

Proposed Methodology for Ranking of Engineering Institutions in India

**(Suitable Modifications Needed for Other
Disciplines to account for Discipline Specific
Issues)**

Salient Features

- Based on a set of metrics around the parameters agreed upon by the core committee.
- Parameters organized into five broad heads, each with suitable sub-heads. Suitable weights assigned to each head and subhead.
- Task 1: identify the relevant data needed to suitably measure the performance score under-each sub-head. Data easy to generate and verify when needed.

Salient Features

- Task 2: Suitable metrics proposed for each sub-head and a score computed.
- Overall score computed based on weights allotted to each head. The overall score can take a maximum value of 100.
- The institutions can then be rank-ordered based on their scores.

Ranking Based on Institution Categories

- Ranking proposed to be done separately across two distinct categories.
- Autonomous (Category A) and Affiliated (Category B).
Category A: Those engaged in Research and Teaching.
Category B: Those engaged primarily in Teaching.
- Affiliated Institutions may also opt to compete in *category A, if it so wishes*.
- Score computations similar for both categories on most counts

Ranking Based on Institution Categories

- Methodologies somewhat different on a few parameters, to take into account the ground realities.
- It is proposed that weights assigned to the two parameters, viz., Research and Graduation Outcomes be reversed for Tier II (Category B) institutions.
- Even where the assessment metrics are similar, percentile calculations based on institutions of the corresponding category.
- If implemented in this spirit, the ranking methodology will produce two separate rankings, one for each category.

Data Collection

- Institutions desirous of participating in the ranking exercise, will supply the data in a given format (Annexure II).
- Submitted data to be uploaded on their own, publicly visible website and should be verifiable.
- Data to remain there in an archived form for the next 3 years to enable easy verification, where required. Penalty for unethical practices.
- The Ranking Authority to be empowered to take up a random check on institution records and audited accounts.

Data Collection

- For some parameters, data to be populated from internationally available Data Bases: Scopus, Web of Science, or Google Scholar.
- Some other data through a national effort: Number of successful candidates in public examinations: UPSC, GATE, NET, CAT, PSU etc.
- Affiliating universities to provide examination results data in the appropriate format.

Miscellaneous Recommendations

- Proposed metrics be presented to the core-committee (or another independent committee as deemed appropriate): to agree on suitability of the metrics and data used for computing these.
- A Ranking Board or Committee may be set up to oversee the process initially.
- A few institutions from both categories (A and B) be asked to fill the data from previous years: conduct a mock exercise and validate the metrics proposed here.

Implementation Details

- A Ranking Authority/Agency should be identified and empowered.
- May be a Virtual authority, authorized to outsource parts of the work (including data analytics) to various survey organizations.
- The entire effort could be self-supporting if participating institutions are charged a suitable fees.
- Initial seed funding by Government may help.

Annual Calendar

- Submission of applications (on-line) in given format:
1st December.
- The Ranking Agency will extract the relevant information from this data and using software, compute the various metrics and rank institutions based on this data.
- Both these components of work could be outsourced.
- Process completion: in about 3 months.
- Rankings published: ahead of the next year's admission schedule, say on **15th May.**

Metrics Proposed for Tier-I or Category A Institutions

1. Teaching, Learning & Resources (TLR): 100 marks

- Ranking weight: 0.30
- Overall Assessment Metric:

$$\text{TLR} = \text{FSR} + \text{FQE} + \text{LL} + \text{SEC}$$

- Component metrics explained on following pages.

a. Faculty-student ratio with emphasis on permanent faculty (FSR): 30 marks

- **$FSR = 30 \times [10 \times F/N]$**
- N: Total number of students studying in the institution considering all UG and PG Programs, excluding the Ph.D program.
- F_1 : Full time regular faculty of all UG and PG Programs in the previous year.
- F_2 : Eminent teachers/faculty (with Ph.D) visiting the institution for at least a semester on a full time basis can be counted (with a count of 0.5 per semester per visiting faculty) in the previous year.
- $F = F_1 + 0.3F_2$
- Expected ratio is 1:10 to score maximum marks.
- **For $F/N < 1: 50$, FSR will be set to zero.**

b. Combined metric for Faculty with PhD and Experience (FQE) – 30 marks

- **FQ = 15 × (F/95) , F ≤ 95%;**
 - **FQ = 15, F > 95%.**
 - Here F is the percentage of Faculty with Ph.D. averaged over the previous 3 years.

