Gate paper 2023-XH

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Humanities and Social Sciences-Economics

General Aptitude (*GA*)

Q.1 - Q.5 Carry ONE mark each

1. Rafi told Mary, "I am thinking of watching a film this weekend." The following reports the above statement in indirect speech: Rafi told Mary that he _____ of watching a film that weekend.

   (a) thought

   (b) is thinking

   (c) am thinking

   (d) was thinking

   (*GATE XH* 2023)

2. Permit : _____ :: Enforce : Relax (*By word meaning*)

   (a) Allow   (b) Forbid   (c) License   (d) Reinforce

   (*GATE XH* 2023)

3. Given a fair six-faced dice where the faces are labelled '1', '2', '3', '4', '5', and '6', what is the probability of getting a '1' on the first roll of the dice and a '4' on the second roll?

   (a) $\frac{1}{36}$ (b) $\frac{1}{6}$ (c) $\frac{5}{6}$ (d) $\frac{1}{3}$

   (*GATE XH* 2023)

4. A recent survey shows that 65% of tobacco users were advised to stop consuming tobacco. The survey also shows that 3 out of 10 tobacco users attempted to stop using tobacco.
   Based only on the information in the above passage, which one of the following options can be logically inferred with *certainty*?

   (a) A majority of tobacco users who were advised to stop consuming tobacco made an attempt to do so.

(b) A majority of tobacco users who were advised to stop consuming tobacco did not attempt to do so.

(c) Approximately 30% of tobacco users successfully stopped consuming tobacco.

(d) Approximately 65% of tobacco users successfully stopped consuming tobacco.
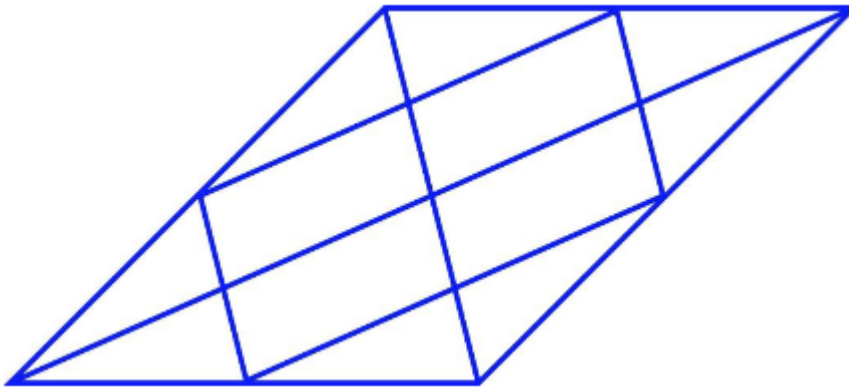
5. How many triangles are present in the given figure

Figure 1

(a) 12   (b) 16   (c) 20   (d) 24

Q.6- Q.10 Carry TWO marks Each

6. Students of all the departments of a college who have successfully completed the registration process are eligible to vote in the upcoming college elections. However, by the time the due date for registration was over, it was found that surprisingly none of the students from the Department of Human Sciences had completed the registration process.Based only on the information provided above, which one of the following sets of statement(s) can be logically inferred with certainty?

   (i) All those students who would not be eligible to vote in the college elections would certainly belong to the Department of Human Sciences.

   (ii) None of the students from departments other than Human Sciences failed to complete the registration process within the due time.

   (iii) All the eligible voters would certainly be students who are not from the Department of Human Sciences.

