrolysis- distillation- Fermentation- bioethanol
- Fermentation- Enzyme hydrolysis- distillation- bioethanol

**Question No.54**

4.00

Bookmark

Which of the following is an “even” function of  $t$ ?

- $t^3 + 6$
- $t^2$
- $t^2 - 4t$
- $\sin(2t) + 3t$

**Question No.55**

4.00

Bookmark

A solution to a boundary value problem which satisfies boundary condition is a solution to the

- Integral equation
- Differential equation
- logical equation
- Maxwell's equation

**Question No.56**

4.00

Bookmark

Iodine value of lipids is a measure of

- Degree of polysaturation of lipids
- Degree of unsaturation of lipids
- Degree of saturation of lipids
- Degree of monosaturation of lipids

**Question No.57**

4.00

Bookmark

A battery supplies 150W and 196W power to two resistors of  $6\Omega$  and  $4\Omega$  when they are connected separately to it.

The internal resistance of the battery is

- $0.5\Omega$
- $2\Omega$
- $1\Omega$
- $2.5\Omega$

**Question No.58**

4.00

Bookmark

Among the halides  $\text{NCl}_3$  (A),  $\text{PCl}_3$  (B) and  $\text{AsCl}_3$ , those which produce two different acids

- A and C
- B and C
- A,B and C
- A and B

**Question No.59**

4.00

Bookmark 

In mitochondria, oxidation of one molecule of NADH results in formation of

- Four Molecules of ATP
- Two molecules of ATP
- One molecule of ATP
- Three molecules of ATP

**Question No.60**

4.00

Bookmark 

The latent heat of vaporisation of water is 2,240 J. If the work done in the process of vaporisation of 1g is 168 J, then the increase in internal energy is

- 2072 J
- 1904 J
- 2408 J
- 2240 J

**Question No.61**

4.00

Bookmark 

The excess of pressure inside a bubble in a liquid is

- $2T/r$
- $T/r$
- $4T/r$
- $3T/r$

**Question No.62**

4.00

Bookmark 

The rate constant of unimolecular reaction was  $2.66 \times 10^{-3} \text{ s}^{-1}$  and  $2.2 \times 10^{-1} \text{ s}^{-1}$  at  $T = 120 \text{ K}$  and  $360 \text{ K}$  respectively. The rate constant (in  $\text{s}^{-1}$ ) at  $240 \text{ K}$  would be:

- $1.8 \times 10^{-3}$
- $4.8 \times 10^{-2}$
- $2.4 \times 10^{-2}$
- $2.4 \times 10^{-1}$

**Question No.63**

4.00

Bookmark 

"A total electric flux through any closed surface surrounding charges is equal to the amount of charge enclosed" The above statement is associated with

- Maxwell's second law
- Maxwell's first law
- Gauss's law
- Coulomb's square law

**Question No.64**

4.00

Bookmark 

The vapour of a pure substance, when cooled under a pressure less than its triple-point pressure

- Remains unchanged
- Liquefies first and then solidifies
- Solidifies directly
- Liquefies

**Question No.65**

4.00

Bookmark 

All the Eigen value of an orthogonal matrix are of unit modulus.

- true
- false
- All are false.
- The Eigen values of an orthogonal matrix may be any real matrix.

**Question No.66**

4.00

Bookmark 

The classical experiments of variation in plants by Gregor Mendel was performed in

- Arabidopsis
- Rice
- Maize
- Pea

**Question No.67**

4.00

Bookmark 

As the temperature of transistor goes up, the base-emitter resistance \_\_\_\_\_

- First increases and then decreases
- Remains Same
- Decreases
- Increases

**Question No.68**

4.00

Bookmark 

When potassium is added to water, it is seen that the lower region becomes warm first and becomes less dense. It then moves up and the more dense cold water comes down and the process goes on. What is the process taking place?

