

PGDM 2017-19  
Research Methodology  
DM-308

Trimester – III, End-Term Examination: March 2018

Time allowed: 2 Hrs 30 Min  
Max Marks: 50

Roll No: \_\_\_\_\_

**Instruction:** Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. All other instructions on the reverse of Admit Card should be followed meticulously.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	$3 \times 5 = 15$
B	2 out of 3 (Long Questions)	10 Marks each	$2 \times 10 = 20$
C	Compulsory Case Study	15 Marks	15
		<b>Total Marks</b>	<b>50</b>

Section A

1. Describe 3 methods of random sampling
2. What do you mean by a 95% Confidence Interval?
3. What do you mean when you say the null hypothesis is rejected with significance (p-value) 0.002?
4. Graphically explain with an illustration the rejection of the hypothesis  $H_0: \mu = 50$
5. Explain why Factor Analysis is referred to as a dimension reduction technique.

Section B

1. A Factor Analysis was conducted on a sample of 459 people measured on 44 personality traits. Following are parts of some of the SPSS outputs of the Factor Analysis. Study the outputs and answer the questions that follow.
  - a. With reference to the Total Variance Explained table, explain why the Cumulative % is lower for Extracted Sum of Squared Loadings as compared to the Initial Eigenvalues. What is Varimax rotation in FA and what purpose is served – explain with reference to the Cumulative % in the Extraction and Rotation blocks.
  - b. Sketch a Scree Plot for the 12 factors shown in the Total Variance Explained table
  - c. With reference to the Rotated Factor Matrix table, explain the loading pattern for the first two factors. Why does 'disorganized' have a negative load on Factor 1? Based on the loadings how would you name Factor 1 and Factor 2?

**Total Variance Explained**

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.280	16.545	16.545	6.692	15.209	15.209	3.833	8.712	8.712
2	4.192	9.527	26.072	3.631	8.253	23.462	3.764	8.554	17.266
3	3.041	6.910	32.982	2.413	5.485	28.947	3.173	7.211	24.476
4	2.548	5.790	38.772	1.952	4.435	33.382	2.930	6.658	31.134
5	2.253	5.121	43.893	1.613	3.666	37.049	2.602	5.914	37.049
6	1.594	3.624	47.517						
7	1.318	2.996	50.513						
8	1.224	2.781	53.294						
9	1.154	2.622	55.916						
10	1.044	2.373	58.289						
11	.966	2.197	60.486						
12	.951	2.161	62.646						

**Rotated Factor Matrix<sup>a</sup>**

	Factor				
	1	2	3	4	5
does a thorough job	.677			-.154	.118
disorganized	-.645				
lazy	-.623		.119	.261	
efficient	.621				
perseveres	.621			-.240	.127
reliable	.572			-.328	.123
careless	-.553		.170	.181	
sticks to plans	.524	.103			.162
distractable	-.467	.101	.231	.176	
quiet		-.791	.125		
talkative	.126	.757		-.285	
outgoing		.676	-.152	-.122	
reserved	.106	-.645	.183	.152	
shy		-.599	.196		
assertive	.145	.530	-.220	.264	.221
generates enthusiasm in others	.112	.506			.309
full of energy	.108	.315	-.216	.108	.249
prefers routine work		-.168			-.166

12 Refer to the part Codebook for sleep.sav and answer the questions that follow.

How would you frame the research hypothesis to address the following research questions / belief based only on the part of the Codebook for sleep.sav displayed above. Also specify the appropriate test, in each case.

- Women are generally light sleepers compared to men
- Does satisfaction with the amount of sleep depend upon gender, marital status?
- It is thought that satisfaction with the amount of sleep is high if there is a low impact of sleep problem on energy level. Is this true in general? Is it true for males and females separately?

