M.Sc. Economics Entrance Examination
Department of Economic Sciences
Indian Institute of Technology, Kanpur
May 20, 2025

Maximum marks: 100 **Duration: 120 minutes**

Name in block letters: _____

IIT Kanpur Application No.:

Marks Obtained (Not to be filled in by the candidate):_____

Instructions:

1. **Exam Format**: This is a closed-book exam with 50 multiple-choice questions. Each correct answer earns 2 points; **each wrong answer incurs a penalty of 0.5 points.** Unanswered questions receive 0 points.

2. **Exam Conduct**: You have 2 hours to complete the exam. Use only a pen. External assistance, communication with others, or use of electronic devices—including mobile phones, calculators, or AI tools—is **strictly prohibited**. Any violation will lead to disqualification from this and all future exams.

3. **Answer Sheet Instructions:** The answer sheet is on page 2 and must not be detached. Write all answers **only** in the provided grid. Responses written elsewhere will not be graded.

For each answer, you are strictly required to **write both** the option letter and the full answer text. Failure to do so will result in **no marks** being awarded for that question.

Example:
Question: The central bank of India is: a) Federal Reserve System, b) Reserve Bank of India, c) State Bank of India, d) Central Bank of India

Correct Answer (to be written in the grid)*:* b) Reserve Bank of India

Illustration:

Question #	Answer
1.	b) Reserve Bank of India

Important: Writing only 'b' or only 'Reserve Bank of India' will be considered incomplete and will not be graded.

4. **Rough Work & Submission**: Rough sheets will be provided for calculations. Return the question paper and rough sheets at the end of the exam. Ensure your handwriting is legible—illegible responses will not be evaluated.

Candidate Name:_____**IIT Kanpur Application No.:**_____

Answer sheet

(Your answers must be entered in the appropriate space in the below answer grid (table)

Question Number	**Answer**	Question Number	**Answer**
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Official use only

	Examiner 1	**Examiner 2**
1: Number of questions answered:		
2: Number of Correct answers:		
3: Number of Wrong answers:		
4: Final marks scored (out of 100):		

Questions

[Please note that answers are to be provided in the above answer-grid (table) only; do not write/mark/tick in the below section at all]

1. A child starts saving money in an empty piggy bank. He saves ₹5 in the piggy bank each month for the first three months. In each of the subsequent months, he saves ₹4 more than he did in the immediately preceding month. The total money saved in the piggy bank from the start will be ₹54 after:

a. 7 months
b. 6 months
c. 5 months
d. 4 months

2.If one root of the equation $x^2 + \alpha x + 12 = 0$ is 3, while the equation $2x^2 + \alpha x + \beta = 0$ has equal roots, then the value of β is:

a. $\frac{49}{4}$
b. $\frac{49}{16}$
c. 49
d. $\frac{49}{8}$

3. If x, y, z are all positive and are the p^{th}, q^{th} and r^{th}terms of a geometric progression the common ratio of which is β, then the value of the determinant $\begin{vmatrix} \log x & \log y & \log z \\ \beta & \beta & \beta \\ p & q & r \end{vmatrix}$ is

a. 0
b. -1
c. β
d. None of the above

4.There are four balls each of a different colour: red, yellow, green and blue. Also, there are four urns one each of red, yellow, green and blue colours. Each of the four balls is to be put in a different urn. The number of ways in which the balls can be put into the urns so that every ball is in an urn of a different colour is:

a. 12
b. 9
c. 15
d. 8

5.If matrix $A = \begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix}$, then $A^{100} - A^5$ is equal to:

a. $2A^3$
b. $-A$
c. $2A^2$
d. None of the above

6.A student is browsing in a library and finds n books of interest that she wishes to issue. She may issue one or more books out of these n books. The library has 2 copies of each of these

n books. Assuming she never wants duplicate copies of any book, how many ways can she make a selection?

a. $3^{n+1}-1$
b. $2^{n}-1$
c. $2^{2n}-1$
d. $3^{n}-1$

7.The coefficient of the constant term (which is independent of x) in $\left(\frac{1}{3x^2}+2x\right)^6$ is:

a. $\frac{80}{3}$
b. $\frac{80}{9}$
c. $\frac{160}{3}$
d. $\frac{160}{9}$

8.Let matrix $A=\begin{pmatrix}2 & -1\\ -1 & 2\end{pmatrix}$. Suppose $A^2-\lambda A+3I=0$. Here, I is the 2×2 identity matrix. Then, the value of λ is:

a. -2
b. 3
c. 4
d. -3

9.When $31^{2735}+37^{2735}$ is divided by 17, the remainder is:

a. 8
b. 12
c. 0
d. 16

10.Let $f:\mathbb{R}\to\mathbb{R}$ be defined as follows:

$$f(x)=\begin{cases}\frac{x^2}{|x|} & if\ x\neq 0\\ 0 & if\ x=0\end{cases}$$

Then, the value of f is

a. both continuous and differentiable at 0
b. neither continuous nor differentiable at 0
c. continuous but not differentiable at 0
d. none of the above

