Roll No: ----------

UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program/course: B.Tech (Instrumentation and Control Engg.) **Semester – VII**
Subject: Computer Control **Max. Marks: 100**
Code: ICEG-411 **Duration: 3 Hrs**
No. of page/s: 3

Section- A (5 x 4 = 20 Marks)

Attempt *all* the questions

Q.1 Detail the different LAN topologies and ISO standard layers with examples. [5]

Q.2 Would you classify any one of the following systems as real time? In each case give reasons for your answer and classify the real time systems as hard or soft. [5]
(a) A simulation program runs by an engineer on a personal computer.
(b) Air France Flight 447 crashed into the ocean after a sensor malfunction caused a series of system errors. The pilots stalled the aircraft while responding to outdated instrument readings. All 12 crew and 216 passengers were killed.
(c) Mars Pathfinder spacecraft was nearly lost when a priority inversion caused system restarts. A higher priority task was not completed on time due to being blocked by a lower priority task. The problem was corrected and the spacecraft landed successfully.
(d) An Inkjet printer has a print head with control software for depositing the correct amount of ink onto a specific part of the paper. If a deadline is missed then the print job is ruined.

Q.3 What is message mailboxes and pertrinets ? Suggest the suitable examples. [5]

Q.4 Write the basic feature of Modula 2 and Ada Programming. Developthe modula 2 code for continous record of air flow, fuel fow and reacant using enumerated data type. [5]

Section- B (4 x 10 = 40 Marks)

Attempt *all* the questions

Q.5 (a) Outline the flow chat of abstract modeling approach of Ward and Mellor method. Show the relationship between models and diagram as the basic building in essential model and environmental model. [5]
(b) Detail the behavioral model to simulate the behavior of a boiler in power plant with the following parameters The simulation parameters are drum_level = 49 %, steam_temperature_control= 516^0C, furnace_pressure = 0 mmwc, deaerator_pressure_control = 1 kg/cm^2, CBD level conrol = 51 %, O2_Level = 9 %, Fuel_Pressure = 84 Kg/CM^2, Steam_Pressure = 399 Pascal [5]

Q.6 (a) How direct digital control (DDC) is used in direct control with serval loop control handled within one computer. Can PID control algorithm be more accurate in comparison to DDC? Discuss the control technique to support your answer. [5]
(b) Explain concept of parallel processing and detail all possible computer architectures. [5]

Q.7 (a) Explain Hatley and Pirbhai model as requirement model with example. [5]
(b) You are the engineer in a plant which can produce ten different chemical products in batches which can be between 500 and 5000 Kg. What factors would you expect to consider in calculating the optimum batch size? What arguments you would put forward to justify the use of an online computer to calculate optimal batch size. Suggest the batch process control scheme for the same system. [5]

Q.8 Explain the following control systems. [5 x 2 =10]
(a) Supervisory control
(b) Centralized computer control

Section- C (2 x 20 = 40 Marks)

Attempt any *two* of the followings

Q.9 (a) Show the execution of the following processes using preemptive and non-preeemptive scheduling method. Detail both scheduling for the processes listed below in fig.1. [10]

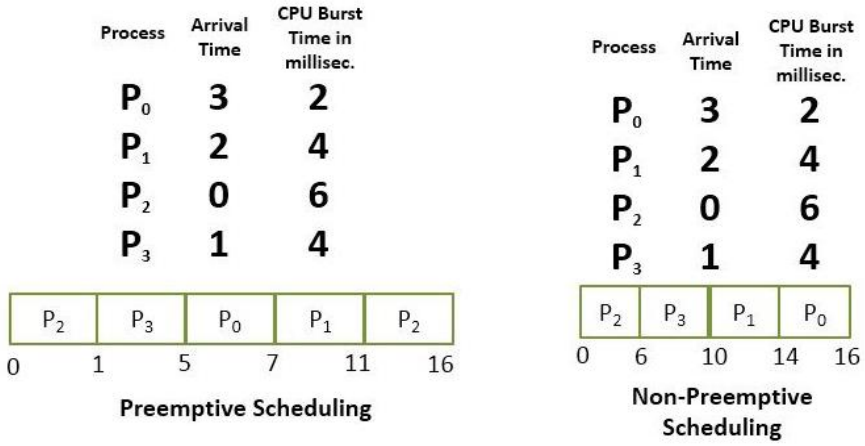

Fig.1 CPU scheduling

(b) Fig.2 shows the different task states. Complete the task state diagram and detail the operation to justify your answer. [10]