   (a) (i) and (ii)   (b) (i) and (iii)   (c) only (i)   (d) only (iii)

   (*GATE XH* 2023)

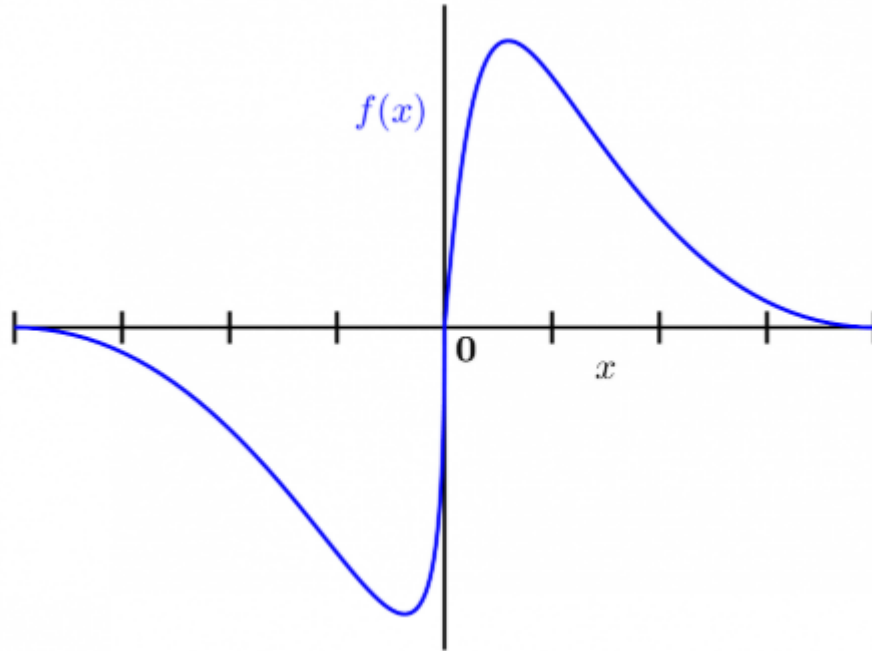7. Which one of the following options represents the given graph?

Figure 2

(a) $f(x) = x^2 2^{-|x|}$ (b) $f(x) = x2^{-|x|}$ (c) $f(x) = |x|2^{-x}$ (d) $f(x) = x2^{-x}$

(*GATE XH* 2023)

8. Which one of the options does NOT describe the passage below or follow from it? We tend to think of cancer as a 'modern' illness because its metaphors are so modern. It is a disease of overproduction, of sudden growth, a growth that is unstoppable, tipped into the abyss of no control. Modern cell biology encourages us to imagine the cell as a molecular machine. Cancer is that machine unable to quench its initial command (to grow) and thus transform into an indestructible, self-propelled automaton. [*Adapted from The Emperor of All Maladies by Siddhartha Mukherjee*]

  (a) It is a reflection of why cancer seems so modern to most of us.

  (b) It tells us that modern cell biology uses and promotes metaphors of machinery.

(c) Modern cell biology encourages metaphors of machinery, and cancer is often imagined as a machine.

(d) Modern cell biology never uses figurative language, such as metaphors, to describe or explain anything.

(GATE XH 2023)

9. The digit in the unit's place of the product $3^{999} \times 7^{1000}$ is

   (a) 7   (c) 4
   (b) 1   (d) 9

(GATE XH 2023)

10. A square with sides of length 6 cm is given. The boundary of the shaded region is defined by two semi-circles whose diameters are the sides of the square, as shown. The area of the shaded region is ____ cm²
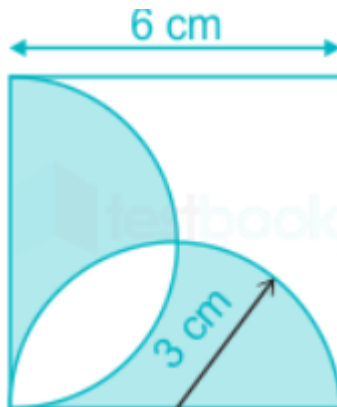

Figure 3

   (a) 6π (b) 18   (c) 20   (d) 9π

(GATE XH 2023)

Reasoning and Comprehension(XH-B1)
XH-B1:Q11-Q17 Carry ONE mark Each

11. Which word below best describes the idea of being both *Spineless* and *Cowardly*?

    (a) Pusillanimous (b) Unctuous   (c) Obsequious   (d) Reticent

    (*GATE XH* 2023)