 - **FE = 15 X (E/15), E ≤ 15 years;**
 - **FE = 15, E > 15 years.**
- $$E_i = A_i - 30$$
- Combined Metric for Faculty Qualifications and Experience:
 - **FQE = FQ + FE.**

c. Metric for Library, Laboratory Facility (LL): 30 marks

- **Library**
- **LI = 15 × (percentile parameter on the basis of annual expenditure (EXLI) on library resources).**
EXLI = EXLIPS + EXLIES
EXLIPS = EXLIP/N
EXLIES = 2×EXLIE/N
EXLIP: Actual Annual Expenditure on Physical Resources, Books, Journals, etc.
EXLIPE: Actual Annual Expenditure on Electronic Resources, Books, Journals etc.
- **Laboratories**
- **LB = 15 × (percentile parameter on the basis of annual expenditure (EXLB) on creation and maintenance of lab resources).**
- If these expenditures are below a threshold value to be determined separately for each category of institutions, EXLI = 0, EXLB = 0.
- **Combined Metric for Library and Lab Resources:**
- **LL=LI + LB**

d. Metric for Sports and Extra-Curricular facility (SEC):10 marks

- Parameters to be used:
- Sports facilities area per student (A);
- Actual expenditure per student on Sports and EC activities (B); and
- Number of top positions in inter-college sports and EC events (C).

- Each parameter to be evaluated on a percentile basis to obtain the percentile parameter $p(A)$, $p(B)$ and $p(C)$. $p(C)=1$ if a college has at least 3 winners of a state level or national event.

- **$SEC = 10 \times [p(A)/2 + p(B)/4 + p(C)/4]$.**

Research, Professional Practice & Collaborative Performance (RPC): 100 marks

- **Ranking weight: 0.30**
- **Overall Assessment Metric:**

$$\text{RPC} = \text{PU} + \text{CI} + \text{IPR} + \text{CP} + \text{FPPP}$$

- **The component metrics explained on following pages.**

a. Combined metric for Publications (PU): 30 marks

- **PU = 30 × percentile (expressed as a fraction) parameter on the basis of (P/F).**
- P is the number of publications = weighted average of numbers given by Scopus, Web of Science and Google Scholar over the previous 3 years.
- $P = 0.3PW + 0.6PS + 0.1PG$
- PW: Number of publications reported in Web of Science.
- PS: Number of publications reported in Scopus
- PG: Number of publications reported in Google Scholar.
- F is the number of regular faculty members as used in Item 1.
- Explanation: Percentile parameter = (percentile value of P/F)/100.

b. Combined metric for Citations (CI) – 30 marks

- **CI = 30 × percentile (expressed as a fraction) parameter on the basis of (CC/P) for category A × percentile parameter on the basis of P.**
- Here CC is Total Citation Count over previous 3 years and
- P is total number of publications over this period as computed for PU.
- CC is computed as follows
$$CC = 0.3CCW + 0.6CCS + 0.1CCG$$

c. IPR and Patents: Granted, Filed, Licensed (IPR) – 15 marks

- **$IPR = PF + PG + PL$**
- **$PF = 3 \times$ percentile parameter (expressed as a fraction) on the basis of PF/F .**
PF is the number of patents, copyrights, designs filed.
F is the number of regular faculty members.
- **$PG = 6 \times$ percentile parameter (expressed as a fraction) on the basis of PG/F .**
PG is the number of patents, copyrights, designs granted/registered.
F is the number of regular faculty members.
- **$PL = 2 \times I(P) + 4 \times$ percentile parameter (expressed as a fraction) based on EP/F .**
EP is the total earnings from patents etc. over the last 3 years.

$I(P) = 1$, if at least one patent was licensed in the previous 3 years or at least one technology transferred during this period; 0 otherwise.

F is the average number of regular faculty over this period.

d. Percentage of Collaborative Publications, patents CP – 10 marks

- **CP = 10 × (fraction of publications jointly with outside collaborators + fraction of patents jointly with outside collaborators).**
- In case this number turns out to be more than 10, the score will be restricted to this value.
- Data Collection: Mainly from Data Bases like Scopus, Web of Science and Google Scholar.
- Could be aided by information from the institute.

e. Footprint of Projects and Professional Practice (FPPP) – 15 marks

- **FPPP = FPR + FPC**
- **FPR = 7.5 × Percentile parameter (as a fraction) based on the average value of RF for the previous 3 years.**
RF is average annual research funding earnings (amount actually received in Lakhs) at institute level for the previous 3 years.
- **FPC = 7.5 × Percentile parameter (as a fraction) based on the average value of CF for the previous 3 years.**
CF is cumulative consultancy amount (amount actually received in Lakhs) at institute level, for the previous 3 years.

