GOVERNMENT OF MAHARASHTRA
State Common Entrance Test Cell

Document on Normalization for MH Nursing

Maharashtra State CET cell conducts examinations in multiple shifts. The candidates are given different sets of questions in every shift and it is quite possible that in spite of all efforts of maintaining equivalence among various question papers, the difficulty level of these question papers administerefferent shifts will not be exactly the same. In order to overcome such a situation, **Normalization Method** will be used for ensuring that candidates are neither benefitted nor disadvantaged due to the difficulty level of the examination.

The process of Normalization is an established practice for comparing candidate scores across multi shift papers and is similar to those being adopted in other large educational selection tests conducted in India.

Percentile Scores: Percentile scores are scores based on the relative performance of all those who appear for the examination. Basically, the marks obtained are transformed into a scale ranging from 100 to 0 for each session of examinees.

The Percentile Score indicates the percentage of candidates that have scored EQUAL TO OR BELOW (same or lower raw scores) **that particular Percentile in that examination. Therefore the topper (highest score) of each session will get the same Percentile of 100 which is desirable. The marks obtained in between the highest and lowest scores are also converted to appropriate Percentiles.**

The Percentile score will be the Normalized Score for the examination (Instead of the raw marks of the candidate)**.**

The Percentile Scores will be calculated up to 7 decimal places to avoid bunching effect and reduce ties.

The Percentile score of a Candidate is calculated as follows:

$$\frac{100 * (No.\,of\ candiddates\ appeared\ in\ the\ session\ with\ raw\ score \leq\ the\ candidate's\ Score)}{\text{Total no.of candidates in the session}}$$

Note: The Percentile of the Total shall NOT be an aggregate or average of the Percentile of individual subject. Percentile score is not the same as percentage of marks obtained.

Example: Suppose a test was held in 3 sessions of examinees as per details given below: - (Allocation of Days and shifts were done randomly)

(a) Distribution of candidates were as follows:

Session-1: Day-1 Batch 1-1, Session-2: Day-1 Batch-2, Session-3: Day-1 Batch-3

		No. of Candidates			Marks	
Session	**Day/Batch**	**Absent**	**Present**	**Total**	**Highest**	**Lowest**
1	**D1 B1**	150	2249	2399	92	1
2	**D1 B2**	186	2272	2458	91	0
3	**D1 B3**	215	2216	2431	91	0

In this method of scoring, the HIGHEST RAW SCORE in each paper (irrespective of the raw scores) will be the 100 Percentile indicating that 100% of candidates have scores equal to or lesser than the highest scorer/ topper for that session.

Highest Raw Score and Percentile Score: All the highest raw scores will have normalized Percentile Score of 100 for their respective session.

Session	**Total candidates appeared**	**Highest Raw Score**	**Candidates who scored EQUAL OR LESS THAN Highest Raw Score**	**Percentile Score**	**Remarks**
1	2249	92	2249	100.0000000 [(2249/2249)*100]	i.e. all the highest raw scores would be normalized to 100 Percentile Score for their respective session.
2	2272	91	2272	100.0000000 [(2272/2272)*100]	
3	2216	91	2216	100.0000000 [(2216/2216)*100]	

<u>Lowest Raw Score and Percentile Score:</u> Percentile Score of all the lowest raw scores will depend on the total number of candidates who have taken the examination for their respective session.

Session	Total candidates appeared	Lowest Raw Score	Candidates who scored EQUAL OR LESS THAN Lowest Raw Score	Percentile Score	Remarks
1	2249	1	2	(2/2249) [(2/2249)*100]	i.e. Percentile Score of all the lowest raw scores are different i.e. Percentile Score depend on the total number of candidates who have taken the examination for their respective session.
2	2272	0	2	(2/2272) [(2/2272)*100]	
3	2216	0	1	(1/2216) [(1/2216)*100]	

STEP-BY-STEP PROCEDURE FOR NORMALIZATION AND PREPARATION OF PERCENTILE SCORE:

Step-1: Distribution of Examinees in two days and in two shifts per day Candidates would be distributed into four sessions randomly so that each session has approximately equal number of candidates. These four sessions would be as follows:

Session-1: Day-1 Batch 1-1, Session-2: Day-1 Batch-2 and Session-3: Day-1 Batch-3

In the event of more number of days or more number of shifts, the candidates will be divided accordingly.

