Practical Test

Astronomy Questions

Time: 90 Minutes **Maximum Marks: 34**

Instructions:

1. Please write your student code on the cover page as well as on the top right of every page of answer sheet / calculations sheets.
2. Please write your answers legibly. Illegible answers will be counted as incorrect.
3. Please write your final answers in appropriate boxes in the main answer sheet. **For numerical questions, show the calculations on blank calculation sheets provided.**
4. For numerical questions, you may attempt part of the answer even if you don't know the final result. There will be stepwise marking.
5. You can get as many calculations sheets as you want. Just raise your hand to ask for extra sheets. The volunteers will bring extra sheets to your table.
6. Write question number clearly at the top of the calculations sheet.
7. Read the entire question group carefully before starting to answer. Each question has a point value assigned and indicated on the right hand side of the question.
8. Any inappropriate examination behaviour will result in your withdrawal from the IESO.

1. Construct a Sundial for Mysore (Latitude = +12° 16' N, Longitude = 77° 33'E). You can ignore corrections due to equation of time.
   Materials given: a square plastic board of size of 40 cm x 40 cm, a 1 metre long metal rod, 2 nut bolts, a 30 cm scale and marker pens to make Sundial markings on the plasticboard. Use the following procedure.

To make a simple Sundial, you should make the shadow of the rod fall in the equatorial plane. For this, push the rod through the hole at the centre of the board.

Now put this device on a flat surface such that it rests on a board edge and one end of the rod. The board should be exactly perpendicular to the rod. For this, fix the nut bolts on the rod on both the sides of the board. The other end of rod should be pointing towards the north celestial pole. Write your student code on the plastic board. Show this arrangement to the examiner. **(1 point)**

   (a) Measure length of the rod from the end towards the North Celestial Pole to the board and write on the answer sheet. Mark North facing and South facing sides of the board with letters **N** and **S** respectively. **(3 points)**
   (b) Mark lines showing the direction of the shadow of the rod on the board for the winter solstice day. Make markings for every 2 hours. **(4 points)**
   (c) Mark the similar lines for summer solstice day. **(3 points)**
   (d) Where do you expect the shadow of the rod will be seen on the equinox days? Write answer as N (North side) / S (South side) / B (both sides) / X (neither side).**(1 point)**

2. You are given a sky map which shows sky for 24 hours x 120 degrees. You are also given a list of all constellations with their IAU designations. Assume that today is the date of closing ceremony i.e. 19th September 2013 and you are told that it is a full moon day. **(2 points each)**

   (a) Mark the Celestial Equator on the map at appropriate place. Denote it with letter '**Q**'.
   (b) Mark the Ecliptic (apparent path of the Sun over one year) on the map at appropriate place. Denote it with letter '**E**'.
   (c) Mark the Sun's position on the map for the noon of given day. Denote it with letter '**S**'.
   (d) Mark the Moon's position on the map for the noon of given day. Denote it with letter '**M**'.
   (e) Write the three letter IAU code of the constellation you will observe on the zenith at the time of Moonrise. Mark the position of the zenith on the map as '**Z**'.
   (f) Write the three letter IAU code of the constellation you will observe on the nadir at the time of Moonrise. Mark the position of the nadir on the map as '**N**'.

3. Picture 1 shows star trails captured by an Astronomy Olympiad student.
   (a) Identify constellation(s) in the picture. Write the three letter IAU code of the constellation(s) in your answer sheet. There are more than one constellations / parts of constellations visible in the picture. Identify as many as you can. **(4 points)**
   (b) Write the letters from the following table, corresponding to the stars, if they are present in the picture. **(2 points)**

A.	Deneb	D.	Dubhe	G.	Denebola
B.	Rigel	E.	Algol	H.	Mizar
C.	Spica	F.	Regulus	I.	Betelgeuse

   (c) Let us assume that stars numbered as 1 and 2 have nearly the same Right Ascension (R.A.) Find exposure time of the photograph. **(4 points)**

List of Constellations with IAU Codes

No.	Constellation	Code
1	Andromeda	And
2	Antlia	Ant
3	Apus	Aps
4	Aquarius	Aqr
5	Aquila	Aql
6	Ara	Ara
7	Aries	Ari
8	Auriga	Aur
9	Bootes	Boo
10	Caelum	Cae
11	Camelopardalis	Cam
12	Cancer	Cnc
13	Canes Venatici	CVn
14	Canis Major	CMa
15	Canis Minor	CMi
16	Capricornus	Cap
17	Carina	Car
18	Cassiopeia	Cas
19	Centaurus	Cen
20	Cepheus	Cep
21	Cetus	Cet
22	Chamaleon	Cha
23	Circinus	Cir
24	Columba	Col
25	Coma Berenices	Com
26	Corona Australis	CrA
27	Corona Borealis	CrB
28	Corvus	Crv
29	Crater	Crt
30	Crux	Cru
31	Cygnus	Cyg
32	Delphinus	Del
33	Dorado	Dor
34	Draco	Dra
35	Equuleus	Equ
36	Eridanus	Eri
37	Fornax	For
38	Gemini	Gem
39	Grus	Gru
40	Hercules	Her
41	Horologium	Hor
42	Hydra	Hya
43	Hydrus	Hyi
44	Indus	Ind
45	Lacerta	Lac
46	Leo	Leo
47	Leo Minor	LMi
48	Lepus	Lep
49	Libra	Lib
50	Lupus	Lup
51	Lynx	Lyn
52	Lyra	Lyr
53	Mensa	Men
54	Microscopium	Mic
55	Monoceros	Mon
56	Musca	Mus
57	Norma	Nor
58	Octans	Oct
59	Ophiucus	Oph
60	Orion	Ori
61	Pavo	Pav
62	Pegasus	Peg
63	Perseus	Per
64	Phoenix	Phe
65	Pictor	Pic
66	Pisces	Psc
67	Pisces Austrinus	PsA
68	Puppis	Pup
69	Pyxis	Pyx
70	Reticulum	Ret
71	Sagitta	Sge
72	Sagittarius	Sgr
73	Scorpius	Sco
74	Sculptor	Scl
75	Scutum	Sct
76	Serpens	Ser
77	Sextans	Sex
78	Taurus	Tau
79	Telescopium	Tel
80	Triangulum	Tri
81	Triangulum Australe	TrA
82	Tucana	Tuc
83	Ursa Major	UMa
84	Ursa Minor	UMi
85	Vela	Vel
86	Virgo	Vir
87	Volans	Vol
88	Vulpecula	Vul