12. Choose the right preposition to fill up the blank:
    The whole family got together _ _ Diwali

    (a) of   (b) at   (c) in   (d) till

    (*GATE XH* 2023)

13. Select the correct option to fill in all the blanks to complete the passage:

    The (i) _____ factor amid this turbulence has been the (ii) _____ of high-octane, action-oriented films such as RRR, K.G.F: Chapter 2 and Pushpa from film industries in the south of the country. Traditionally, films made in the south have done well in their own (iii) _____. But increasingly, their dubbed versions have performed well in the Hindi heartland, with collections (iv) _____ those of their Bollywood counterparts.

    (a) (i) disheartening   (ii) failure   (iii) channels   (iv) matching
    (b) (i) redeeming   (ii) outperformance   (iii) geographies   (iv) eclipsing
    (c) (i) shocking   (ii) underperformance   (iii) cinemas   (iv) below
    (d) (i) humbling   (ii) bombing   (iii) theatres   (iv) falling behind

    (*GATE XH* 2023)

14. The following passage consists of 6 sentences. The first and sixth sentences of the passage are at their correct positions, while the middle four sentences (represented by 2, 3, 4, and 5) are jumbled up. Choose the correct sequence of the sentences so that they form a coherent paragraph:

(a) Most obviously, mobility is taken to be a geographical as well as a social phenomenon.

(b) Much of the social mobility literature regarded society as a uniform surface and failed to register the geographical intersections of region, city and place, with the social categories of class, gender and ethnicity.

(c) The existing sociology of migration is incidentally far too limited in its concerns to be very useful here.

(d) Further, I am concerned with the flows of people within, but especially beyond, the territory of each society, and how these flows may relate to many different desires, for work, housing, leisure, religion, family relationships, criminal gain, asylum seeking and so on.

(e) Moreover, not only people are mobile but so too are many 'objects'.

(f) I show that sociology's recent development of a 'sociology of objects' needs to be taken further and that the diverse flows of objects across societal borders and their intersections with the multiple flows of people are hugely significant.

(a) 3,2,5,4   (b) 2,3,4,5   (c) 5,4,3,2   (d) 4,2,5,3

15. The population of a country increased by 5% from 2020 to 2021. Then, the population decreased by 5% from 2021 to 2022. By what percentage did the population change from 2020 to 2022?

(a) -0.25%   (b) 0%   (c) 2.5%   (d) 10.25%

16. The words **Thin: Slim: Slender** are related in some way. Identify the correct option(s) that reflect(s) the same relationship:

(a) Fat: Plump: Voluptuous   (c) Tall: Taller: Tallest

(b) Short: Small: Petite   (d) Fair: Dark: Wheatish

17. A pandemic like situation hit the country last year, resulting in loss of human life and economic depression. To improve the condition of its citizens, the government made a series of emergency medical interventions and increased spending to revive the economy. In both these efforts, district administration authorities were actively involved. Which of the following action(s) are plausible?

(a) In future, the government can make district administration authorities responsible for protecting health of citizens and reviving the economy.

(b) The government may set up a task force to review the post pandemic situation and ascertain the effectiveness of the measures taken.

(c) The government may set up a committee to formulate a pandemic management program to minimize losses to life and economy in future.

(d) The government may take population control measures to minimize pandemic related losses in future.

XH-B1:Q18-Q26 Carry TWO mark Each

18. Six students, Arif, Balwinder, Chintu, David, Emon and Fulmoni appeared in the GATE-XH exam in 2022. Balwinder scores less than Chintu in XH-B1, but more than Arif in XH-C1. David scores more than Balwinder in XH-C1, and more than Chintu in XH-B1. Emon scores less than David, but more than Fulmoni in XH-B1. Fulmoni scores more than David in XH-C1. Arif scores less than Emon, but more than Fulmoni in XH-B1. Who scores highest in XH-B1?

