Q1. For the following project calculate SV,CV, SPI and CPI at the end of second month.

Month	1	2	3	4
Planned Value	$ 11,10,000	$ 6,00,000	$ 25,00,000	$ 8,00,000
Earned Value	$10,00,000	$ 7,50,000		
Actual Cost	$ 12,50,000	$ 5,00,000		

Sol. **DATA:**

SV=?

CV=?

SPI=?

CPI=?

ANS:

As we have to calculate at the end of second month so

Planned Value (PV)   = 11,10,000+ 600,000

                = $1710000

Earned Value (EV)   = 10,00,000+ 7,50,000

                = $ 175,0000

Actual Cost (AC)   = 12,50,000+ 500,000

                = $ 175,0000

Now Calculating Schedule Variance

Schedule Variance (SV) = EV – PV

                = 175,0000 – 1710000

                = $ 40,000.

Now Calculating Schedule Performance Index

Schedule Performance Index (SPI) = EV / PV

                    = 1750000 / 1710000

                    = 1.023

Now Calculating Cost Variance

Cost Variance (CV) = EV – AC

$$= 175,0000 - 175,0000$$

$$= \$ 0$$

Now Calculating Cost Performance Index

Cost Performance Index (CPI) = EV / AC

$$= 1750000 / 1750000$$

$$= 1$$

Since the SV is positive and SPI is greater then 0 , The above project is head of schedule.

As CV is equal to zero and CPI is equal to 1, The project is on budget.

Q2. You are managing a project which is into six months of its execution. You are now reviewing the project status and you have ascertained that project is behind schedule. The actual cost of Activity A is $ 2,00,000 and that of Activity B is $ 1,00,000. The planned value of these activities is $ 1,80,000 and $ 80,000 respectively. The Activity A is 100% complete. However, Activity B is only 75% complete. Calculate the schedule performance index and cost performance index of the project on the review date.

Sol: DATA:

Actual Cost of Activity A = $ 2,00,000

Actual Cost of Activity B = $ 1,00,000.

Planned Value of Activity A = $ 1,80,000

Planned Value of Activity B = $ 80,000

Activity A Completion = 100%

Activity B Completion = 75%

SPI = ?

CPI = ?

ANS:

FOR ACTIVITY A

%age completion data is available so we will calculate Earned Value

Earned Value (EV) = 100% x 180000

= **$ 180,000**

FOR ACTIVITY B

%age completion data is available so we will calculate Earned Value

Earned Value (EV) = 75% x 80,000

= 0.75 x 80000

= **$ 60,000**

Now,

Cumulative Planed Value (PV) = Activity A + Activity B

= 180000 + 80000

= **$ 2,60,000**

Cumulative Actual Cost (AC) = Activity A + Activity B

= 2,00,000 + 100000

= **$ 300000**

Cumulative Earned Value (EV) = Activity A + Activity B

= 180000 + 60000

= **$ 240000**

NOW,

Schedule Performance Index (SPI) = EV/PV

= 240000 / 260000

= **0.92**

Cost Performance Index (CPI) = EV/AC

= 240000 / 300000

= **0.8**

Since Both SPI and CPI are less than 1 therefor the project is behind the schedule and having cost overrun.

Q3. Task – Develop and install ten printer drivers. Budget - $100,000 ($10K per printer driver) Time – 10 weeks (1 printer driver per week)

At week 5:

• 4 printer drivers developed and installed

• $47,500 spent to date

PV = $???

AC = $???

EV = $???

Sol: <u>DATA:</u>

Printers to be installed = 10

Cost per printer = $ 10,000

Duration = 10 weeks

   1 printer driver per week

Acutal Cost of 4 printers developed and installed = $47500

PV =?

AC =?

EV =?

<u>ANS:</u>

At week 5 planned value is **PV**= $50,000

At week 5 earned value is **EV** =$ 40,000

At week 5 actual cost is **AC**= $47500

Now

Cost Variance (CV) = EV – AC

    = 40000 – 47500

    = **$ -7500**

Schedule Variance (SV) = EV-PV

$$= 40000 - 50000$$

$$= \$ -10,000$$

Cost performance index (CPI) = EV / AC

$$= 40000 / 47500$$

$$= 0.84$$

Schedule performance index (SPI) = EV / PV

$$= 40000 / 50000$$

$$= 0.8$$

As CV is negative &CPI is less than 1 so project is over budget and

SV is negative and SPI is less than 1 so project is behind the schedule.