- Purification



- Convection
- Radiation
- Conduction

Question No.69

4.00

Bookmark

Analysis of boundary value problem involves functions of a differential operator. These functions are

- Eigen function
- algebraic function
- symmetric function
- logical function

Question No.70

4.00

Bookmark

In a transformer the energy is conveyed from primary to secondary

- Both air and cooling coil
- Through air
- By the flux
- Through cooling coil

Question No.71

4.00

Bookmark

A square matrix [A] is lower triangular if

- $a_{ij} \neq 0, i > j$
- $a_{ij} \neq 0, j > i$
- $a_{ij} = 0, j > i$
- $a_{ij} = 0, i > j$

Question No.72

4.00

Bookmark

For a face centered cubic lattice, the Miller indices for the first Bragg's peak (smallest Bragg angle) are

- 1 1 0
- 0 0 2
- 0 0 1
- 1 1 1

Question No.73

4.00

Bookmark

Choose the correct meaning of the italicized idiom.

You cannot throw *dust into my eyes*.

- Abuse me
- Cheat me
- Hurt me
- Terrify me

Question No.74

4.00

Bookmark

How many atoms are there in an element packed in a FCC structure

- 83
- 2
- 1
- 4

Question No.75

4.00

Bookmark

A differential equation is considered to be ordinary if it has

- One independent variable
- More than one independent variable
- One dependent variable
- More than one dependent variable

Question No.76

4.00

Bookmark

The dimensions of capacitance are

- $M^{-1}L^{-1}T^2Q^2$
- $M^2L^{-2}T^2Q^2$
- $M^{-1}L^{-2}T^2Q^2$

- M<sup>-1</sup>L<sup>-2</sup>T<sup>2</sup>Q<sup>2</sup>

**Question No.77**

4.00

Bookmark 

The species <sup>19</sup>Ne and <sup>14</sup>C emit a positron and β- particle respectively. The resulting species formed are respectively-

- <sup>19</sup>Na and <sup>14</sup>N
- <sup>19</sup>Na and <sup>14</sup>B
- <sup>19</sup>F and <sup>14</sup>N
- <sup>19</sup>F and <sup>14</sup>B

**Question No.78**

4.00

Bookmark 

A cantilever of length l is carrying a uniformly distributed load of w per unit run over the whole span. The deflection at the free end is given as

- $\frac{wl^2}{4EI}$
- $\frac{wl^4}{16EI}$
- $\frac{wl^4}{8EI}$
- $\frac{wl^3}{4EI}$

**Question No.79**

4.00

Bookmark 

The reverse current in a diode is of the order of

- Amps
- μ A
- kA
- mA

**Question No.80**

4.00

Bookmark 

Choose the missing term : AZ, GT, MN, ?, YB

- SX
- KE
- SH
- TS

**Question No.81**

4.00

Bookmark 

Based on the information given answer the following question.

1. In a family of six persons, there are people from three generations. Each has separate professions and they like different colours. There are two couples.
2. Shyam is an Engineer and his wife is not a doctor and she does not like Red colour.
3. Chartered Accountant likes green colour and his wife is a teacher.
4. Manisha is the mother-in-law of Sunita and she likes orange colour.
5. Vimal is the grand father of Tarun and tarun is the Principal and likes black colour.
6. Nyna is the grand daughter of Manisha and she likes blue colour. Nyna's Mother likes white colour.

Which of the following is the correct pair of two couples?

- Shyam-Manisha, Vimal-Sunita
- Cannot be determined
- Shyam-Sunita, Vimal-Manisha
- Tarun-Nyna, Shyam-Sunita

**Question No.82**

4.00

Bookmark 

The path of a magnetic flux in a transformer should have

- Low resistance
- High reluctance
- Low reluctance
- High resistance

**Question No.83**

4.00

Bookmark 

**Statements:** All tools are books, Some books are pens.

**Conclusion:**

- I. Some tools are pen
  - II. Some pens are books
- If either I or II follows
  - If only conclusion II follows
  - If only conclusion I follows
  - If neither I nor II follows

**Question No.84**

4.00

Bookmark 

Study the following information carefully and answer the question below it

- (i) There is a group of five persons- A, B, C, D and E

- (ii) One of them is manual scavenger, one is sweeper, one is watchman, one is human scarecrow and one is grave-digger  
(iii) Three of them – A, C and grave-digger prefer tea to coffee and two of them – B and the watchman prefer coffee to tea  
(iv) The human scarecrow and D and A are friends to one another but two of these prefer coffee to tea.  
(v) The manual scavenger is C's brother

Who is a manual scavenger?