    (a) Fulmoni   (b) Emon   (c) David   (d) Chintu

19. Select the correct relation between E and F.

$$E = \frac{x}{1+x} \quad \text{and} \quad F = \frac{-x}{1-x} \quad x > 1$$

    (a) $E > F$ (b) $E < F$ (c) $E = F$ (d) $E < -F$

20. A code language is formulated thus: Vowels in the original word are replaced by the next vowel from the list of vowels, A-E-I-O-U (For example, E is replaced by I and U is replaced by A). Consonants in the original word are replaced by previous consonant (For example, T is replaced by S and V is replaced by T). Then how does the word, GOODMORNING appear in the coded language?

    (a) HUUFNUSPOPH   (c) FUUCLIUQMOMF

    (b) FIICLIQMEMF   (d) HEEDATTACRH

21. The stranger is by nature no "owner of soil" – soil not only in the physical, but also in the figurative sense of a life-substance, which is fixed, if not in a point in space, at least in an ideal point of the social environment. Although in more intimate relations, he may develop all kinds of charm and significance, as long as he is considered a stranger in the eyes of the other, he is

not an "owner of soil."

Restriction to intermediary trade, and often (as though sublimated from it) to pure finance, gives him the specific character of mobility. If mobility takes place within a closed group, it embodies that synthesis of nearness and distance which constitutes the formal position of the stranger. For, the fundamentally mobile person comes in contact, at one time or another, with every individual, but is not organically connected, through established ties of kinship, locality, and occupation, with any single one. What assumptions can be made about the stranger from the passage above?

  (a) The stranger can become an owner of soil through developing all kinds of charm in more intimate relations.

  (b) The stranger cannot become an owner of soil either in the physical or psychological sense.

  (c) The stranger can become an owner of soil through establishing ties of kinship and so on.

  (d) The stranger might become an owner of soil in the physical sense but not in the psychological.

<div align="right">(GATE XH 2023)</div>

22. L is the only son of A and S. S has one sibling, B, who is married to L's aunt, K. B is the only son of D. How are L and D related?

Select the possible option(s):

  (a) Grandchild and Paternal Grandfather

  (b) Grandchild and Maternal Grandfather

  (c) Grandchild and Paternal Grandmother

  (d) Grandchild and Maternal Grandmother

<div align="right">(GATE XH 2023)</div>

23. Five segments of a sentence are given below. The first and fifth segments are at their correct positions, while the middle three segments (represented by 2, 3, and 4) are jumbled up. Choose the correct order of the segments so that they form a coherent sentence:

1. Consumed multitudes are jostling and shoving inside me

2. and guided only by the memory of a large white bedsheet with a roughly circular hole some seven inches in diameter cut into the center,

3. clutching at the dream of that holey, mutilated square of linen, which is my talisman, my open-sesame,

4. I must commence the business of remaking my life from the point at which it really began,

5. some thirty-two years before anything as obvious, as present, as my clock-ridden, crime-stained birth

(a) 2-3-4   (b) 3-2-4   (c) 4-2-3   (d) 4-3-2

24. "I told you the truth," I say yet again, "Memory's truth, because memory has its own special kind. It selects, eliminates, alters, exaggerates, minimizes, glorifies, and vilifies also; but in the end it creates its own reality, its heterogeneous but usually coherent versions of events; and no sane human being ever trusts someone else's version more than his own."
What are the different ways in which 'truth' can be understood from the passage?

(a) Truth is what can be verified by hard empirical evidence.

(b) Truth is based on what can be perceived by the senses.

(c) Truth is the product of memory that is fallible, selective and slanted.

(d) Truth is contingent on the observer and can only be partial.