Q4. You are the project manager on a project that has $800,000 software development effort. There are two teams of programmers that will work for six month for a total of 10,000 hours. According to the project schedule your team should be done with 38% of the work. As of today, the project is 40% complete while 50% budget has been used. Calculate and share your conclusion for EV Analysis.

Sol: DATA

BAC= $800,000

Planned %age= 38%

PV=?

As 50% budget is used so Actual cost will be

AC= $400,000

CV=?

SV=?

CPI=?

SPI=?

ANS:

Planned Value (PV) = BAC x Planned %age complete

$$= 800000 \text{ x } 38\%$$

$$= 800{,}000 \text{ x } 0.38$$

$$= \mathbf{\$ \ 304{,}000}$$

Now to calculate Earned Value

Earned Value (EV) = BAC x Actual % Complete

$$= 800{,}000 \text{ x } 40\%$$

$$= 800000 \text{ x } 0.40$$

$$= \mathbf{\$ \ 320{,}000}$$

Now Calculation Cost Variance

Cost Variance (CV) = EV – AC

$$= 320000 - 400000$$

$$= \mathbf{\$ \ \text{-}80000}$$

Now Calculation Cost Performance Index

Cost Performance Index (CPI) = EV / AC

$$= 320000 / 400000$$

$$= \mathbf{0.8}$$

Now Calculation Schedule Variance

Schedule Variance (SV) = EV – PV

$$= 320{,}000 - 304{,}000$$

$$= \mathbf{\$ \ 16000}$$

Now Calculation Schedule Performance Index

Schedule Performance Index (SPI) = EV / PV

$$= 320000 / 304000$$

$$= \mathbf{1.05}$$

Since CPI is less than 1, the project is over budget.

And SPI is more than 1 so the project is ahead of schedule.

Q5: Suppose you have a budgeted cost of a project at $900,000. The project is to be completed in 9 months. After a month, you have completed 10 percent of the project at a total expense of $100,000. The planned completion should have been 15 percent.

Sol: <u>DATA</u>

BAC = $ 900,000

Project Completion time = 9 months

Actual Cost AC = $100,000

PV=?

EV=?

CPI= ?

SPI=?

ANS: **Using Formulae to calculate values**

Planned Value (PV) = Planned Completion (%) x BAC

= 15% x 900,000

= 0.15 x 900,000

= $ 135,000

Earned Value (EV) = Actual Completion (%) x BAC

= 10% X 900,000

= 0.1 x 900,000

= $ 90,000

Now Calculating Earned Value Variances

Cost Performance Index (CPI) = EV / AC

= 90000 / 100000

= 0.90

This value means that for every 1$ spent the project is producing only 90 cents in work.

Schedule Performance Index (SPI) = EV / PV

$$= 90000 / 135000$$

$$= \mathbf{0.67}$$

This value means for every estimated hour of work, the project team is completing only 0.67 hours.

Since both CPI and SPI are less than 1 , which means that the project is over budget and behind the schedule.

Q6. Suppose you are managing a software development project. The project is expected to be completed in 8 months at a cost of $10,000 per month. After 2 months, you realize that the project is 30 percent completed at a cost of $40,000. You need to determine whether the project is on-time and on-budget after 2 months.

Sol: <u>DATA</u>

Actual Cost: $ 40000

Actual Completion: 30%

Competion duration = 8 months @ $10,000

PV= ?

EV?

CV=?

SV=?

CPI=?

SPI=?