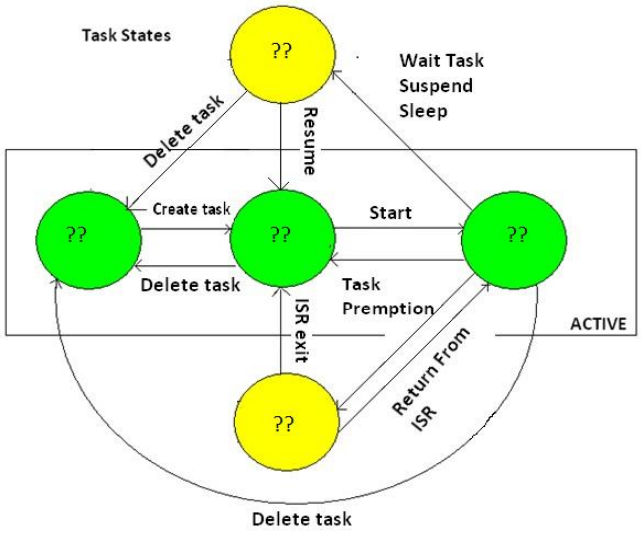

Fig.2 Task States

Q.10 (a) what are the different types of semaphore? Detail all with examples. What synchronization technique can be employed in fig.3 for synchronization task and ISR?

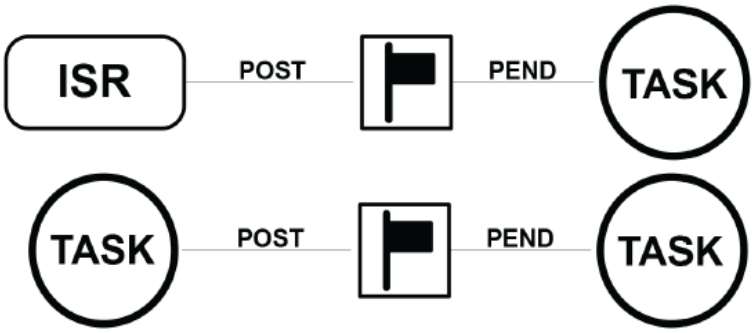

Fig.3 Task synchronization with ISR

(b) Suggest the finite state machine for the following traffic light controller. Design the control algorithm, to control the traffic intensity from one way and develop the code for the same in Modula 2, Ada or embedded 'C'. [10]

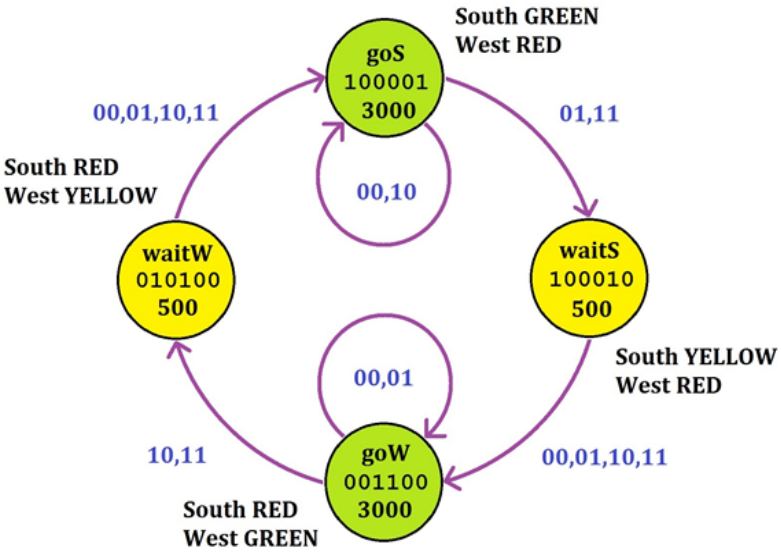

Fig.4 Traffic Light Controller

Q.11 (a) A computer control hot air blower system is interfaced with digital computer for control purpose. The air flow can be controlled automatically and manual. Suggest the suitable interface diagram with the description of different units and temperature control. [10]

(b) A typical reactor vessel for sequence control is used fir chemical production by the reaction of two chemicals at specified. The chemicals are mixed together in a sealed vessel and the temperature of the reaction is controlled by feeding hot or cold water through the water jacket which surrounds the vessel. The water flow is controlled is adjusted with the values. The flow of material into and out of the vessel is regulated by other valves. The temperate of the contents of the vessel and the pressure in the vessel is also monitored.