25. A firm needs both skilled labour and unskilled labour for the production of cloth. The wage of skilled labour is Rs. 40,000 per month, and that of unskilled labour is Rs. 15,000 per month. The total wage bill of the firm for the production of cloth is Rs. 23,75,000 in a month for 100 labour. How many skilled labour are employed by the firm (in Integer)?   (*GATE XH* 2023)

26. Select the odd word and write the option number as answer:

(a) Lek

(b) Zloty

(c) Diner

(d) Drachma

(e) Real

(*GATE XH* 2023)

Economics-C1
XH-C1: Q.27-Q.44 Carry ONE mark Each

27. An individual is endowed with income of Rs. 142 and has the utility function $(U(x_1, x_2) = x_2(x_1 + 1))$, where $(x_1 \geq 0, x_2 \geq 0)$. The unit price of (x_1) is Rs. 2 and the unit price of (x_2) is Rs. 3. The utility maximizing bundle is:

    (a) $(x_1 = 35, x_2 = 30)$ (b) $(x_1 = 30, x_2 = 24)$ (c) $(x_1 = 35, x_2 = 24)$ (d) $(x_1 = 30, x_2 = 20)$

    (GATE XH 2023)

28. The International Monetary Fund (IMF) began operations in the year:

    (a) 1942   (b) 1947   (c) 1945   (d) 1940

    (GATE XH 2023)

29. According to the Working Group on Money Supply: Analytics and Methodology of Compilation (1998) constituted by the Reserve Bank of India (RBI), which of the following is NOT a component of the new monetary aggregate NM1?

    (a) Currency with the public
    (b) Demand deposits with the banking system
    (c) Short-term time deposits of residents
    (d) 'Other' deposits with the RBI

    (GATE XH 2023)

30. Stagflation is a situation when

    (a) both unemployment and inflation are low
    (b) both unemployment and inflation are high
    (c) unemployment is high but inflation is low
    (d) unemployment is low but inflation is high

    (GATE XH 2023)

31. Consider the Keynesian consumption function $(C = \alpha + \beta\gamma)$, where (C) is the aggregate consumption, (γ) is the aggregate income, (α) is a constant $((\alpha > 0))$, and (β) is the marginal propensity to consume $((0 < \beta < 1))$. Then, the average propensity to consume is

(a) (α) (b) $\left(\frac{\alpha}{\gamma} + \beta\right)$ (c) $\left(\alpha\gamma + \beta\gamma^2\right)$ (d) $\left(\alpha + \frac{\beta}{\gamma}\right)$

32. An analyst regressed (Y) on (X_1) and (X_2). If she later noticed that $(X_1 = 5X_2)$, then which of the following assumptions of the classical linear regression model was violated?

    (a) Homoscedasticity   (c) No Autocorrelation

    (b) No Perfect Multicollinearity   (d) Linearity in parameters

33. Which of the following is NOT an example of non-tariff barriers?

    (a) Voluntary export restraint

    (b) A procurement law directing a government to buy domestically made products unless comparable foreign made products are substantially cheaper.

    (c) Imposition of sanitary and phytosanitary measures on agricultural produce.

    (d) An antidumping law

34. Among the following, who first proposed that internal government debt does not create a burden for the future generation?

    (a) N. Gregory Mankiw   (c) Harvey S. Rosen

    (b) Martin Feldstein   (d) A. P. Lerner

35. Which of the following is an example of direct tax?

    (a) Sales tax   (c) Individual income tax

    (b) Customs duty   (d) Excise tax

36. In the context of endogenous growth theory, the Nobel laureate Paul Romer emphasized that "ideas" are

    (a) non-rival

    (b) rival with medium degree of excludability

    (c) rival with high degree of excludability

    (d) rival with low degree of excludability

37. In the Human Development Index (HDI), the longevity is measured by

    (a) child survival rate

    (b) healthy life expectancy

    (c) disability-adjusted life years

    (d) life expectancy at birth

38. Which of the following statements is correct about the Fourteenth Finance Commission?

    (a) The Commission was chaired by Dr. C. Rangarajan.

