PG/IVS/MA-2205/11

# M.Sc 4th Semester Examination, 2011

## APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

PAPER—MA - 2205

*Full Marks* : 50

*Time* : 2 hours

*The figures in the right-hand margin indicate marks*

( *Operational Research Modelling* -II )

[ *Marks* : 25 ]

*Time* : 1 hour

Answer **Q.No.1** and any *two* from the rest

**1.** Answer any *two* questions : 2 x 2

( *a* ) Define encoding with examples in Information Theory.

( *b* ) How do you estimate reliability of a machine ?

(*c*) What do you mean by dynamic slack time per operations ?

2. (*a*) Derive Shannon-Fano encoding procedure with examples to obtain a uniquely decodable code. 5

(*b*) Principal assumptions made on sequencing problem. 3

3. (*a*) Prove that reliability function for random failures is an exponential distribution. 3

(*b*) Derive Johnson's algorithm for processing *n* jobs through three machines in a sequence. 5

4. (*a*) Find the stationary path $x = x(t)$ for the functional $J = \int_0^1 \left[1 + \left(\frac{d^2x}{dt^2}\right)^2\right] dt$. 5

(*b*) State Pontryagin's minimum principal. 2

(*c*) What do you mean by transversality condition for unconstraint problem ? 1

[*Internal Assessment* : 5 Marks]

( *Dynamical Meteorology* - II )

[ *Marks* : 25 ]

*Time* : 1 hour

Answer **Q.No.1** and any *two* from the rest

**1.** Answer any *one* question : 2 x 1

(*a*) What is cyclogenesis and what are the criteria for it ?

(*b*) What is dynamic and kinemetic boundary conditions for a front ?

**2.** (*a*) Explain the pressure distribution near the fronts. 3

(*b*) Derive the Margules formula for the slope of the front ? 6

**3.** (*a*) What is storm surge ? How does it occurs and derive the surge ? 2 + 2

(*b*) Derive the expression of amplitude for the stationary planetory waves. 3

(*c*) For wind blowing 16·2 m/s over a 1 km high mountain range at 45° N, find the wavelength and amplitude of the planetory wave. Assume the troposphere depth is 10 km. 2

4. Derive the general equations of horizontal motion including the effect of frictional forces resulting from turbulent air motion according to the Prandtl theory. 9

[*Internal Assessment* : 5 Marks]