

**Question 1.**

Define and explain the risk log/register in your own words. Develop a risk log/register for the construction project (you have worked in or you are working). Details of each project must be unique and should be provided accurately to the best of your knowledge. Risk register is attached at the end of the paper (Table 1). Use notes for specifying headings>

**Risk Log/Register:****Definition:**

A Risk Register, also referred to as a Risk Log, is a master document which is created during the early stages of your project. It is a tool that plays an important part in your Risk Management Plan, helping you to track issues and address problems as they arise.

**Explanation:**

The Risk Register will generally be shared between project stakeholders, allowing those involved in the project to be kept aware of issues and providing a means of tracking the response to issues. It can be used to flag new project risks and to make suggestions on what course of action to take to resolve any issues.

Risk Log/Register enlist the identified risks and its impact on budget, program, and quality/performance aspects of the project. It is a management tool to prompt risk owner to take actions. Risk log also contains information about the risks to avoid, mitigate or transfer risks or the secondary risks arising from and possible fall back plan. Also facilitates ranking of risk, low, medium and high. It permits quantitative estimates in term of percent probability and cost impact. The output may be shown in the risk map (or matrix) format, also known as the probability/impact grid (PIG) to ease understanding of the results. In the case of quasi-quantitative analyses, cumulative frequency curves and histograms can be produced. The risk log will also contain the information on actions to avoid, mitigate or transfer risks, the secondary risks arising and possible fallback plans. The risk log will be capable of being updated and will provide an audit trail. It is possible to use the risk log as a management tool to prompt risk owners to take action. Status reports can also be generated. Following are some main categories of risks:

**Main categories of Risk:**

1. Project constitution and organization structure
2. Project management team, experience and skills.
3. Management Authority and approval.
4. Site safety procedures
5. Ground conditions.
6. Procurement risks
7. Uncertainty and assumption related risk
8. Potential of cost growth risk
9. Delivery period of equipment's
10. Constraints due to staff or resources shortage

The reality of projects is that they do not follow a trend of steadily decreasing risk. Risks fluctuate in importance, and the reporting should reflect the changes.

Risks should be linked to the project's programme to understand the timeframe in which they can occur and the lead time to initiate preventative action. Whenever possible and cost effective to do so, risks should be avoided. In reality that must be mitigated as the project progresses. Many of these will be ongoing, that is to say they may span over several activities so that they cannot be closed for a considerable time.

Following from the creation of a comprehensive risk log, an overview of the total likely risk exposure of the project can be formulated, based on the sensitivity of the budget and programme to identified risks and their potential impact in terms of budget overrun, delay and impact on the project's performance objectives.

The aim is to determine the most cost-effective strategy of risk avoidance, mitigation and/or transfer. The factors to be considered are:

1. Potential Impact of risk on the project
2. Possibility of avoiding the risk through management action
3. Possibility of taking actions to mitigate the risk
4. Transfer of risk: passing it.

When risks have been passed to a contractor or supplier, there is the residual risk that they will not manage or will succeed in passing it back totally or in part through claims. Contingent sums should be allowed in budgets for these residual risks.

### Developing Risk Log/Register for in hand construction Project:

We will develop the risk log/register of a 05 marla house construction:

| ID  | Date raised | Risk description  | Risk |   |   | Without controls |             |   | Controls  | Residual risk   | Action   |
|-----|-------------|---|------|---|---|------------------|-------------|---|---|---|--|
|     |             |   | H    | M | L | Cost impact      | Time impact | Other   |   |   |  |
| 001 | 25-06-2020  | Water table fluctuation<br>Water table is at very shallow depth that may cause foundation settlement leading to crack later on. | H    |   |   | 30 Man days      | 15 Man days | The building might crack later on and would have impression of the company. | The structural design must consider the fact to reduce the risk of settlement | Proper execution of the design. If the execution is not properly implemented it might cause residual risk | Design check before making final. QAQC check during execution. |
| 002 | 25-06.2020  | Approval from PDA. As the drawing submission  |      | M |   | 25M Days         | 50 Mans day |   | 'As the apporvin g authority  |   | Transfer the risk to owner.                                    |

|     |            |   |   |   |  |      |      |  |  |                                     |
|-----|------------|---|---|---|--|------|------|--|--|-------------------------------------|
|     |            | and approval from PDA is too much time consuming, and the owner has set fixed timeline with no flexibility option.                          |   |   |  |      |      |  | is PDA and the approval is not related to this office, so the issue has to be highlighted to client that might late the schedule as planned. |                                     |
| 003 | 25.07.2020 | Inflation in rates. As the owner has fixed budget, looking into the country economic situation the prices may vary abruptly in near future. |   | H |  | 50MD | 30MD |  | The increase in prices that may be due to current government economic situation may be highlighted to client.                                | Transfer the risk to owner.         |
| 04  | 05.08.2020 | Changes in design   | Design Changes Required or materials and palette not suitable or agreed |   |  | M    |      |  | Checking to be carried out by MRS-19   | Changes approval from owner client. |

**Question 2.**

Discuss how Cost-benefit analysis is effective for a project? Support your arguments with real example.