    (b) The Commission recommended achieving 90 percent metering of electricity by the end of the year 2012.

    (c) The Commission recommended an increase in the share of tax devolution to states to 42 percent of the divisible pool.

    (d) The Commission was mandated to make recommendations for the period 2010-2015.

39. Many scholars consider the study conducted by Dandekar and Rath in the 1960s as the first systematic assessment of poverty in independent India. Which option from the following is NOT correct about the study?

    (a) The study used the data on monthly per capita consumption expenditure (MPCE) from the 1960-61 round of the National Sample Surveys.

(b) The study used the identical calorie norm for rural and urban areas.

(c) The poverty head count ratio estimated by the study was higher for rural areas than that for urban areas.

(d) The study used the same poverty line for all states.

40. Which of the following statements is/are correct about the Pradhan Mantri Kaushal Vikas Yojana (PMKVY)?

(a) It has been a flagship scheme of the Ministry of Education.

(b) It was launched in the year 2010.

(c) The National Skill Development Corporation has been responsible for its implementation.

(d) One of the objectives of PMKVY has been to enable a large number of Indian youth to take up industry-relevant skill training.

41. Which of the following is/are used for testing the assumption of normality?

(a) Shapiro-Wilk test   (c) Jarque-Bera test

(b) Breusch-Godfrey test   (d) Park test

42. Suppose Amar borrows Rs. 1000 from Ujala. After one year, Ujala wants Rs. 1100 back from Amar. The yield to maturity in percent (%) on this borrowing is _____ *(round off to one decimal place).*

43. A 250 ml bottle of mango juice costs USD 4 in the United States. If the exchange rate is 0.02 USD per Rupee, then the cost of the same bottle of mango juice in Rupees would be _____ *(in integer).*

44. The following table provides population information for different age groups in 2010 and 2017.

Age group	Population in 2010	Population in 2017
0 to 14 years	201630	213609
15 to 64 years	899210	847552
65 years and above	232450	254474

Table 1

The percentage change in old-age dependency ratio from 2010 to 2017 is _____ *(round off to two decimal places).* (*GATE XH* 2023)

45. A firm in a market with perfect competition has the following total cost ((TC)) function:

$$TC(Q) = a + b(Q)$$

where (Q) is the quantity produced by the firm, (a) is the fixed cost and ($b(Q)$) is the variable cost. What will happen if the fixed cost increases?

   (a) In the short-run, the firm's Average Variable Cost (AVC) curve will shift upwards.

   (b) In the short-run, the firm's Average Total Cost (ATC) curve will shift upwards.

   (c) The firm will earn higher profits.

   (d) In the short-run, the firm's Marginal Cost (MC) curve will shift upwards.

(*GATE XH* 2023)

46. The emission of greenhouse gases is an example of "bads" that are

   (a) rival and excludable

   (b) non-rival and excludable

   (c) rival and non-excludable

   (d) non-rival and non-excludable

(*GATE XH* 2023)

47. Consider a closed-economy IS-LM model. The IS and LM equations are:

$$Y = C(Y) + I(z) + \bar{G}$$

$$\frac{\bar{M}}{P} = kY - li$$

where (Y) is the output, (C) is the consumption $((C' > 0))$, (I) is the investment $((I' < 0))$, $(z = i - \pi^e)$, (i) is the nominal interest rate, (π^e) is the expected inflation, $(\bar{G})$ is the government purchases, $\left(\frac{\bar{M}}{P}\right)$ is the fixed real money balances, and (k) and (l) are positive constants.

Suppose everyone in the economy suddenly expects the inflation to rise in the future. Assuming that the LM curve remains unchanged, what will happen in the short-run?

(a) Equilibrium (Y) increases.

(b) Aggregate demand remains unchanged.

(c) Equilibrium (Y) remains unchanged.

(d) Aggregate demand shifts down.

