Birla Institute of Technology and Science
II semester 2017-2018
MEL G641- CAD for IC Design
Comprehensive Examination (Closed-Book)

01.05.2018 (AN) MM: 25 Time: 1 Hr. 30 Min

Attempt all parts of a question together in sequence.

Q1: For the following CIF code draw and label the specified geometry at each step, showing layer name and operation performed. (Note: Geometries should be drawn in CIF units only). **(4) M**

```
DS3 10 1; L NP; P  2  3  5  3  5  7; DF;
DS 6 1 1; C 3  T  -70  -10   MY R 0 1  ; DF; E;
```

Q2: For the bipartite graph shown in fig. 1, apply the Kernighan-Lin algorithm to reduce final cut size. Show all steps in the problem and gain table. Also find final cut-size.
(In case of tie, choose the **topmost** node in the list, e.g. if tie occurs between $(i, j)^{th}$ gain pair & $(i+x, j)^{th}$ gain pair (where: $x>1$) then $(i, j)^{th}$ gain pair should be selected. **(7)M**

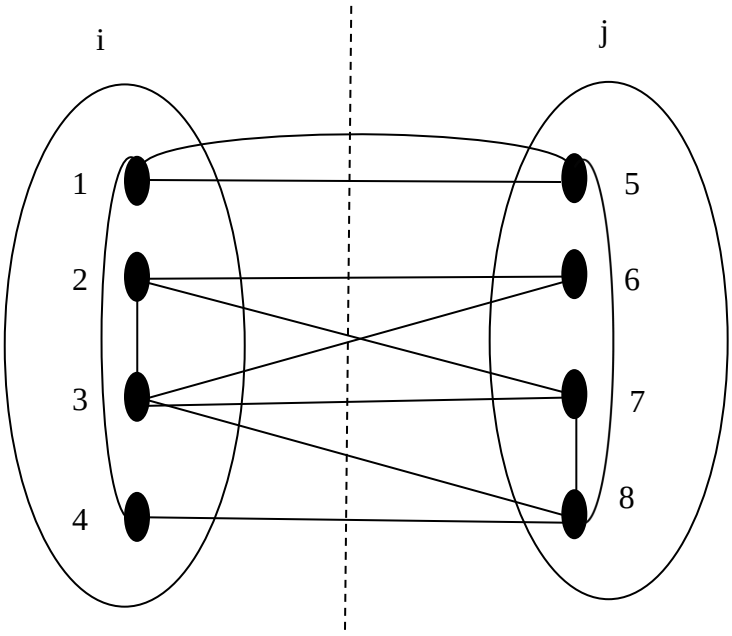

Figure 1

Q3:
(A) For the rectangular floorplan shown in fig. 2, draw the vertical adjacency graphs, horizontal adjacency graphs and slicing tree. Explain the use of slicing tree in channel routing process. **(3 M)**
(B) Confirm if the graph shown in fig. 3 is Properly Triangulated planar (PTP) graph, show all conditions to justify your answer. **(2 M)**
(C) Mention the suitable partitioning-based placement algorithm for standard cell placement and explain it in brief. **(1 M)**

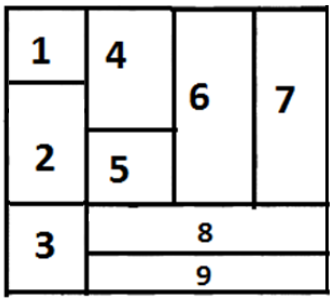

Figure 2

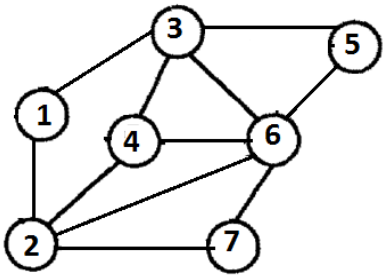

Figure 3

Q4: The grid graph model shown in fig. 4 has all empty grids on all four sides (could not be shown due to space limitation. The 'S' represent source terminal and 'T' represent the target terminal and other darken circle represents blockages).

(A) Draw the weighted cellular array. Find the final weights of optimum path and their corresponding lengths between 'S' and 'T_1' using weighted Lee maze routing algorithm (show the weights on grids cell till first **two** paths are reached). Indicate the more desirable path. (Assume terminals 'T_2', 'T_3', and 'T_4' as blockages)

(B) Find the minimum length of (i)Spanning tree, (ii)Steiner tree and (iii)Source to sink connection method for a the multi-terminal net consisting of terminals 'S' , 'T_1', , 'T_2', 'T_3', and 'T_4'.

(3+3)M

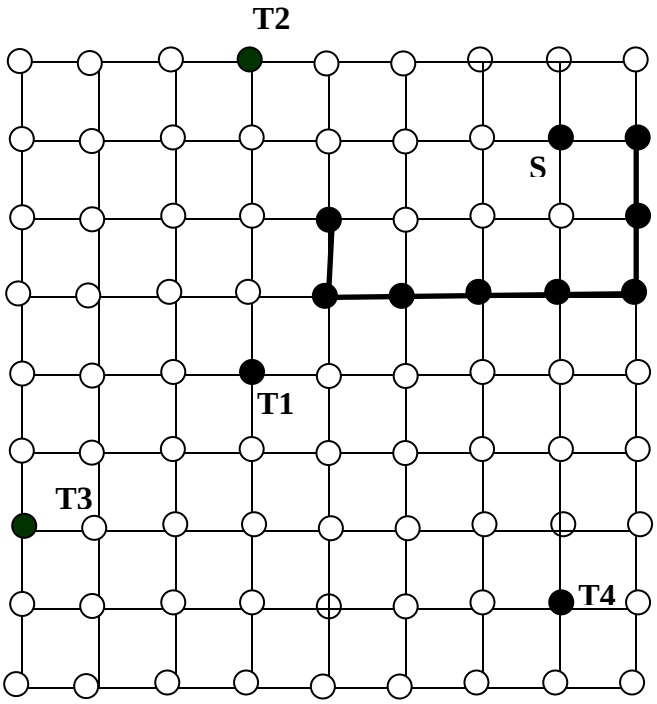

Figure 4

Q5: Perform the tree-height reduction on the following operation without increasing number of time steps and resources, if the each operation is scheduled in one clock cycle? **(2)M**

$x = a - (b * c) - d;$

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