Booklet Number:_____ TEST CODE: **PEB**

AFTERNOON

INDIAN STATISTICAL INSTITUTE

ADMISSION TEST 2018

Questions: 30 **Time: 2 hours**

- This test contains thirty (30) multiple-choice questions (MCQs).
- The questions are to be answered in a separate *Optical Mark Recognition* (OMR) Answer Sheet.
- Please write your *Name, Registration Number, Test Centre, Test Code* and the *Number of this Question Booklet* in the appropriate places on the OMR Answer Sheet. Please do not forget to put your signature in the designated place.
- For each of the questions there are four suggested answers, of which only one is correct. For each question, indicate your choice of the correct answer by darkening the appropriate circle (●) completely on the OMR Answer Sheet, using black/blue ball-point pen.
- You will score
  4 marks for each correctly answered question,
  0 mark for each incorrectly answered question, and
  1 mark for each unattempted question.
- ALL ROUGH WORK MUST BE DONE ONLY IN THE SPACE AVAILABLE IN THIS QUESTION BOOKLET.
- THE USE OF CALCULATORS, MOBILE PHONES AND ALL TYPES OF ELECTRONIC COMPUTING AND COMMUNICATION DEVICES IS STRICTLY PROHIBITED.

STOP! WAIT FOR THE SIGNAL TO START.

1. A consumer has the utility function $U(x, y) = (x - 10)y$; $x \geq 0,\ y \geq 0$. Prices of the commodities are given by $P_x = P_y = 1$, and the consumer's money income is $M = 5$. Then the utility maximizing income-exhausting consumption bundle of this consumer is:

(a) $(x = 0, y = 5)$.
(b) $(x = 5, y = 0)$.
(c) $(x = 2.5, y = 2.5)$.
(d) none of the above.

2. Two individuals, X and Y, have to share Rs 100. The shares of X and Y are denoted by x and y respectively; $x, y \geq 0, x + y = 100$. Their utility functions are $U_X(x, y) = x + \left(\frac{1}{4}\right) y$ and $U_Y(x, y) = y + \left(\frac{1}{2}\right) x$. The social welfare function is $W(U_X, U_Y) = \min\{U_X, U_Y\}$. Then the social welfare maximizing allocation is:

   (a) $(44, 56)$.
   (b) $(48, 52)$.
   (c) (50, 50).
   (d) (60, 40).

3. Let the utility function of a consumer be given by $U(x, y) = \min\{y + 2x, x + 2y\}$. Prices are given by $P_x = 1$, $P_y = 3$, while the consumer's income is $M = 15$. Then her equilibrium consumption will be:

   (a) (15,0).
   (b) (0, 5).
   (c) (3, 4).
   (d) (6, 3).

4. Consider two consumers. They consume one private good (X) and a public good (G). Consumption of the public good depends on the sum of their simultaneously and non-cooperatively chosen contributions towards the public good out of their incomes. Thus, if g_1 and g_2 are their contributions, then the consumption of the public good is $g = g_1 + g_2$. Let the utility function of consumer i $(i = 1, 2)$ be $U_i(x_i, g) = x_i\, g$. The price of the private good is $p > 0$ and the income of each consumer is $M > 0$. Then the consumers' equilibrium contributions towards the public good will be:

   (a) $(\frac{M}{2}, \frac{M}{2})$.
   (b) $(\frac{M}{3}, \frac{M}{3})$.
   (c) $(\frac{M}{4}, \frac{M}{4})$.
   (d) $(\frac{M}{p}, \frac{M}{p})$.

5. A consumer has a stock X of infinitely durable consumption goods. She decides her consumption of this stock over an infinite (discrete) time horizon. Her utility function in period t is $u_t = \ln c_t$, where c_t is her consumption in period t, t = 0, 1, 2, ….. Let δ be the discount factor. The consumer wishes to maximize the present value of her

consumption over her infinite time horizon. Then her consumption in period t will be given by:

(a) $c_t = \delta^t(1-\delta)X$.
(b) $c_t = (1-\delta)^t\delta X$.
(c) $c_t = \delta(1-\delta^t)X$.
(d) $c_t = (1-\delta)X$.

6. Let the production function of a firm be $Q = \min\{aK, bL\}$, and let r and w be the prices of the inputs K and L respectively; a and b are positive constants. Then the cost function of the firm is:

(a) $C(Q) = \min\left\{\frac{r}{a}, \frac{w}{b}\right\} Q$.
(b) $C(Q) = (\mathrm{ar} + \mathrm{bw})Q$.
(c) $C(Q) = \min\{ar, bw\}\, Q$.
(d) $C(Q) = \left(\frac{r}{a} + \frac{w}{b}\right) Q$.