(GATE XH 2023)

48. Consider the following simultaneous equations model:

$$Y_t = \beta_1 + \beta_2 X_t + \beta_3 X_{t-1} + \beta_4 Z_t + \mu_{1t}$$

$$Z_t = \delta_1 + \delta_2 Y_t + \delta_3 W_t + \mu_{2t}$$

Before estimating the above model, a researcher performed the test of identification using order and rank conditions, and found that equation (2) is overidentified. Then, which of the following methods is appropriate to estimate equation (2)?

(a) Two-Stage Least Squares

(b) Indirect Least Squares

(c) Weighted Least Squares

(d) Ordinary Least Squares

(GATE XH 2023)

49. An income tax system is considered as progressive if the average tax rate rises with income. Consider an income tax schedule: $(T = p + tY)$, where (T) denotes the tax liability, (p) is a constant, (t) is the constant marginal tax rate, and (Y) is the income. For this tax schedule to be progressive, the value of (p)

(a) must be positive   (c) must be zero

(b) must be negative   (d) can be any value except zero

50. Match the following:

Demographic Transition Stage	Feature
I	P. High fertility and high mortality
II	Q. Declining fertility
III	R. Stationary population
IV	S. Declining mortality

Table 2

(a) I → P ; II → Q ; III → R ; IV → S

(b) I → P ; II → S ; III → Q ; IV → R

(c) I → R ; II → S ; III → Q ; IV → P

(d) I → S ; II → P ; III → R ; IV → Q

51. Consider two countries, India and Bangladesh, and two goods, Glass Bottle and Ceramic Plate, with labour requirements of production for a unit of each good given below:

Labour hours required per unit of production	Glass Bottle	Ceramic Plate
India	2 hours	3 hours
Bangladesh	3 hours	9 hours

Table 3

Which of the following options is/are correct?

(a) India has an absolute advantage in Glass Bottle production and a comparative disadvantage in Glass Bottle production.

(b) India has an absolute advantage in Ceramic Plate production and a comparative disadvantage in Ceramic Plate production.

(c) India has an absolute advantage in Ceramic Plate production and a comparative disadvantage in Glass Bottle production.

(d) India has an absolute advantage in Glass Bottle production and a comparative disadvantage in Ceramic Plate production.

52. Suppose the own price elasticity of demand and income elasticity of demand are given by e_p and e_I, respectively. The subscript p represents own price of a good and the subscript I represents the income of the consumer. Identify the correct statement(s) from the following.

    (a) If $1 < e_p < \infty$, the demand is price inelastic.

    (b) Luxury goods are more price inelastic and the necessities are price elastic.

    (c) Luxury goods have $e_I > 1$.

    (d) If $0 < e_p < 1$, the demand is price elastic.

53. Let π^e be the expected inflation rate, i be the nominal interest rate and r be the real interest rate. Which of the following statements is/are correct?

    (a) For small values of r and π^e, $r \approx i - \pi^e$.

    (b) When real interest rate is low, there are greater incentives to borrow and fewer incentives to lend.

    (c) Real interest rate reflects the real cost of borrowing.

    (d) If $i = 8\%$ and $\pi^e = 10\%$, then r is approximately $(+) 2\%$.

54. Which of the following models explain(s) the upward-sloping aggregate supply curve in the short-run?

(a) Sticky-wage model   (c) Imperfect-information model

(b) Worker-misperception model   (d) Solow model

55. Consider a Mundell-Fleming model for a small open economy with perfect capital mobility. The goods market equation is

$$Y = C(Y) + I(r^*) + G + NX(e)$$

where Y is the output, C is the consumption ($C' > 0$), I is the investment ($I' < 0$), G is the government purchases, and NX is the net exports ($NX' < 0$), r^* is the fixed world interest rate, and e is the exchange rate. The money market equation is

$$\frac{M}{\bar{P}} = kY - lr^*$$

where M is the money supply, $\bar{P}$ is the fixed price level, and k and l are positive constants.

Which of the following policies is/are ineffective (i.e., have no impact on income) in the short-run?