Suggest the model and procedure of operation to support the same functionality and detail the block diagram for this chemical batch process, when all the operations are controlled by the computer and timings by software. [10]

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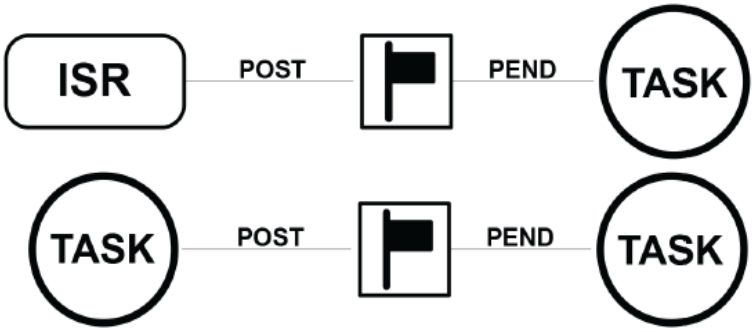

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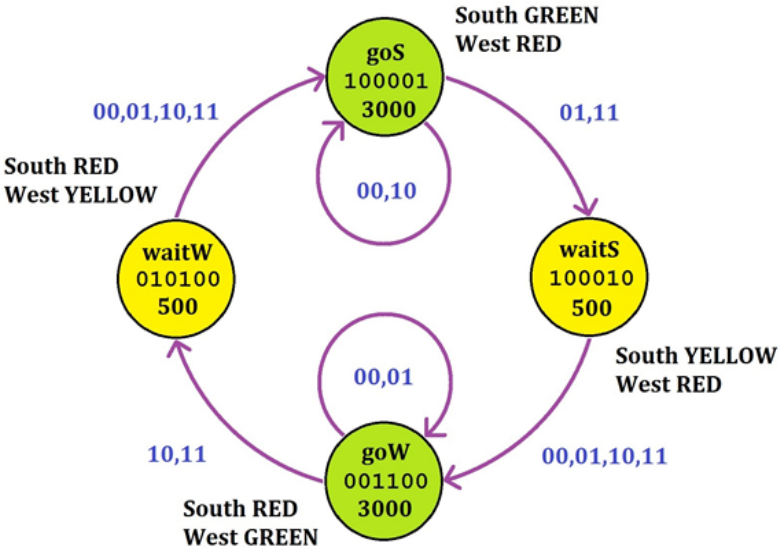

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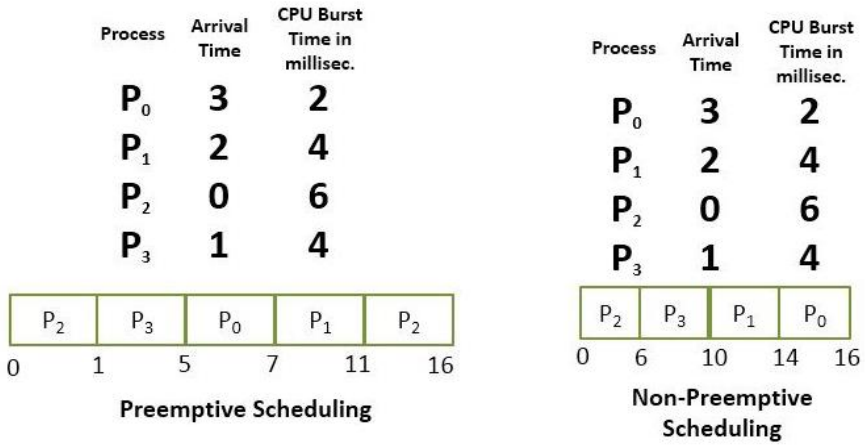

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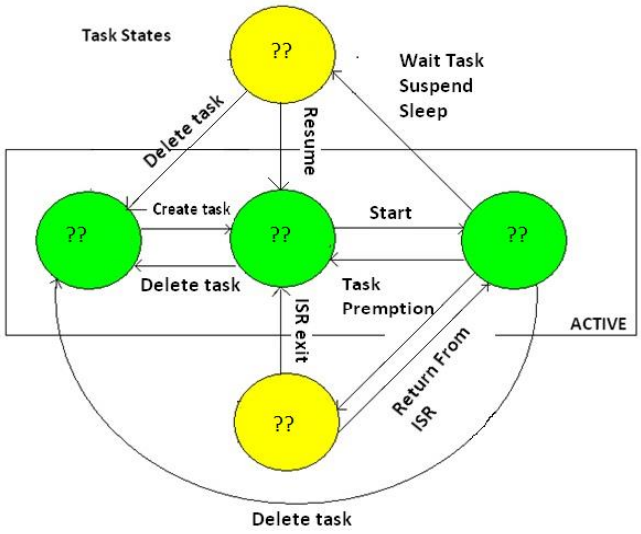

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