<u>ANS:</u>

Using formulae for calculating PV and EV

Budget At Completion (BAC) = 10000 x 8

$$= \mathbf{\$\ 80,000}$$

Planned Completion = 2/ 8

$$= 0.25 \times 100$$

$$= \textbf{25\%}$$

Now Calculating Planned Value (PV)

Planned Value (PV) = Planned Completion (%) x BAC

$$= 0.25 \times 80000$$

$$= \textbf{\$ 20,000}$$

Now Calculating Earned Value (EV)

Earned Value (EV) = Actual Completion (%) x BAC

$$= 30\% \times 80000$$

$$= 0.3 \times 80000$$

$$= \textbf{\$24,000}$$

Now Calculation variances

Cost Variance (CV) = EV – AC

$$= 24000 - 40000$$

$$= \textbf{\$ -16000}$$

Schedule Variance (SV) = EV – PV

$$= 24000 - 20000$$

$$= \textbf{\$ 4000}$$

Cost Performance Index = EV / AC

$$= 24000 / 40000$$

$$= \textbf{0.6}$$

Schedule Performance Index = EV / PV

$$= 24000 / 20000$$

$$= \textbf{1.2}$$

As CPI is less than 1 so project is over budget. For every dollar spent we are getting 60 cents worth of performance

And SPI is greater than 1 so the project is ahead of schedule.

Therefore corrective measures should be taken.

Q7. Multiple Choice Questions:

1. **If a project has a Schedule Performance Index (SPI) of 0.90, this means that:**
A. 90% of the work planned to date has been completed
B. 90% of the work of the whole project has been completed
C. 90% of the budget planned to date has been spent
D. 90% of the project budget has been spent

SOLUTION = A

REASON = if Schedule Performance Index is 1 then the work completion schedule is 100% means the work is done on time. If it is less than 1 then it means the work is behind schedule which is > 100%.

2. **If a project has a Cost Performance Index (CPI) of 0.90, this means that:**
A. 90% of the work planned to date has been completed
B. 90% of the budget planned to date has been spent
C. 111% of the budget planned to date has been spent
D. 111% of the project budget has been spent

SOLUTION = C

REASON = If the CPI is 1 or more than 1 then it means project is under budget. But here CPI of project is 0.90 which means the project is over budget which means the amount spent on the budget is more than it was calculated.

3. **A project with Earned Value (EV) = $1000, Actual Cost (AC) = $800 and Planned Value (PV) = $800. What is the Schedule Variance (SV)?**
   A. $200
   B. $0
   C. -$100
   D. -$200

SOLUTION = A

REASON = SV = EV – PV
$$= 1000 – 800$$
$$= \$200$$

4. **A project with Earned Value (EV) = $1000, Actual Cost (AC) = $800 and Planned Value (PV) = $800. What is the Cost Variance (CV)?**
   A. **$200**
   B. **$0**
   C. **-$100**
   D. **-$200**

SOLUTION = A

REASON = CV = EV- AC

$\qquad$ = 1000 – 800

$\qquad$ = **$200**

5. A project with Earned Value (EV) = $250, Actual Cost (AC) = $200 and Planned Value (PV) = $350. What is the Schedule Performance Index (SPI)?
    A. 1.25
    B. 0.80
    C. 0.71
    D. 1.40

SOLUTION = C

REASON = SPI = EV / PV

$\qquad$ = 250 / 350
$\qquad$ = **0.71**

6. A project with Earned Value (EV) = $250, Actual Cost (AC) = $200 and Planned Value (PV) = $350. What is the Cost Performance Index (CPI)?
A. 1.25
B. 0.80
C. 0.71
D. 1.40

SOLUTION = A

REASON = CPI = EV / AC
$\qquad$ = 250 / 200
$\qquad$ = **1.25**

Q8 You are the project manager of a housing project in which a total of 10 houses are to be build over 10 months (1 house per month). The total budget for the housing project is $1,000,000. The project is now at the end of the 6th month with 5 houses built and $500,000 spent. The project is behind schedule owing to a work strike for a month. The Cost Performance Index (CPI) for the project is:
    A. 1.0
    B. 0.9
    C. 1.1

D.1.2

SOLUTION= A

REASON

    Budget At Completion = $ 1,000,000
    1 House Cost = $100,000
    Duration = 10 months (1 house per month)
    CPI= ?

    At the end of 6th month 5 houses built which means

    Earned Value (EV) = $ 500,000
    The actual cost for 5 house will be
    Acutal value (AC) = $ 500,000

Cost Performance Index (CPI) = EV / AC
                              = 500000 / 500000
                                = 1.0

THE END