GANPAT UNIVERSITY

M.Sc. Third Semester Examination (C .B .C .S.) Nov-Dec, 2013

Subject: Geophysics

Paper: GPA 301 GSP Geophysical Signal Processing

Time: 3 hours Total Marks: 70

Instructions:

1) Attempt any three questions from each section, of which question No. 4 and 8 are compulsory.
2) Answer each section in separate answer book.

SECTION A I

1. (a)	Describe the Region of convergence (ROC)with figures and write their properties.	07
(b)	What is inverse z- transform? Discuss briefly property of multiplication by an exponential (frequency modulation) and time shifting.	07
2. (a)	Define shanon's sampling theorem and its all condition. Define the type of signal according to sampling interval describe with the figure.	07
(b)	How the reconstruction of the signal is done? Write the equation and draw the figure.	07
3.	Describe the DFT (Discrete Fourier transform).	14
4.(a)	Define the Recursive and non-recursive filters.	01
(b)	Write briefly about the maximum phase wavelet and specify the zero phase wavelet.	01
(c)	Briefly describe the time domain and frequency domain.	01
(d)	Write down the Dirichlet conditions.	01
(e)	Briefly explain the transfer function with figure.	01
(f)	Write down the condition for pole and zero.	01
(g)	What is amplitude and phase response?	01

SECTION B II

5.(a)	Justify the statement for calculating cross correlation of two data sets "Cross correlation can be performed by reversing the first data set and convolving".	07
(b)	Convolve and cross correlate the following two time series (-0.1, 0.2, 0.1, 0.0, -0.2) with (0.2, -0.4, 0.2, 0, 0.2).	07
6.(a)	What is inverse filtering? Design a two term truncated inverse filter (-2, -4, -8) with input wavelet (-1/2, 1). Calculate error energy also.	07
(b)	What is Density Function, Probability Density Function and N^{th} Moment of random variable?	07
7.(a)	What do you mean by downward continuation? What is ergodicity? Write properties of white Gaussian noise.	07
(b)	Discuss seismic convolution model in brief.	07
8.(a)	Convolution of source wavelet (1, -1/2) with reflectivity sequence (1, 1/2, 1/4) is?	01
(b)	Write window function of Hanning window.	01
(c)	What is goal of matched filtering?	01
(d)	What is condition of random process to be WSS (Wide Sense Stationarity)?	01
(e)	Write equations of Wiener Khinchine theorem.	01
(f)	Write short notes on SSS (Strict Sense Stationarity)?	01
(g)	Write equation of seismic convolution model in frequency domain.	01

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M.Sc. Third Semester Examination (C.B.C.S) Nov-Dec, 2013

Subject: Geophysics

Paper: GPA 302 SES Seismology and Engineering Seismology

Time: 3 hours Total Marks: 70

Instructions:

1) Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2) Answer each section in separate answer book.

SECTION: I

Q-1	(a) Explain elastic rebound theory, and double couple hypothesis.	07
	(b) Illustrate different seismic phases of local earthquakes	07
Q-2	(a) What are the different computational methods of earthquake location? Explain the Double Difference (Hypo-DD) method.	07
	(b) Explain frequency-magnitude relation of earthquakes, and Wadati plot for Vp/Vs estimation.	07
Q-3	(a) Give a brief outline of seismotectonics of Peninsular India.	07
	(b) Discuss various magnitude scales of earrhquakes.	07
Q-4	1. What is the frequency range of a broadband seismometer?	01
	2. What is the tectonics that caused the 1993 Latur earthquake?	01
	3. What is the meaning of p-value?	01
	4. Station correction is mapped by which method?	01
	5. What type of tectonics we observe in the Himalaya?	01
	6. What is earthquake swarm?	01
	7. What is the full abbreviation of CMT?	01

SECTION: II

Q-5	(a) What is strong ground motion.Define (i) PGA (ii) Response Spectra and (iii) Fourier Spectrum.	07
	(b) Explain the two approaches of Seismic Hazard Assessment.	07
Q-6	(a) What is a scenario earthquake and its role in Seismic Hazard Assessment.	07
	(b) What is Site amplification? Explain how Site amplification is measured.	07
Q-7	(a) Explain the difference between Seismic Resistant Design and Seismic Safe Design.	07
	(b) What is Zone factor? What are the Zone factor values for Zone III, IV and V in the BIS Map?	07
Q-8	1. What is the unit of ground acceleration?	01
	2. Above which value the Ground Motion is called as Strong Ground Motion?	01
	3. Name the major active fault in the Kachchh region.	01
	4. In Normalized Response Spectra which floor of the building corresponds to period of 0.2 sec?	01
	5. What is the zone factor value for Zone IV in Seismic Zoning Map of India?	01
	6. Deterministic Seismic Hazard approach which parameter is important?	01
	7. The BIS Seismic Zoning Map of India shows how many zones?	01

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M.Sc. Third Semester Examination (C.B.C.S) Nov-Dec, 2013

Subject: Geophysics

Paper: GPA 303 EGI Electromagnetic Methods & Geophysical Inversion

Time: 3 hours Total Marks: 70

Instructions:

1) Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2) Answer each section in separate answer book.