14

## Codebook for sleep.sav

Description of variable	SPSS Variable name	Coding instructions
Identification Number	id	
Gender	gender	0=female, 1=male
Age	age	In years
Marital status	marital	1=single, 2=married/defacto, 3=divorced, 4=widowed
Highest education level achieved	edlevel	1=primary 2=secondary 3=trade 4=undergrad 5=postgrad
Weight (kg)	weight	In kg
Height (cm)	height	In cm
Rate general health	healthrate	1=very poor 10=very good
Rate physical fitness	fitrate	1=very poor 10=very good
Rate current weight	weightrate	1=very underweight 10=very overweight
Do you smoke	smoke	1=yes 2=no
How many cigarettes per day	smokesum	Cigs per day
How many alcoholic drinks per day	alcohol	Drinks per day
How many caffeine drinks per day	caffeine	Drinks per day
Hours sleep/ week nights	hourwnit	Hrs sleep on average each weeknight
Hours sleep/ week ends	hourwend	Hrs sleep on average each weekend night
How many hours sleep needed	houmeed	Hrs of sleep needed to not feel sleepy
Trouble falling asleep?	trubslep	1=yes 2=no
Trouble staying asleep	trubstay	1=yes 2=no
Wake up during night	wakenite	1=yes 2=no
Work night shift	niteshft	1=yes 2=no
Light sleeper?	liteslp	1=yes 2=no
Wake up feeling refreshed weekdays	refreshd	1=yes 2=no
Satisfaction with amount of sleep	satsleep	1=very dissatisfied 10=very satisfied
Rate quality of sleep	qualslp	1=very poor 2=poor 3=fair 4=good 5=very good 6=excellent
Rating of stress over last month	stressmo	1=not at all 10=extremely
Medication to help you sleep?	medhelp	1=yes 2=no
Do you have a problem with your sleep	problem	1=yes 2=no
Rate impact of sleep problem on mood	impact1	1=not at all 10=to a great extent
Rate impact of sleep problem on energy level	impact2	1=not at all 10=to a great extent

15

**B3** Study the questionnaire and the codebook for a survey of staff of an organization (staffsurvey.sav).

### Staff Survey (selected items)

Age:  under 20  21 to 30  31 to 40  41 to 50  over 50yrs

Length of service with the organization (in years): \_\_\_\_\_ Employment status:  permanent  casual

For each of the aspects shown below please rate your level of agreement and importance using the following scales:

Agreement: 1=not at all 2=slight extent 3=moderate extent 4=great extent 5=very great extent

Importance: 1=not at all 2=slightly important 3=moderately important 4=very important 5=extremely important

	Agreement	Importance
1. Is it clear what is expected of you at work?	1 2 3 4 5	1 2 3 4 5
2. At work have you been provided with all the equipment and materials required for you do your work efficiently?	1 2 3 4 5	1 2 3 4 5
3. Does the organization keep you up to date with information concerning development and changes?	1 2 3 4 5	1 2 3 4 5
4. Do you receive recognition from the organization for doing good work?	1 2 3 4 5	1 2 3 4 5
5. Does your manager or supervisor encourage your development at work?	1 2 3 4 5	1 2 3 4 5
6. Do you feel that your opinions seem to count to the organization?	1 2 3 4 5	1 2 3 4 5
7. Does the organization make you feel that your job is important?	1 2 3 4 5	1 2 3 4 5
8. Do you feel that your fellow workers are committed to doing good quality work?	1 2 3 4 5	1 2 3 4 5
9. Has your performance been assessed or discussed in the last six months?	1 2 3 4 5	1 2 3 4 5
10. Have you had the opportunity over the last year at work to improve your skills?	1 2 3 4 5	1 2 3 4 5

Would you recommend this organization as a good place to work?  Yes  No

You will observe that each of the 10 questions have two parts to be answered in the Likert Scale – one part is for the degree of agreement and the other is for the importance of the question item as perceived by the respondent.

Whether an employee likes the organization he/she is working for, depends on a high degree of agreement on each question, particularly those he/she feels are more important.

Derive a weighted measure of work environment liking, on a 0-1 scale with 0 denoting least possible liking, and 1 representing maximum possible liking.

Consider the variables as Q1a (for agreement to Q1) and Q1imp (for importance of Q1).

16

## Staff Survey Codebook

Variable	SPSS variable name	Coding instructions
Identification number	id	Subject identification number
City of residence of staff member	City	Each city was given a numerical code
Age of staff member	age	1= under 20, 2=21 to 30, 3=31 to 40, 4=41 to 50, 5=over 50
Years of service with the organization	service	Years of service (if less than 1 record as decimal eg. 6 mths =.5 year)
Employment status	employstatus	1=permanent, 2=casual
Q1 level of agreement	Q1a	1=not at all, 2=to a slight extent, 3=to a moderate extent, 4=to a great extent, 5=to a very great extent
Q1 level of importance	Q1imp	1=not important, 2=slightly important, 3=moderately important, 4=very important, 5=extremely important
Q2 level of agreement	Q2a	1=not at all, 2=to a slight extent, 3=to a moderate extent, 4=to a great extent, 5=to a very great extent
Q2 level of importance	Q2imp	1=not important, 2=slightly important, 3=moderately

or permanent employees only (5<sup>th</sup> row of Staff Survey Codebook – variable Employment Status), would you check if liking for work environment differs among the three age groups, 21-30, 31-40 and 41-50?