This is colour inverted copy of the central part of the picture in the question paper.

Practical Test

Astronomy Answer Sheet

1. Sundial

(a) Length of the rod = (d)

2. (e) IAU code =

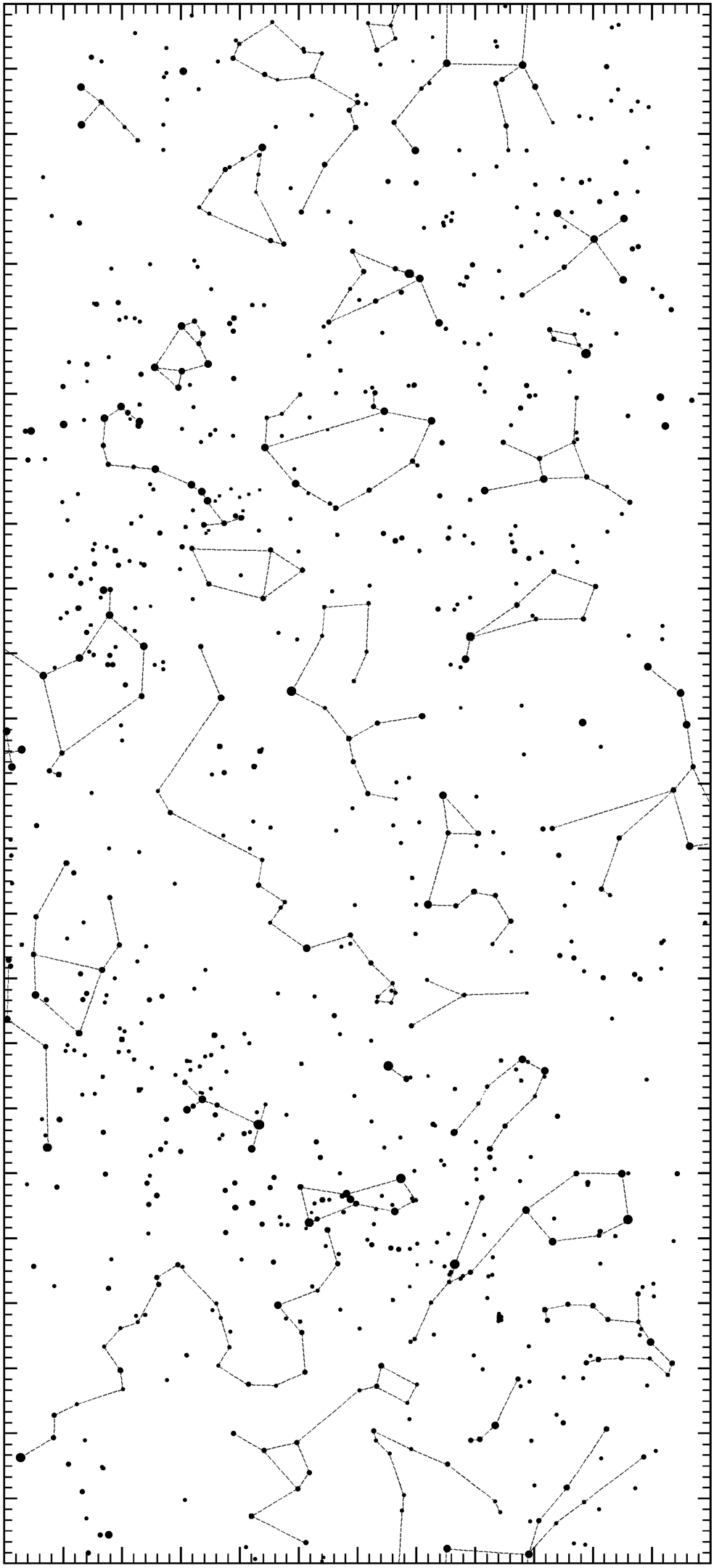
(f) IAU code =

3. Star Trails
   (a) Constellation Names

   (b) Star Letters

   (c) Exposure time =

7th Inte :



Mysore, I stronomy

Sheet for numerical calculations (write question number clearly)