- D
- B
- C
- A

**Question No.85**

4.00

Bookmark

A small loudspeaker radiates 5W of power and the intensity is  $1 \text{ Wm}^{-2}$  at a distance of 2m from the speaker. If the power of the speakers is doubled, the intensity in  $\text{Wm}^{-2}$  at a distance of 4m from the speaker is

- 2
- 0.5
- 1
- 4

**Question No.86**

4.00

Bookmark

Which among the following amino acid residue is most likely getting phosphorylated in prokaryotes?

- Threonine
- Histidine
- Serine
- Tyrosine

**Question No.87**

4.00

Bookmark

Moment of inertia of an object does not depend upon

- Angular velocity
- Mass of distribution
- Mass of object
- Axis of rotation

**Question No.88**

4.00

Bookmark

Chelate effect is

- independent of ring size
- due to equal contribution of entropy and enthalpy change
- predominantly due to entropy change
- predominantly due to enthalpy change

**Question No.89**

4.00

Bookmark

The decreasing order of dipole moment of molecules is

- $\text{NH}_3 > \text{NF}_3 > \text{H}_2\text{O}$
- $\text{H}_2\text{O} > \text{NF}_3 > \text{NH}_3$
- $\text{H}_2\text{O} > \text{NH}_3 > \text{NF}_3$
- $\text{NF}_3 > \text{NH}_3 > \text{H}_2\text{O}$

**Question No.90**

4.00

Bookmark

A metal crystallizes in fcc structure with a unit cell side of 500 pm. If the density of the crystal is 1.33 g/cc, the molar mass of the metal is

- 25
- 24
- 23
- 26

**Question No.91**

4.00

Bookmark

Transplastomics

- Provides exceptionally low yields of protein products
- Produces genes that are released in pollen
- Targets genes in the chloroplast
- Targets genes in the mitochondria

**Question No.92**

4.00

Bookmark

Which is an intensive property?

- Mass
- Weight
- Refractive index

- Refractive Index
- Volume

**Question No.93**

4.00

Bookmark

Which of the following biological macromolecules are structurally diverse in living world?

- Nucleic acids
- Proteins
- Lipids
- Carbohydrates

**Question No.94**

4.00

Bookmark

**Statement:** "A Car is required on rent"-An Advertisement

**Assumptions:**

I. All types of Vehicles are available on Rent

II. People will respond to the advertisements

- If only assumption I is implicit
- If neither I nor II is implicit
- If only assumption II is implicit
- If both I and II are implicit

**Question No.95**

4.00

Bookmark

In recent times, the number of cases of death by poisoning \_\_\_\_\_ sharply.

- increased
- have increased
- had increased
- has increased

**Question No.96**

4.00

Bookmark

A partial differential equation requires

- Exactly one independent variable
- More than one dependent variable
- Two or more independent variables
- Equal number of dependent and independent variables

**Question No.97**

4.00

Bookmark

Water use efficiency is minimum in

- C3 plants
- C4 plants
- All higher plants
- CAM plants

**Question No.98**

4.00

Bookmark

During tensile test, what does percentage elongation indicate

- Fatigue Strength
- Ductility
- Malleability
- Creep

**Question No.99**

4.00

Bookmark

The knee voltage of a crystal diode is approximately equal to

- Barrier Potential
- Applied Voltage
- Forward Voltage
- Breakdown Voltage

**Question No.100**

4.00

Bookmark

Choose the best antonym of the italicized word.

There are four chapters that are *extraneous* to the structure of the book.

- needful
- relevant
- important
- integral