### Section C

**I** These are some of the questions for studying sleep disorder relating to the survey file sleep.sav.

satsleep	How satisfied are you with the sleep you get? very dissatisfied 1 2 3 4 5 6 7 8 9 10 very satisfied
qualsleep	Overall how would you rate the quality of your sleep? very poor 1 2 3 4 5 6 excellent
stressmo	Please rate how stressed you have felt over the last month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent
fatigue	Please rate how fatigued you have felt over the past month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent
lethargy	Please rate how lethargic you have felt over the past month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent
tired	Please rate how tired you have felt over the past month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent
sleepy	Please rate how sleepy you have felt over the past month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent
energy	Please rate how much you have felt lacking in energy over the past month not at all 1 2 3 4 5 6 7 8 9 10 to a great extent

17

There are two exhibits provided for a General Linear Model run to predict *sleep satisfaction* (satsleep) based on

- a. q23 = qualsleep + stressmo
- b. q48 = fatigue + lethargy + tired + sleepy + energy
- c. agegp (age group)
  - a. group 1 <= 25
  - b. group 2 26-35
  - c. group 3 36-45
  - d. group 4 >=46
- d. gender 0-female, 1-male

Tests of Between-Subjects Effects								
Dependent Variable: quality of sleep								
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>a</sup>
Corrected Model	124.836 <sup>a</sup>	14	8.917	11.236	.000	.423	157.302	1.000
Intercept	116.874	1	116.874	147.270	.000	.407	147.270	1.000
sex	.484	1	.484	.610	.436	.003	.610	.122
agegp	1.498	3	.499	.629	.597	.009	1.887	.21
q48	76.199	1	76.199	96.016	.000	.309	96.016	1.000
q23	16.831	1	16.831	21.208	.000	.090	21.208	.996
sex * q48	3.837	1	3.837	4.835	.029	.022	4.835	.591
sex * q23	.099	1	.099	.125	.724	.001	.125	.064
agegp * q48	.754	3	.251	.317	.813	.004	.950	.111
agegp * q23	1.126	3	.375	.473	.701	.007	1.419	.145
Error	170.625	215	.794					
Total	3422.000	230						
Corrected Total	295.461	229						

a. R Squared = .423 (Adjusted R Squared = .385)  
 b. Computed using alpha = .05

Parameter Estimates

Dependent Variable: quality of sleep

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared	Noncent. Parameter	Observed Power <sup>a</sup>
					Lower Bound	Upper Bound			
Intercept	3.760	.510	7.368	.000	2.754	4.766	.202	7.368	1.000
[sex=0]	-.428	.548	-.781	.436	-1.508	.652	.003	.781	.122
[sex=1]	0 <sup>b</sup>								
[agegp=1.00]	1.156	1.019	1.134	.258	-.853	3.165	.006	1.134	.204
[agegp=2.00]	.628	.704	.892	.373	-.760	2.017	.004	.892	.144
[agegp=3.00]	.478	.653	.731	.466	-.810	1.765	.002	.731	.113
[agegp=4.00]	0 <sup>b</sup>								
q48	-.093	.013	-7.377	.000	-.118	-.069	.202	7.377	1.000
q23	.218	.051	4.310	.000	.118	.317	.080	4.310	.990
[sex=0] * q48	.029	.013	2.199	.029	.003	.056	.022	2.199	.591
[sex=1] * q48	0 <sup>b</sup>								
[sex=0] * q23	-.019	.055	-.353	.724	-.127	.088	.001	.353	.064
[sex=1] * q23	0 <sup>b</sup>								
[agegp=1.00] * q48	.019	.022	.880	.380	-.024	.063	.004	.880	.142
[agegp=2.00] * q48	.009	.016	.595	.552	-.022	.040	.002	.595	.091
[agegp=3.00] * q48	.007	.015	.465	.642	-.023	.038	.001	.465	.075
[agegp=4.00] * q48	0 <sup>b</sup>								
[agegp=1.00] * q23	-.110	.110	-.999	.319	-.326	.107	.005	.999	.169
[agegp=2.00] * q23	-.055	.065	-.842	.401	-.183	.073	.003	.842	.134
[agegp=3.00] * q23	-.038	.071	-.534	.594	-.178	.102	.001	.534	.083
[agegp=4.00] * q23	0 <sup>b</sup>								

a. Computed using alpha = .05

b. This parameter is set to zero because it is redundant.

- Comment on the ANOVA table for this GLM.
- How many separate regression equations are represented in the Parameter Estimates table above?
- Write down the equations for
  - Females below 25
  - Males in the age group 36-45
  - Males in the 26-35 age group
  - Females in the oldest age group
- Which group (sex\*agegroup) has the largest negative gradient associated with q48; how much and what does it imply?