11. Let $f:\mathbb{R}\to\mathbb{R}$ be such that $f(x+y)=f(x)+f(y)$ for all $x,y\in\mathbb{R}$. Suppose f is differentiable at 0 and $f(2)=4$. Then $f(2025)=$

a. 2025
b. 4050
c. 2027
d. not enough information to compute the answer

12. $\int \frac{1+x^4}{1+x^6} dx =$

(In the options, C is the constant of integration)

a. $Tan^{-1}x + \frac{1}{3} Tan^{-1}x^3 + C$

b. $\frac{1}{3} Tan^{-1}x + Tan^{-1}x^3 + C$

c. $Tan^{-1}x + Tan^{-1}x^3 + C$

d. $\frac{1}{3} Tan^{-1}x + \frac{1}{3} Tan^{-1}x^3 + C$

13. Let (x^*, y^*) denote the solution to the following optimization problem:

maximize $-x^2 - y^2 + 2x + 4y + 5$

subject to $x + y \leq 5, x, y \geq 0$.

Then $x^* + y^* =$

a. 1

b. 2

c. 3

d. 4

14. Let $f: \mathbb{R} \to \mathbb{R}$ be defined as follows:

$$f(x) = x^3 - 3x^2 + 3x - 1.$$

Then, f has

a. A local maximum at $x = 1$

b. A local minimum at $x = 1$

c. A global maximum at $x = 1$

d. None of the above

15. For $n = 1,2,3, \ldots$, let

$$s_n = \frac{1}{1\times3} + \frac{1}{3\times5} + \cdots + \frac{1}{n\times(n+2)}.$$

Then, $lim_{n\to\infty}\, s_n$ equals

a. $\frac{1}{2}$

b. 2

c. 1

d. Does not exist

16. $\int_0^\infty \frac{y}{(y+1)^3} dy =$

a. $\frac{1}{3}$

b. $\frac{1}{2}$

c. $\frac{2}{3}$

d. $\frac{3}{4}$

17. Let n be the number of solutions to the following system of equations:

$$\begin{aligned} x + 2y &= 1 \\ 2x + y &= 2 \\ x + y &= 1 \end{aligned}$$

Then, $n =$

a. 0
b. 1
c. 2
d. 3

18. Let A, B be square matrices of order n. Which of the following statement is **incorrect** about determinants?

a. $det(A) = det(A^T)$
b. $det(AB) = det(BA)$
c. $det(A + B) = det(A) + det(B)$
d. $det(AB) = det(A)det(B)$

19.Suppose we conduct n independent Bernoulli trials, each with probability of success p. If k is such that the probability of k successes is equal to the probability of $k + 1$ successes, then k is

a. np
b. $p(n-1)-1$
c. $p(n+1)-1$
d. None of the above

20.Let Y denote the number of heads obtained when 3 fair coins are tossed. Then, the variance of $Z = 2 + 3Y^2$ is

a. 67.5
b. 76.5
c. 78.5
d. 65.5

21.Suppose $y_1, y_2, \ldots, y_n$ are observed completion time of an experiment with values in [0,1]. Each of these random variables are independently and uniformly distributed on [0,1]. If X is the minimum observed completion time. Then expected value of X is

a. $2/(n+1)$
b. $1/(n+1)$
c. $1/(n+2)$
d. None of the above

22.The systolic blood pressure X $(in\ mmHg)$ of an individual selected at random from a certain population is normally distributed with mean of $120\ mmHg$ and standard deviation of $10\ mmHg$. Then the probability that the blood pressure $(mmHg)$ of a randomly selected person from the given population will be either below $90\ mmHg$ or above $140\ mmHg$ is (Given $\int_0^2 \frac{1}{\sqrt{2\pi}} e^{\frac{-t^2}{2}} dt = 0.4772$) and $\int_0^3 \frac{1}{\sqrt{2\pi}} e^{\frac{-t^2}{2}} dt = 0.4987$)

a. 0.0312
b. 0.0241
c. 0.0373
d. 0.6321

23.Two women and four men are to be seated randomly around a circular table. Then the probability that the women are not seated next to each other is

a. $1/3$

b. 2/5

c. 1/2

d. $3/5$

24.An experiment has 10 equally likely outcomes. Let A and B be two non-empty events of the experiment. If A consists of 4 outcomes, then the number of outcomes B must have so that A and B are independent, is

a. 4 and 6

b. 6 and 9

c. 5 and 10

d. 4 and 9.

