This question paper contains 3 printed pages.

2230

Your Roll No. ....

M.A. / Winter Semester

A

ECONOMICS

Course 005— Markets, Institutions and Economic Growth

(Admissions of 1999 and onwards)

Time : 2 1/2 hours

Maximum Marks : 70

(Write your Roll No. on the top immediately on receipt of this question paper.)

Use separate answer-scripts for Part A and Part B.

PART A

Answer any two questions from Part A.
All questions carry equal marks.

1 Consider a risk neutral landlord who wants to lease out a plot of land to a tenant. The tenant can be of two types: high ability and low ability. The tenant knows her true type. The landlord does not know the true type of the tenant but it only has a prior belief that with probability p tenant can be of high ability and with probability (1-p) the tenant can be of low ability. The high ability tenant produces an output of Rs. Q_H and the low ability tenant produces an output of Rs. Q_L ($Q_H > Q_L$). The tenant has a reservation payoff of Rs. 0. The landlord has the option of either writing a fixed rent contract or a combination of fixed rent and share contract. What would be the optimal payoff to the landlord when the landlord writes only a fixed rent contract? What would be the optimal contract for the landlord when he can specify both a fixed rent and a share of the output in the contract? 17 ½

2. Consider a principal-agent model with moral hazard of effort choice. Effort is not observable to the principal. Formulate the problem and state all necessary assumptions. Derive the optimal risk sharing rule between the principal and the agent. What would be the optimal contract offered by the principal depending on the risk preferences of the two parties?

17 ½

3. Suppose there are two types of firms. The current assets of the firm are worth either H or L (H>L). Firm's types are known to the managers whose objective is to maximize the value of the current shareholders claim. Outside investors believe that the firm is of type

H with probability p and type L with probability (1-p). Investors behave competitively. Both types of firms have access to a new project that requires investment of I and has net present value of v. I and v are assumed to be common knowledge. The firm must decide whether to undertake the project or pass up. If the project is accepted, the investment I must be financed by issuing equity to new shareholders. Derive the conditions for pooling and separating equilibrium in this context.

17 ½

PART B

Answer Q. No. 4 and any one of Q. Nos. 5 and 6.

4. Consider the following **centrally planned** economy where the central planner carries out the final goods production by using a Cobb-Douglas technology such that $Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}$; $0 < \alpha < 1$. Total population in this economy is constant, given by $\overline{N}$ - of which the central planner employs **only** a constant fraction λ in final goods production. The rest of the population is engaged by the planner in R&D activities which enhances the productivity term in the following way: $\frac{\dot{A}}{A} = (1-\lambda)\overline{N}$. The initial capital stock is given at K_0 and there is no depreciation of capital stock.

All households are identical and have identical life-time utility function represented by: $U = \int_0^{\infty} \log c_t \exp^{-\rho t} dt$; ρ is a positive constant. The benevolent central planner maximizes this utility function subject to his aggregate resource constraint.

(i) Derive the resource constraint for the central planner **per unit of effective labour** at every point of time t and define the corresponding dynamic optimization problem of the central planner - with consumption **per unit of effective labour** as the control variable and capital **per unit of effective labour** as the state variable;

(ii) Write down the corresponding FONCs and derive the dynamic equations for the optimal consumption **per unit of effective labour** and capital accumulation **per unit of effective labour** from the first order conditions;

(iii) Draw the corresponding phase diagram and identify the steady states for this economy. Using the FONCs, argue that the **only** optimal trajectory in the case is a unique path which takes the economy to the non-trivial steady state point in the long run.

(iv) What is the long run rate of growth of **per capita** consumption in this economy? How does this rate change if there is an increase in λ? 4+8+8+5

5. Consider the following modified version of a Solow economy, where we introduce a government sector. Output is produced by using a Cobb Douglas technology:

$Y_t = (K_t)^{\alpha}(L_t)^{1-\alpha}$; $0 < \alpha < 1$. Competitive firms maximize profit so that the market wage rate and market interest rate are equal to the marginal products of labour and capital at full employment respectively. The entire output is thus distributed to the households as factor incomes. Now the government comes in and taxes away a part of the household income at a constant proportional rate τ. Out of the total tax revenue thus collected, the government saves a constant proportion s_G and consumes the rest. The households on the other hand save a constant proportion s_H of their total **disposable** income and consume the rest. Assume that $s_G > s_H$. All savings (by government as well as households) are automatically invested so as to augment the next period's capital stock. Population in this economy grows at a constant rate n, and there is no depreciation of capital stock.

(i) Derive the dynamic equation for capital-labour ratio $(k_t \equiv K_t / L_t)$ for this economy;
(ii) What is the short run impact of an increase in the tax rate τ on the per capita output? What is the corresponding long run impact? 5+5

6. Consider the following modified version of the Barro model with an aggregate production function given by $Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}$; $0 < \alpha < 1$, where the labour productivity term depends on the public infrastructural input (G_t) through the following relationship: $A_t = \frac{G_t}{K_t}$. Government finances the infrastructural input by imposing a proportional income tax at an arbitrary rate τ. Households are identical with preferences given by a logarithmic utility function: $U = \int_0^{\infty} \log c_t \exp^{-\rho t} dt$. Total population is constant at $\overline{L}$.
(i) Write down the social planner's optimization problem (with the government resource constraint defined in per capita terms) and the associated FONCs. Is the social marginal product constant?
(ii) What is the steady state (long run) growth rate of per capita consumption? Explain your answer. 4+6