FACULTY OF CHEMICAL AND ENERGY ENGINEERING
UNIVERSITI TEKNOLOGI MALAYSIA

SKPN 2273 PROGRAMMING FOR ENGINEERS — Semester II 2017-2018
Test 1 — 60 minutes

1. Draw the flowchart symbol for the following functions
   a) Conditional loop
   b) Counted loop
   c) Conditional transfer

2. List and explain the two types of programming errors.

3. Convert the following mathematical expressions into valid Fortran expressions

   (a) $\sqrt{\frac{5x + 25y}{25}}$ (b) $b^2 + c^2 - 2bc(\cos A)$

4. You did not declare `IMPLICIT NONE` at the beginning of your Fortran program. Which of the following are *integer* variable names, which are *real* variable names, and which are neither of the two?

   (a) `A` (b) `XPQ` (c) `CHARACTER` (d) `REAL`
   (e) `LIST` (f) `INTERVAL` (g) `LOGICAL` (h) `KOUNT`

5. Write a Fortran program segment that will print out, *column-by-column*, the array `B(5,10)`

continued →

6. Show the step-by-step trace through the following Fortran program segments and predict the output.

a)
```
      INTEGER I, J, K
       DO 10 I = 2, 8, 2
         DO 10 J = I, 2
           DO 10 K = 1, J, 2
             PRINT*, I, J, K
10    CONTINUE
```

b)
```
      X = 1.0
      DO WHILE (X .LE. 100.0)
         PRINT*, x
         X = (X-1)**2 + 2.0
       END DO
```

7. When two vectors, say *x* and *y*, are perpendicular to each other, they are said to be orthogonal, i.e. when their dot product is zero (or very close to zero). The dot product is defined as

$$x \odot y = \sum_{i=1}^{3} x_i \, y_i$$

Using arrays to store these vectors, write a Fortran program to check their orthogonality.