25.The frequency distribution of variable X (monthly family expenditure in rupees) for 100 households is as follows

X	Below 2000	$2000 - 4999$	$5000 - 9999$	$10000 - 15000$
No. of households	30	45	15	10

The median monthly family expenditure is in the range

a. $2000 - 3000$

b. $3000 - 4000$

c. $4000 - 5000$

d. $5000 - 6000$

26. Suppose there are three consumers in the market for a good and their demand functions are as follows:
$d_1(p) = 60 - p$ for any price less than or equal to 60, and $d_1(p) = 0$ at any price greater than 20.
$d_2(p) = 30 - 2p$ for any price less than or equal to 15, and $d_2(p) = 0$ at any price greater than 15.
$d_3(p) = 40 - 4p$ for any price less than or equal to 10, and $d_3(p) = 0$ at any price greater than 10.
What is the market demand at $p = 16$?

a. 44
b. 42
c. 18
d. 10

27. Suppose there was a 5 % decrease in the price of a good, and as a result, the expenditure on the good increased by 3 %. Based on this information, what is about the elasticity of demand?

a. -1.25
b. -1.60
c. -2.00
d. -8.00

28. Let the production function of a firm be

$$Q = 2L^2K^2$$

What is the maximum possible output that the firm can produce with 10 units of L and 5 units of K?

a. 1000
b. 2500
c. 5000
d. 10000

29. A firm earns a revenue of Rs 50 when the market price of a good is Rs 10. The market price increases to Rs 15 and the firm now earns a revenue of Rs 150.
What is the price elasticity of the firm's supply curve?

a. 1
b. 2
c. 5
d. 10

30. Suppose the demand and supply curves of sugar is initially given by $q^D = 1000 - p$ and $q^S = 700 + 2p$ respectively. Suppose that the government decides to impose a tax of 3 per unit of sale of sugar from the next year. How would the equilibrium quantity be affected as a result of the tax?

a. Equilibrium quantity decreases by 2 units.
b. Equilibrium quantity increases by 2 units.
c. Equilibrium quantity decreases by 5 units.
d. Equilibrium quantity increases by 5 units.

31.Suppose you purchased a second-hand bike for Rs. 50,000 and spent Rs. 10,000 in refurbishment, all produced and sourced domestically. Which of the following statements seems appropriate for these transactions

a. Indian consumption increases by Rs. 60,000, and Indian GDP increases by Rs. 60,000
b. Indian consumption increases by Rs. 50,000, and Indian GDP increases by Rs. 50,000
c. Indian consumption increases by Rs. 10,000, and Indian GDP increases by Rs. 10,000
d. Indian consumption increases by Rs. 10,000, and Indian GDP increases by Rs. 60,000

32.Calculate the Gross National Product (GNP) at Market Prices (GNP_{MP}) and GNP at Factor cost (GNP_{FC}) from the following indicators, choose the appropriate values from the options given below:

Indicators	**Value in thousand crores**
NDP_{FC}	1,55,000
Depreciation	10,540
Net indirect taxes	18,500
Net income from abroad	550

a. 190, 450 and 173,450
b. 165,540 and 173,500
c. 184,040 and 155,550
d. 184,590 and 166,090

33.Suppose a country reports its nominal and real GDP from 2022-2025, shown in the table below. Which of the following is an appropriate value of the GDP deflator and inflation rate for 2024?

Year	Nominal GDP	Real GDP
2022	201.5	780
2023	199.5	770

2024	198.4	734.5
2025	179.3	728.5

a. 25.83 and 4.5
b. 25.85 and 3.45
c. 27.01 and 4.25
d. 24.61 and 3.95

34. Which of the following statements about the total income and expenditure in a circular-flow diagram is correct?

a. Total income exceeds total expenditure and never equals
b. Unemployment conditions occasionally allow equality between total income and total expenditure
c. Equals only in the absence of government purchases
d. Total income and total expenditure are always equal

35.Which of the following statements appropriately explains when we see a rise in prices of goods and services while the quantity of all goods and services remains the same?

a. Nominal and real GDP rise
b. Real GDP rises, but not nominal GDP
c. Nominal GDP rises, but not real GDP
d. Nominal and real GDP do not change

36. Look at this series: 8, 7, 13, 38, 151, ... What number should come next?

(a) 6
5
3

(b) 1
2
2

(c) 45
23

(d) 7
5
4

37. What will come in the place of the "?" Flow : River :: Stagnant : ?

a. Ocean
b. Sea
c. Canal
d. Pool

38. **Statements:** All mangoes are golden in colour. No golden-coloured things are cheap.
Conclusions:

I. All mangoes are cheap.

II. Golden-coloured mangoes are not cheap.

Select the correct statement from the following:

a. Only conclusion I follows.

b. Only conclusion II follows.

c. Both I and II follow.

d. Neither I nor II follows.