This will ensure that there is no bias in the distribution of candidates who shall take the examination. Further, with a large population of examinees spread over the entire country the possibility of such bias becomes remote.

Step-2: Preparation of Results for each Session: The examination results for **each session** would be prepared in the form of

- Raw Scores
- Percentiles Scores separately for each of the three subjects (Mathematics, Physics, Chemistry) and the Total.

$$\text{Total Percentile (T1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than T1 score}}{\text{Total no. of candidates appeared in the session}}$$

$$\text{Physics Percentile (P1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than P1 score in Physics}}{\text{Total no. of candidates appeared in the session}}$$

$$\text{Chemistry Percentile (P1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than C1 score in Chemistry}}{\text{Total no. of candidates appeared in the session}}$$

$$\text{Biology Percentile (B1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than B1 score in Biology}}{\text{Total no. of candidates appeared in the session}}$$

$$\text{English Percentile (E1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than E1 score in English}}{\text{Total no. of candidates appeared in the session}}$$

$$\text{Nursing Aptitude Percentile (N1P)} = 100 \times \frac{\text{No. of candidates appeared from the session with raw score equal to or less than N1 score in Nursing Aptitude}}{\text{Total no. of candidates appeared in the session}}$$

Step-3: Compilation of Total CET score:

The Percentile scores for the Total Raw Score for all the four sessions (Session-1: Day-1 Batch 1, Session-2: Day-1 Batch-2 and Session-3: Day-1 Batch-3) as calculated in Step-2 above would be merged and shall be called the CET scores which will then be used for compilation of result.

The Percentile of all four sessions will be calculated separately for the Total raw score and the raw scores in five subjects (Physics, Chemistry, Biology, English and Nursing Aptitude) as follows:

PERCENTILE : SESSION-1 i.e. DAY-1 Batch-1												
Roll Number	Physics		Chemistry		Biology		English		Nursing Aptitude		B.Sc. Nursing Total	
	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile
D1 B1-01	17	89.2841263	20	100.0000000	17	99.9555358	18	99.9555358	20	100.0000000	92	100.0000000
D1 B1-02	19	100.0000000	19	99.0217875	18	98.9773233	16	98.9773233	18	99.0217875	90	99.9962814
D1 B1-03	19	100.0000000	16	92.0409071	17	99.9555358	18	99.9555358	14	92.0409071	84	99.9119718
D1 B1-04	19	100.0000000	16	92.0409071	17	99.9555358	18	99.9555358	14	92.0409071	84	99.9119718
D1 B1-05	19	100.0000000	19	99.0217875	16	98.7105380	15	98.7105380	18	99.0217875	87	99.9075764
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D1 B1-2244	3	3.5571365	2	6.8030236	2	2.4010671	2	2.4010671	2	6.8030236	11	1.3644366
D1 B1-2245	2	2.4455313	0	1.2449978	3	2.8012450	3	2.8012450	0	1.2449978	8	1.2323944
D1 B1-2246	1	1.7341040	0	1.2449978	3	2.8012450	3	2.8012450	0	1.2449978	7	1.1883803
D1 B1-2247	0	0.3112494	2	6.8030236	0	0.5780347	0	0.5780347	2	6.8030236	4	1.1443662
D1 B1-2248	0	0.3112494	1	2.7567808	0	0.5780347	0	0.5780347	1	2.7567808	2	1.1003521
D1 B1-2249	1	1.7341040	0	1.2449978	0	0.5780347	0	0.5780347	0	1.2449978	1	1.0000671

PERCENTILE : SESSION-2 i.e. DAY-1 Batch-2												
Roll Number	Physics		Chemistry		Biology		English		Nursing Aptitude		B.Sc. Nursing Total	
	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile
D1 B2-01	19	100.0000000	18	100.0000000	17	99.9555358	18	99.9559859	19	100.0000000	91	100.0000000
D1 B2-02	19	100.0000000	18	100.0000000	18	98.9773233	18	99.9559859	17	99.0217875	90	99.9982848
D1 B2-03	19	100.0000000	18	100.0000000	17	99.9555358	18	99.9559859	14	92.0409071	86	99.9976888
D1 B2-04	15	97.5792254	18	100.0000000	17	99.9555358	18	99.9559859	14	92.0409071	82	99.8679577
D1 B2-05	15	97.5792254	14	94.6742958	16	98.7105380	19	100.0000000	17	99.0217875	81	99.8299546
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D1 B2-2268	3	4.6654930	1	2.1126761	2	2.4010671	0	0.5281690	2	6.8030236	8	0.2200704
D1 B2-2269	2	3.3010563	0	0.9242958	3	2.8012450	1	0.9683099	0	1.2449978	6	0.1760563
D1 B2-2270	1	2.4647887	0	0.9242958	3	2.8012450	0	0.5281690	0	1.2449978	4	0.1320423
D1 B2-2271	0	0.4841549	0	0.9242958	0	0.5780347	0	0.5281690	2	6.8030236	2	0.0880282
D1 B2-2272	0	0.4841549	0	0.9242958	0	0.5780347	0	0.5281690	0	2.7567808	0	0.06701006