3. Graduation Outcome (GO) :100 marks

- Ranking weight: 0.15
- Overall Assessment Metric: $GO = PUE + PHE + MS$
- The component metrics are explained on following pages.

a. Combined Performance in Public and University Examinations (PUE):30 marks

- Public examination Metric: to be based on cumulative percentile of students (as a fraction of the number appearing) qualifying in public examinations (such as UPSC Conducted, State Govt., GATE, NET, CAT etc. list to be notified) from an institution, out of the cumulative number of successful students in that year.
- University examination Metric: to be based on the percentage of students clearing/complying with degree requirements in minimum time.
- **PUE = PE + UE (?)**
- Public Exam (PE) (20 Marks) + University Exam (UE) (10 Marks)

a. Combined Performance in Public and University Examinations (PUE)

- For Public Exams, we first calculate the percentile parameter p as follows:
- Let f_i be the fraction of successful students from a given institution (ratio of the number successful and the number appearing) for exam i .
- Let t_i be the toughness parameter of exam i .

$$p = \text{fraction percentile of } \sum (1 - t_i) f_i, \text{ where}$$
$$t_i = \frac{\text{number of successful candidates in exam } i}{\text{number appearing in exam } i}$$

- **PE = 20 × cumulative percentile of students from the institution in the cumulative data of public exams.**
- **UE = 10 × (N/80)**
- N is the percentage of Students (as a fraction of those admitted for the batch, averaged over the previous 3 years) qualified in university examinations in minimum time.

b. Combined % for Placement, Higher Studies, and Entrepreneurship (PHE): 50 marks

- N_1 = Percentage of students placed through campus placement in the previous year.
- N_2 = Percentage of students who have been selected for higher studies. Ideally this data should come from admitting institutions. But initially we may encourage applicant institutions to maintain credible records of this information.
- p_3 = percentile parameter for the number of entrepreneurs produced over the previous 10 year period.
- **$PHE = 20 \times (N_1/100 + N_2/100) + 10p_3$**
- OR: simply $PHE = 50 \times N_1/100$ (Data for all three to be collected, but used only when reliable data starts coming).

Mean Salary for Employment (MS): 20 marks

- **MS = 20 × average salary of graduates from an institution as a percentile parameter of the maximum average salary across institutions × placement percentile parameter.**
- Data from a list of chosen 100 (or 50) top employers to obtain average salary offered to students from different institutions?
- The bouquet of employers could be different for Tier I and Tier II institutions. The list of employers could be rotated from year to year to avoid biases of any kind.
- Alternatively, data could also be populated through outsourcing the task to a reliable market survey agency.

4. Outreach and Inclusivity (OI):100 marks

- Ranking weight: 0.15
- Overall Assessment Metric: $OI = CES + WS + ESCS + PCS$
- The component metrics are explained on following pages.

a. Outreach Footprint (Continuing Education, Service) (CES) – 25 marks

- **CES = 25 × percentile parameter based on N**
- N: Number of participation certificates issued per year (averaged over previous 3 years) to Teachers/Industry Personnel etc. for outreach programs of 6 days or more.

b. Percent Students from other states/ countries (Region Diversity RD): 25 marks

- **RD = $18 \times$ fraction of total students admitted (averaged over past 3 years) from other states + $7 \times$ fraction of students admitted (averaged over past 3 years) from other countries**
- **(Percentile basis: the above fractions may be converted into percentile fractions).**

c. Percentage of Women (WF)+ (WS) + (WG)– 20 marks

- $WS = 8 \times (N_1/50) + 8 \times (N_2/20) + 4 \times (N_3/2)$
- N_1 and N_2 are the percentage of Women Students and faculty respectively. N_3 is the number of women members of eminence as Heads of Institute or in the Governing Board.
- Expectation: 50% women students and 20% women faculty and 2 women members as Institute Head or in the Governing Board expected to score maximum marks;

d. Facilities for Economically and Socially Challenged Students (ESCS) – 20 marks

- **ESCS = $20 \times (N/50)$**
- N is the percentage of economically and socially challenged Students averaged over the previous 3 years.
- Expectation: 50% economically and socially challenged students should be admitted to score maximum marks.

e. Facilities for Physically Challenged Students (PCS) – 10 marks

- **PCS = 10 marks, if the Institute provides full facilities for physically challenged students.**
- **NAAC and NBA to provide a list of such institutions.**

Perception (PR) – 100 marks

- Ranking weight: 0.1
- Overall Assessment Metric: $P = PR$
- Process explained on following pages.

Process for Peer Perception Rating in (PR): 30 marks

- This is to be done through a survey conducted over a large category of academics, Institution heads, HR people of employers, members of funding agencies in government, private sector, NGOs, etc.
- Lists may be obtained from institutions and a comprehensive list may prepared taking into account various sectors, regions, etc.
- Lists to be rotated periodically.
- This will be an on-line survey carried out in a time-bound fashion.