39. In a row of persons, the position of Saket from the left side of the row is 28th and the position of Saket from the right side of the row is 34th. Find the total number of students in the row?

a. 60

b. 61

c. 62

d. 59

40. There is a shift in demand in our economy from the manufacturing sector to the service sector. The expansion of the service sector will require managers to work more with people than with objects and things on the assembly line.

This passage best supports the statement that:

a. Interpersonal skills will become more important in the future work- place.
b. Assembly lines will exist in service organizations.
c. Manufacturing organizations ignore the importance of people.
d. Managers will be unemployed.

41. Which word does not belong with the others?

a. unimportant
b. familiar
c. trivial
d. insignificant

42. Which word best expresses the meaning of "GERMANE"

a. Relevant
b. Responsible
c. Planting
d. Develop

43. In the question below, the passage consist of six sentences. The first and sixth sentences are given in the beginning. The four middle sentences in each have been removed and jumbled up. These are labelled as P, Q, R and S. What is the proper order for the four sentences. S1: The heart is the pump of life. P : They have even succeeded in heart transplants. Q : Nowadays, surgeons are able to stop a patient's heart and carry out complicated operations. R : A few years ago, it was impossible to operate on a patient whose heart was not working properly. S : If the heart stops, we die in about five minutes. S6: All of this was made possible by the invention of heart-lung machine. The proper sequence should be:

a. QPRS
b. PSQR
c. RQPS
d. SRQP

44. Choose the correct meaning of "to make a clean breast of" idiom.

a. To be proud.
b. To confess without reserve.
c. To become noticeable.
d. To gain prominence.

45. Consider the following code language:

'given time simple plan' was written as '@N5 %E4 &E6 #N4' 'tired solution plant great' was written as '%D5 &N7 #T5 @T5' 'sick point good turn' was written as '&K4 #T5 @D4 %N4' 'garden sister phone team' was written as '@N6 &R6 #E5 %M4' What is the code for 'telephone'?

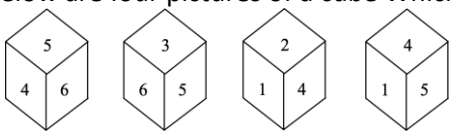
a. #T4
b. &L9
c. @P4
d. %E9

46. Read the information given below and answer the question. Six statements are followed by options consisting of three statements put together in a specific order. Choose the option which indicates a valid argument, that is, the third argument is a conclusion drawn from the earlier two statements.

A. Amar is unhappy
B. Amar is honest
C. Some magicians are honest
D. No honest man is a magician
E. No magician is happy
F. Amar is not a magician

a. FED
b. BFA
c. AEF
d. BDF

47. Given below are four pictures of a cube Which number is on the face opposite to 3?



(a) 1
(b) 2
(c) 4
(d) 5

48. If $P - Q$ means Q is son of P, $P \times Q$ means P is brother of Q, $P \div Q$ means Q is sister of P and $P + Q$ means P is mother of Q, which of the following is definitely true about $N \times K - M \div L$?

(a) K is father of L and M
(b) L is daughter of K and niece of uncle N
(c) K is father of L and M - his son and daughter respectively
(d) M is uncle of K's brother N

Read the information given below and answer the questions 49 and 50 below. Five girls Rama, Sudha, Tara, Uma and Veena share an apartment and have distributed the task as one girl making breakfast per day, Monday through Friday, one of the five dishes upama, dosa, idli, uttapa and paratha. Veena does not make uttapa and does not cook

on Tuesday. Sudha makes parathas but not on Monday or Friday. Upama is made on Thursday. Tara makes her dish which is not uttapa on Wednesday. Idli is made on Friday but not by Uma. Rama cooks on Monday

49. What does Tara cook on Wednesday?

a. Upama
b. Paratha
c. Idli
d. Dosa

50. What day does Uma prepare her dish?

a). Monday
b). Tuesday
c). Thursday
d). Friday