(a) Expansionary fiscal policy under floating exchange rate

(b) Expansionary monetary policy under floating exchange rate

(c) Expansionary fiscal policy under fixed exchange rate

(d) Expansionary monetary policy under fixed exchange rate

56. In the context of Balance of Payments accounting, which of the following transactions is/are NOT recorded under the Current Account?

(a) Merchandise trade

(b) Unilateral transfer payments

(c) Purchase of international financial assets

(d) Purchase of foreign currency by the central bank

57. The demand and supply functions for a commodity are given by: $D(p) = 10-2p$ and $S(p) = -2+p$ where $D(p)$ and $S(p)$ are the quantity demanded and supplied, respectively, and p (in USD) is the unit price of the good. If the government sets a price ceiling of USD 3 per unit, then the increase in consumer surplus (in USD) is _____ *(round off to two decimal places).*

58. A duopoly faces the inverse market demand function $p = 120 - Q$, where p is the unit price (in Rs.) of the good being sold by firms A and B, and Q is the total output. Firm A has a constant marginal cost of Rs. 20, which is exactly half of firm B's constant marginal cost. There is no fixed cost for both the firms. If there exists a Cournot-Nash equilibrium, Q is _____ *(in integer).*

59. Consider the following short-run cost function:

$$C(q) = 10q^3 - 80q^2 + 300q + 50$$

At the minimum average variable cost (AVC), the value of marginal cost (MC) is _____ *(in integer).*

60. Consider the Keynesian Cross Model with a linear consumption function and a zero tax, where the government purchase is Rs. 100 and the equilibrium income is Rs. 1300. If the government purchase is increased to Rs. 125, the equilibrium income increases to Rs. 1400. Using the given information, the marginal propensity to consume is _____ *(round off to two decimal places).*

61. Using the Ordinary Least Squares (OLS) method, a researcher estimated the relationship between initial salary (S) of MBA graduates and their cumulative grade point average ($CGPA$) as

$\hat{S}_i = \hat{\beta}_0 + \hat{\beta}_1 CGPA_i$; $i = 1, 2, \ldots, 100$

where $\hat{\beta}_0 = 4543$ and $\hat{\beta}_1 = 645.08$. The standard errors of $\hat{\beta}_0$ and $\hat{\beta}_1$ are 921.79 and 70.01, respectively.

The t-statistic for testing the null hypothesis $\beta_1 = 0$ _____ *(round off to two decimal places).*

(GATE XH 2023)

62. Let X be a random variable with the probability density function $f(x)$ such that

$$f(x) = \begin{cases} \dfrac{1}{2\sqrt{3}} & \text{if } -\sqrt{3} < x < \sqrt{3} \\ 0 & \text{otherwise} \end{cases}$$

Then, the variance of X is _____ *(in integer).*
(GATE XH 2023)

63. Suppose from the estimation of a linear regression model

$$Y_i = \beta_0 + \beta_1 X_i + e_i$$

the residual sum of squares and the total sum of squares are obtained as 44 and 80, respectively.

The value of coefficient of determination is _____ *(round off to two decimal places).*

(GATE XH 2023)

64. A labour-augmenting production function is $Y = K^{0.33}(A L)^{0.67}$
where Y = output, K = capital, L = labour, and A = technology.

Assume that the growth rate of L is 1.2 percent per annum, the growth rate of K is 3 percent per annum, and the growth rate of A is 1.5 percent per annum.

Using the growth-accounting approach, the growth rate of Y in percent per annum is _____ *(round off to two decimal places).*

(GATE XH 2023)

65. A monopolist is facing the demand function $Q = \dfrac{100}{(P-1)}$, where Q is the quantity demanded and P is the price per unit of the good ($P > 1$). The average variable cost for the monopolist is $\dfrac{4}{\sqrt{Q}}$ and the fixed cost is 10. The profit maximizing price is _____ *(in integer)*.