7. Consider two firms, 1 and 2, producing a homogeneous product and competing in Cournot fashion. Both firms produce at constant marginal cost, but firm 1 has a lower marginal cost than firm 2. Specifically, firm 1 requires one unit of labor and one unit of raw material to produce one unit of output, while firm 2 requires two units of labor and one unit of raw material to produce one unit of output. There is no fixed cost. The prices of labor and material are given and the market demand for the product is determined according to the function $q = A - bp$, where q is the quantity demanded at price p and $A, b > 0$. Now, suppose the price of labor goes up, but that of raw material remains the same. Then, the equilibrium profit of firm 1 will:

(a) increase.
(b) decrease.
(c) remain unchanged.
(d) go up or down depending on the parameters.

8. Considered again the problem in Question 7. As before, suppose that the price of labor goes up, but that of raw material remains the same. Then, the equilibrium profit of firm 2 will:

(a) increase.
(b) decrease.
(c) remain unchanged.
(d) go up or down depending on the parameters.

9. Consider a firm which initially operates only in market A as a monopolist and faces market demand $Q = 20 - P$. Given its cost function $C(Q) = \frac{1}{4}Q^2$, it charges a monopoly price P_m in this market. Now suppose that, in addition to selling as a

monopolist in market A, the firm starts selling its products in a competitive market, B, at price $\bar{p} = 6$. Under this situation the firm charges P_m^* in market A. Then:

(a) $P_m^* > P_m$.
(b) $P_m^* < P_m$.
(c) $P_m^* = P_m$.
(d) given the available information we cannot say whether $P_m^* > P_m$ or $P_m^* < P_m$.

10. Consider a monopolist which faces the following market demand function $D(P)$:

$$\begin{aligned} D(P) &= 10 && \text{if } 0 \leq P \leq 10 \\ &= 20 - P && \text{if } 10 < P < 20 \\ &= 0 && \text{if } P \geq 20 \end{aligned}$$

Production requires no variable cost; however, if the firm decides to produce it will have to incur a fixed cost of 50. Then the optimal monopoly price is:

(a) 0.
(b) 5.
(c) 10.
(d) 15.

11. Suppose there are two groups of consumers in a market. The first group generates α proportion of the total demand and the second generates the remaining $(1-\alpha)$ proportion. The (absolute) price elasticity of demand for group i $(i = 1, 2)$ is e_i. Then the price elasticity of demand for all consumers taken together is given by:

(a) $\alpha(e_2 - e_1) + e_1$.
(b) $(1-\alpha)(e_2 - e_1) + e_1$.
(c) $\alpha(e_1 - e_2) + e_2$.
(d) $(1-\alpha)(e_1 - e_2) + e_2$.

12. Two consumers, A and B, have utility functions $U_A = \min\{x_A, y_A\}$ and $U_B = x_B + y_B$, respectively. Their endowments vectors are $e_A = (100, 100)$ and $e_B = (50, 0)$. Consider a competitive equilibrium price vector (P_X, P_Y). Then,

(a) $(\frac{1}{5}, \frac{2}{5})$ is the unique equilibrium price vector.
(b) $(\frac{1}{5}, \frac{2}{5})$ is one of the many possible equilibrium price vectors.
(c) $(\frac{1}{5}, \frac{2}{5})$ is never an equilibrium price vector.
(d) an equilibrium price vector does not exist.

13. Suppose that museums are public goods. Suppose also that there are two types of individuals, A and B, in the society, each type with a different individual marginal benefit function for museums. A type A individual's marginal benefit is $Max\{20 - 2Q, 0\}$,

while a type B individual's marginal benefit is $Max\{4 - Q, 0\}$, where Q is the number of museums; $0 \leq Q \leq 10$. There are 10 individuals of each type in the society. The overall marginal benefit function for the society (20 people) is:

(a) [240 – 30Q] if $0 \leq Q \leq 4$, and [200 – 20Q] if $4 < Q \leq 10$.
(b) [240 – 30Q].
(c) [40 – 10Q] if $0 \leq Q \leq 4$, and [200 – 20Q] if $4 < Q \leq 10$.
(d) 140 – 15Q.

14. In the scenario described in Question 13, suppose that the constant marginal cost of production of museums is 100. Then the socially efficient level of museum production is:

(a) 5.
(b) 15.
(c) 10.
(d) 7.

15. Suppose a firm is a monopsonist in the labor market and faces separate labor supply functions for male and female workers. The labor supply function for male workers is given by $l_M = {w_M}^k$, where l_M is the amount of male labor available when the wage offered to male workers is w_M, and k is a positive constant. Analogously, the labor supply function for female workers is given by $l_F = w_F$. Male and female workers are perfect substitutes for one another. The firm produces one unit of output from each unit of labor it employs, and sells its output in a competitive market at a price of p per unit. The firm can pay male and female workers differently if it chooses to. Suppose the firm decides to pay male workers more than female workers. Then it must be the case that:

(a) $k < \frac{1}{2}$.
(b) $\frac{1}{2} \leq k < 1$.
(c) $k = 1$.
(d) $k > 1$.

16. Consider the problem in Question 15, and assume that the firm pays male workers more than female workers. Suppose further that $p > 2$. Then the firm must:

(a) hire more male workers than female workers.
(b) hire more female workers than male workers.
(c) hire identical numbers of male and female workers.
(d) hire more females than males if $2 < p \leq 4$, but more males than females if $p > 4$.