**Cost-Benefit Analysis:****Definition:**

A cost-benefit analysis is a process businesses use to analyze decisions. The business or analyst sums the benefits of a situation or action and then subtracts the costs associated with taking that action.

It provides management a framework for evaluating alternative factor that are high conjectural in nature. The factor other than money must be taken into account in construction project. The project analysis must not confine to just financial considerations. It must recognize the overall social objective to produce possible benefit for a given cost.

**Example:**

For example factors that must evaluate if a dam is constructed it might:

1. Drown a historical monument,
2. Reduce the likelihood of loss of life due to flooding
3. Increase the growth of new industry because of the reduced dam flooding risk etc.

**Discussion:**

The factors should not be ignored and must be consider because it is difficult or even impossible to quantify it in monetary terms. Methods are available to express, for instance, the value of recreational facilities, and although it may not be possible to put a figure on the value of human life, it is surely not something we can afford to ignore.

The essential cost–benefit analysis is to take into account all the factors, which influence either the benefits or the cost of a project. Imagination must be used to assign monetary values to what at first sight might appear to be intangibles. It should be mentioned that monetary values are highly subjective and must be evaluated with care. Even factors to which no monetary value can be assigned must be taken into consideration. The analysis should be applied to projects of roughly similar size and patterns of cash flow. Those with the higher cost–benefit ratios will be preferred. The maximum net benefit ratio is marginally greater than the next most favored project. The scope of the secondary benefits to be taken into account frequently depends on the viewpoint of the analyst.

When comparing alternative consideration is being made that each project must be designed within itself at the minimum cost that will allow the fulfilment of objectives including the appropriate quality, level of performance and provision of safety.

Perhaps more important, the viewpoint from which each project is assessed plays a critical part in properly assessing both the benefits and cost that should be attributed to a project. For instance, if a private electricity board wishes to develop a hydroelectric power station, it will derive no benefit from the coincidental provision of additional public recreational facilities, which cannot therefore enter into its cost–benefit analysis. A public sector owner could quite properly include the recreational benefits in its cost–benefit analysis. Again, as far as the private developer is

concerned, the cost of labour is equal to the market rate of remuneration, no matter what the unemployment level. For the public developer however, in times of high unemployment, the economic cost of labour may be nil, since the use of labour in this project does not preclude the use of other labour for other purposes.

### Question 3.

- (a) What is Normal Probability distribution?  
 (b) Suppose that the data concerning the first-year salaries of employees is normally distributed with the population mean  $\mu = 60000$  PKR and the population standard deviation  $\sigma = 15000$  PKR. Find the probability of a randomly selected employees earning less than 45000 PKR annually. Hint: To answer this question, you have to find the portion of the area under the normal curve from 45 all the way to the left. Find Z-Score table at the end of the paper (Table 2)

#### (a) Normal Probability Distribution:

It is a probability distribution. The normal probability plot is a graphical technique to identify substantive departures from normality.

The normal distribution is the most important probability distribution in statistics because it fits many natural phenomena. For example, heights, blood pressure, measurement error, and IQ scores follow the normal distribution. It is also known as the Gaussian distribution and the bell curve.

The normal distribution is a probability function that describes how the values of a variable are distributed. It is a symmetric distribution where most of the observations cluster around the central peak and the probabilities for values further away from the mean taper off equally in both directions. Extreme values in both tails of the distribution are similarly unlikely. Graphical Example is given below for heights:

Mathematically: it is given by:

$$\text{The Normal pdf: } f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \text{ where}$$

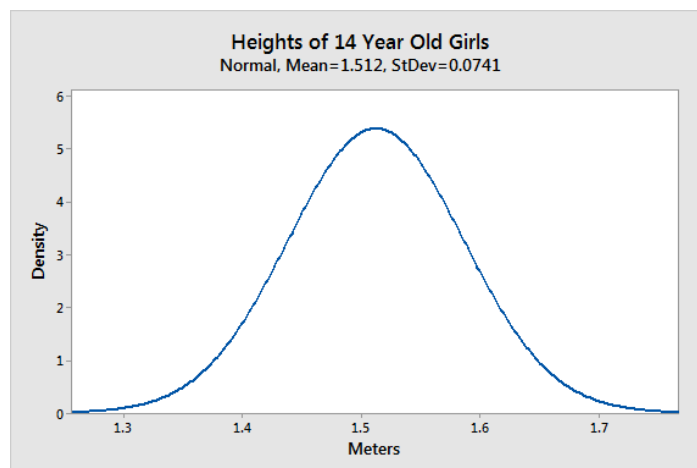
$\mu$  = mean

$\sigma^2$  = variance

$\pi=3.14159$ =ratio of the circumference to diameter

$e = 2.71829$

Graphically:



(b) Given Data:

Mean  $\mu = 60000$  PKR

Population standard deviation  $\sigma = 15000$  PKR

Required:

Find the probability of a randomly selected employees earning less than 45000 PKR annually

Solution: calculating z value by using:

$$Z = \frac{x - \mu}{\sigma}$$

$$Z = \frac{45000 - 60000}{15000}$$

$$= -1$$

**For z = -1 from table find Area (probability) which came out to be 0.158 or 15.8%**