Similar, calculations are carried out for the 3rd Batch.

Merge the Percentile Scores calculated above of all the sessions across multiple days for the **Total Percentile, Physics Percentile, Chemistry Percentile, Biology Percentile, English Percentile and Nursing Aptitude Percentile** for preparation of CET scores.

PERCENTILE : All sessions COMBINED												
Roll Number	Physics		Chemistry		Biology		English		Nursing Aptitude		B.Sc. Nursing Total	
	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile	Raw Score	Percentile
D1 B2-01	19	100.0000000	18	100.0000000	17	99.9555358	18	99.9559859	19	100.0000000	91	100.0000000
D1 B1-01	17	89.2841263	20	100.0000000	17	99.9555358	18	99.9555358	20	100.0000000	92	100.0000000
D1 B2-02	19	100.0000000	18	100.0000000	18	98.9773233	18	99.9559859	17	99.0217875	90	99.9982848
D1 B2-03	19	100.0000000	18	100.0000000	17	99.9555358	18	99.9559859	14	92.0409071	86	99.9976888
D1 B1-02	19	100.0000000	19	99.0217875	18	98.9773233	16	98.9773233	18	99.0217875	90	99.9962814
D1 B1-03	19	100.0000000	16	92.0409071	17	99.9555358	18	99.9555358	14	92.0409071	84	99.9119718
D1 B1-04	19	100.0000000	16	92.0409071	17	99.9555358	18	99.9555358	14	92.0409071	84	99.9119718
D1 B1-05	19	100.0000000	19	99.0217875	16	98.7105380	15	98.7105380	18	99.0217875	87	99.9075764
D1 B2-04	15	97.5792254	18	100.0000000	17	99.9555358	18	99.9559859	14	92.0409071	82	99.8679577
D1 B2-05	15	97.5792254	14	94.6742958	16	98.7105380	19	100.0000000	17	99.0217875	81	99.8299546
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↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
D1 B3-2244	3	3.5571365	2	6.8030236	2	2.4010671	2	2.4010671	2	6.8030236	11	1.3644366
D1 B1-2245	2	2.4455313	0	1.2449978	3	2.8012450	3	2.8012450	0	1.2449978	8	1.2323944
D1 B1-2246	1	1.7341040	0	1.2449978	3	2.8012450	3	2.8012450	0	1.2449978	7	1.1883803
D1 B3-2247	0	0.3112494	2	6.8030236	0	0.5780347	0	0.5780347	2	6.8030236	4	1.1443662
D1 B1-2248	0	0.3112494	1	2.7567808	0	0.5780347	0	0.5780347	1	2.7567808	2	1.1003521
D1 B1-2249	1	1.7341040	0	1.2449978	0	0.5780347	0	0.5780347	0	1.2449978	1	1.0000671
D1 B2-2268	3	4.6654930	1	2.1126761	2	2.4010671	0	0.5281690	2	6.8030236	8	0.2200704
D1 B2-2269	2	3.3010563	0	0.9242958	3	2.8012450	1	0.9683099	0	1.2449978	6	0.1760563
D1 B2-2270	1	2.4647887	0	0.9242958	3	2.8012450	0	0.5281690	0	1.2449978	4	0.1320423
D1 B3-2271	0	0.4841549	0	0.9242958	0	0.5780347	0	0.5281690	2	6.8030236	2	0.0880282
D1 B3-2272	0	0.4841549	0	0.9242958	0	0.5780347	0	0.5281690	0	2.7567808	0	0.06701006

NOTE: The roll numbers provided in the table are only for representational purpose.