Unit 3 · Software Engineering

WORKSHEET

Full marks 31

Name _____ Class _____ Roll no. ____ Date _____ Marks _____ / 31

1 Key words [4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

boundary	breakpoint	commit	critical path	facade	merge conflict	pure function	regression	repository	stub

The folder that git looks after, with every saved version, is a _____. A snapshot of the whole project at one moment, with a message saying what changed, is a _____. When two branches changed the same lines, git stops with a _____ and asks a person to decide. Something that used to work, broken by a later change, is a _____. Test values at the edges, where the program's behavior changes, are _____ data. A line where a debugger pauses the program, before the line runs, is a _____. A function whose answer depends only on its arguments, with no side effects, is a _____. The longest chain of tasks that wait for each other, where any delay makes the whole project late, is the _____.

2 Changing over [2]

Match each way of changing over to a new system, in Column A, with what it means, in Column B. Two items in Column B are not needed. Each carries 0.5 mark.

Column A		Column B
1. direct changeover	☐	**a.** both run side by side, and their results are compared
2. parallel running	☐	**b.** the new system replaces the old one a part at a time
3. phased changeover	☐	**c.** one group uses the whole new system first, then everyone
4. pilot changeover	☐	**d.** the program is changed because the rules around it changed
		e. a working program is made faster
		f. the old system stops and the new one starts on the same day

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which is the best commit message? [1]

a. changes
b. Fixed the bug that Dawa found yesterday and also tidied some names and added the new GPA report
c. Refuse marks over 100 in check_marks()
d. asdf

ii. Two people changed **different** functions in the same file on two branches. What happens when the branches are merged? **[1]**

a. Git joins both changes by itself; there is no conflict, though the tests should still be run.

b. Git always reports a conflict when the same file was changed on both branches.

c. The second branch's file replaces the first's, losing the other change.

d. Git refuses to merge until one branch is deleted.

iii. Dawa's change to a function makes a test that passed last week fail. What is this called? **[1]**

a. a boundary test **b.** a regression

c. a merge conflict **d.** erroneous data

iv. A weather app must update its screen, its widget on the home screen and its rain alarm whenever new data arrives, and more such parts may be added later. Which pattern fits? **[1]**

a. observer **b.** strategy

c. facade **d.** none: call each part by name

v. A team builds an app for a cooperative whose members aren't sure what they want, and who can meet the team every two weeks. Which method suits it best? **[1]**

a. waterfall, so the requirements are fixed before any code is written

b. agile, so the members can try a working version every two weeks and steer what comes next

c. no method: start coding at once

d. spiral, because every project needs it

4 Think **[2]**

Think, then answer.

After a week of work, Kiran says: "All 40 of my tests pass, so the results program has no bugs left. We can do a direct changeover on results day." Is he right? Explain.

5 Choosing test data [4]

Fill in the table. Then answer.

A function books seats for a class trip. It must accept from 5 to 40 students. For each test value, write whether it is normal, boundary or erroneous data, and whether the function should accept or refuse it.

Test value	Kind of data	Accept or refuse?
22		
5		
40		
41		
-3		
twenty		

i. Which two values, one on each side of the range, are missing from the list, and why do they matter?

6 A merge conflict [3]

Read the file, then answer.

Dawa merges the branch `new-fees` into `main`, and git stops with a conflict in `fees.py`:

FEES.PY

```
def fee_for(grade):
<<<<<<< HEAD
    return 4500 if grade >= 11 else 3500
=======
    if grade >= 11:
        return 5000      # the new fee from Shrawan
    return 3500
>>>>>>> new-fees
```

i. Which lines come from `main`, and which from `new-fees`?
ii. The new fee is right. Write the function as it should be after the conflict is resolved.
iii. What must Dawa do before the merge is finished?

7 Find and fix the bug [3]

Read the program, then answer.

The unit's test runner runs the four tests. Three pass, and it prints `FAIL test_sixty 60 gave 100`.

```
def ticket_price(age):
    # Rs 50 for under-12s and for people 60 or over, else Rs 100
    if age < 12:
        return 50
    elif age > 60:
        return 50
    else:
        return 100

def test_child():
    assert ticket_price(7) == 50
def test_adult():
    assert ticket_price(35) == 100
def test_twelve():
    assert ticket_price(12) == 100
def test_sixty():
    assert ticket_price(60) == 50, f"60 gave {ticket_price(60)}"
```

i. Which line is wrong? Write it correctly.

ii. What kind of test data found the bug, and why is a bug most likely there?

8 Planning with a Gantt chart [4]

Fill in the table. Then answer.

A team plans an app for a health post. Each task starts as soon as all the tasks it waits for are done. Fill in the weeks each task takes up.

Task	Weeks	Waits for	First week	Last week
A Requirements	2	-	1	2
B Design the screens	2	A		
C Design the database	1	A		
D Write the code	3	B and C		
E Write the user guide	1	B		
F Test	2	D		
G Train the staff	1	E and F		

i. Write the critical path and how long the project takes. How many weeks can task E slip without making the project late?

Science Playground, Katunje, Bhaktapur
https://science-playground.com/learn/grade-12-computing/software-engineering

9 Write a program [4]

Write the program in Python on the lines. Any program that gives the right result gets the marks.

A school adds a late fee of Rs 10 a day to a fee paid late, but never more than Rs 200. Write a **pure** function `late_fee(fee, days_late)` that gives back the amount to pay, and raises a `ValueError` if `days_late` is negative. Then write three test functions with `assert`: one with normal data, one with boundary data and one with erroneous data.

10 Activity: Find the bug with a debugger (not marked)

At a computer or on a phone, open the unit's page (the QR code) and find **Find the bug with a debugger.** Set a breakpoint on line 15 and press **Run.** Each time it stops, write the value of `total`, then press **Resume.**

When	`total`
The 1st stop at line 15	
The 2nd stop at line 15	
The 3rd stop at line 15	
At the end	
What `gpa()` gives back	