17. If the value of the parameter k in Question 15 increases, then the equilibrium value of the female to male wage ratio (i.e., $\frac{w_F}{w_M}$) in Question 15 must:

(a) fall.
(b) rise.
(c) stay the same.
(d) rise if $p > 3$, but fall otherwise.

18. If the value of the parameter k in Question 15 increases, then the equilibrium value of the male wage rate (i.e., w_M) in Question 15 must:

(a) fall.
(b) rise.
(c) stay the same.
(d) fall if $p > 3$, but rise otherwise.

19. Suppose a consumer consumes positive amounts of N goods, $N > 1$. Her preferences are given by $u(x_1, x_2, \dots, x_N) = [\sum_{i=1}^{N} \alpha_i \ln x_i]^{\gamma}$, where $\alpha_i > 0$ for $i = 1,2, \dots, N$, and $\gamma > 0$. Then:

(a) the income elasticity of demand for at least one good must be greater than one.
(b) the income elasticity of demand for every good must be exactly one.
(c) the income elasticity of demand for every good must be less than 1.
(d) the income elasticity of demand for at least one good must be less than 1.

20. In a Ricardian model of international trade with two countries and n commodities (n even), in equilibrium a country will produce:

(a) at least $\frac{n}{2}$ commodities and at most $\frac{n}{2} + 1$ commodities.
(b) exactly $\frac{n}{2}$ commodities.
(c) exactly $\frac{n}{2} + 1$ commodities.
(d) at least one commodity and at most n commodities.

21. In a two country, two factor, two good Heckscher-Ohlin model of trade where both countries are incompletely specialized in trade equilibrium, a rise in the endowment of labor at Home will:

(a) increase the real return to capital in both countries.
(b) reduce the real return to capital at Home while keeping it constant in the Foreign country.

(c) keep the real return to capital unchanged in both countries.
(d) reduce the real return to capital in both countries.

22. In a complete Keynesian model, if the monetary authorities fix the rate of interest instead of the supply of money, the aggregate demand curve will be:

(a) downward sloping.
(b) upward rising.
(c) vertical.
(d) horizontal.

23. In a complete Keynesian model, a recession is characterized by:

(a) a fall in output with a rise in real wage.
(b) a fall in output with a fall in real wage.
(c) a fall in output with a constant real wage.
(d) a fall in output with an ambiguous change in real wage.

24. Suppose that the level of savings varies positively with the level of income and that savings is identically equal to investment. Then the IS curve:

(a) slopes positively.
(b) slopes negatively.
(c) is vertical.
(d) does not exist.

25. Consider the Solow growth model without technological progress. Suppose that the rate of growth of the labor force is 2%. Then, in the steady-state equilibrium:

(a) per capita income grows at the rate of 2%.
(b) per capita consumption grows at the rate of 2%.
(c) wage per unit of labor grows at the rate of 2%.
(d) total income grows at the rate of 2%.

26. Consider a Simple Keynesian Model for a closed economy with government. Suppose there does not exist any public sector enterprise in the economy. Income earners are divided into two groups, Group 1 and Group 2, such that the saving propensity of the former is less than that of the latter. Aggregate planned investment is an increasing function of GDP (Y). Start with an initial equilibrium situation. Now, suppose the government imposes and collects additional taxes from Group 1 and uses the tax revenue

so generated to make transfer payments to Group 2. Following this:

(a) aggregate saving in the economy remains unchanged.
(b) aggregate saving in the economy declines.
(c) aggregate saving in the economy rises.
(d) aggregate saving in the economy may change either way.

27. Suppose, in an economy, the level of consumption is fixed, while the level of investment varies inversely with the rate of interest. Then the IS curve is:

(a) positively sloped.
(b) negatively sloped.
(c) vertical.
(d) horizontal.

28. Suppose, in an economy, the demand function for labor is given by:

$L^d = 100 - 5w,$

whereas the supply function for labor is given by:

$L^s = 5w;$

where w denotes the real wage rate. Total labor endowment in this economy is 80 units. Suppose further that the real wage rate is flexible. Then involuntary unemployment in this economy is:

(a) 30.
(b) 50.
(c) 70.
(d) 0.

29. Consider again the economy specified in Question 28. Suppose now that the real wage rate is mandated by the government to be at least 11. Then total unemployment will be:

(a) 35.
(b) 0.
(c) 30.
(d) 10.

30. Consider a macro-economy defined by the following equations:

$M = kPy + L(r),$
$S(r) = I(r),$
$y = \overline{y},$

where M, P, y and r represent, respectively, money supply, the price level, output and the interest rate, while k and $\overline{y}$ are positive constants. Furthermore, $S(r)$ is the savings function, $I(r)$ is the investment demand function and $L(r)$ is the speculative demand for money function, with , $S'(r) > 0, I'(r) < 0$ and $L'(r) < 0$. Then, an increase in M must:

(a) increase P proportionately.
(b) reduce P.
(c) increase P more than proportionately.
(d) increase P less than proportionately.