SECTION: I

Q-1	Discuss of source of signals and noises in MT method. What is static shift and by which method the effect can be treated? Mention the instruments used in MT data acquisition.	14
Q-2	(a)Discuss Basic principle of Time Domain Electromagnetic Method. Give the name of widely used loop configurations in TDEM survey. (b)Write four applications of Magnetotelluric survey.	14
Q-3	Define four equations of Maxwell's in differential form. Forms that derive diffusion equation obtained for conducive earth medium.	14
Q-4	a. Write five field components measured in MT survey	01
	b. What is the periodicity of Solar cycle?	01
	c. Write average resistivity of saline water.	
	d. In EM methods Fourier transforms are used for converting Frequecy domain to Time domain or time domain to frequency domain.	01
	e.Write average resistivity of pure ground water.	01
	f. In MT method resistivity is directly proportional to skip depth or inversely proportional?	01
	g. Can we conduct MT survey near High Voltage Electricity line or not?	01

SECTION: II

Q-5	(a)Write the difference between Forward and Inverse problems with diagram. (b) Explain the continuous and discrete inverse problem	14
Q-6	Explain forward, backward and central difference method in detail? Give an application of central difference method?	14
Q-7	What is data inversion? Explain an application of Inversion in Geophysics?	14
Q-8	a.What represent data matrix in equation d=Gm? d or m	01
	b.What represent model matrix in equation d=Gm? d or m	01
	c. In Inverse problem we find out what? Output or Input.	01
	d. What is generalized form of equation in Forward problem?	01
	e. In which numerical method Rectangular meshes are incorporated? Central Difference method or Finite difference method?	01
	f. In which method Tetrahedral cells are used? Finite element method or Finite difference method?	01
	g. What is generalized form of equation in inverse problem?	01

--------END OF PAPER--------

GANPAT UNIVERSITY
M.Sc. Third Semester Examination (C.B.C.S) Nov-Dec, 2013
Subject: Geophysics
Paper: GPA 304 SPG Seismic Prospecting

Time: 3 hours Total Marks: 70

Instructions:

1) Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2) Answer each section in separate answer book.

Section I

Q-1 What are the types of elastic waves? Write down the equations for the longitudinal and transverse waves. 14

Q-2 (a)Why are the seismic shots placed below the weathering layer? 7
(b) Plot the time and frequency response of an air-gun array. 7

Q-3 (a) What are the apparent velocities for up-dip and down-dip refractors in case of dipping layers? 7
(b) What is the difference between the low velocity and blind zone problems? 7

Q-4 **Define:** 7
a. Longitudinal wave
b. Transverse wave
c. Ideal seismic source
d. Snell's law
e. Critical reflection
f. Intercept time in refraction method
g. Reflection coefficient

Section II

Q-5 What are the basic components a seismic instrument? Describe in brief. 14

Q-6 (a) What are the advantages of grouping the geophones together? 7
(b) What are the main problems associated with off-shore recording? 7

Q-7 (a) Give the formula for CMP fold calculation. 7
(b) Write down the formula for weathering correction and explain its various terms. 7

Q-8 **Define:** 7
a. Faraday's law
b. A/D converter.
c. Dead trace
d. Deconvolution
e. Static correction
f. Demultiplexing ,
g. Migration.

------End of the paper-----

GANPAT UNIVERSITY

Subject: Geophysics

M.Sc. **Third** Semester Examination (C.B.C.S)

Subject: GPB 305 IPG Introduction to Programming

Time: 3 hours Total Marks: 70

Instructions:

1) Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2) Answer each section in separate answer book.

SECTION: I

Q-1 a. What is the use of flowchart? Explain different symbols of flowchart. Draw flowchart to find maximum number from given two numbers. 14

b. What is the use of operator? Explain different categories of operator with example.

Q-2 a. Write and explain ways of writing looping statements and explain with example. 14

b. Write and explain Switch Case with example.

Q-3 Explain different types of functions. Write a program in C language to create and use following functions 14

- void disp_name()
- void disp_series(char ch ,int cnt)
- float calc_per (int sub1,int sub2,int sub3,int sub4)
- float calc_interest()
- void mul_div(int p, int q, int *mul, float *div)

Q-4 Give answer of following questions in short. 07

a. Write full form of ASCII

b. Write output of
printf("%10.3s","WelCome");

c. What is Ternary Operator?

d. Which library function is used to clear output screen?

e. What is the use of GOTO statement?

f. Following Array declaration is Valid or Invalid?
int a[ ] = {12,44,55,66,77,73,78,90};

g. Write output of following code :

```
void main()
{
    int a=5,b;
    b = a++;
    printf("a = %d    b = %d",a,b);
}
```

SECTION: II

Q-5
a. List String functions and explain any two with examples. 14
b. List preprocessor directives used in C language and explain any three with example.

Q-6
a. Write a program which demonstrates use of structure. 14
b. What is Pointer? Write a C program to perform arithmetic operations using pointer.

Q-7
a. Explain any five FILE functions with example. 14
b. What is Command Line Argument? Explain it using a program.

Q-8 Give answer of following questions in short. 07

a. Write size of the variable created from given structure

```
struct mobile
{
   int width,height;
   char model[10];
   char company[15];
   float price;
};
```

b. Write main difference between union and structure.
c. What is Null Character?
d. What is the use of rewind in file?
e. What is void pointer?
f. Write a code to create enumerated data type.
g. Which header file is required to use string functions?

--------END OF PAPER--------