PRIVATE SECONDARY EDUCATION AUTHORITY

MONITORING OF NORMS AND STANDARDS IN A FACILITY RECKONED AS:

PHYSICS LABORATORY UP TO GRADE 11/13 – Year 2021/2022

Subject Appellation and Level:

- **PHYSICS –Grades 12 & 13 – CIE HSC/AL syllabus code: 9702** ☐
- **PHYSICS –Grades 10 & 11 – CIE SC/OL syllabus code : 5054** ☐
- **SCIENCE - Up to Grade 9 & 9+EP- (the *Physics* component only in schools where there is no Science Junior Laboratory) - NCF** ☐

Name of School : _____Date of Verification :_____

Is the facility New / Relocated / Existing / Upgraded? _____

Number of sections and students using this facility:

	Extended Program				Regular						
Grade	**7**	**8**	**9**	**9+**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
No. of Sections											
No. of Students											
No. of Groups											

Educator in Charge: _____ Qualifications: _____

Specialist Room Attendant: _____ Qualifications: _____

IMPORTANT NOTES:

The following conditions should be fulfilled to ensure a reasonable standard:

- **The room and floor area provided should be appropriate.**
- **A minimum score of 75 % should be obtained in each of the four Sections A to D.**
- **Compulsory items in Section D, highlighted in bold characters, should be provided.**
- **Record of use of the Lab. should be kept as required.**

Minimum requirements for a class of 20 students are specified. However, in case of need provision should be made to accommodate up to 4 additional students.

(A) PHYSICAL FACILITIES – weightage: 30%						
Item	**Description**	**Requirements**	**Marks Per Unit**	**Marks**	**Existing**	**Score** *(for PSEA use only)*
1. Floor Area and Room ***NOTES:** i) For existing Physics Labs, the previously approved Floor Area shall be accepted and rated pro-rata. ii) For new Physics Labs., the required area of 60 m^2 should be provided.	**Concrete Building**	An area of 60 m^2 is required *(Re side-notes)	75	4500		
	CONDITIONS OF ROOM:			1500 **(Marks on conditi-ons pro-rata on area)**		
	Ceiling	Plastered Crack-free	10%			
	Walls	Plastered & painted	10%			
	Flooring	Flat & tiled /painted	10%			
	Shape	Convenient	10%			
	Set Up	Conducive	10%			
	Cleanliness	Maintained	10%			
	Proper Storage and Classification	Indexing & Accessibility	10%			
	Lighting	Adequate Natural/ Assisted	10%			
	Ventilation		10%			
	Utilities	Water/Gas/ Electricity	10%			

2. Furniture & Accessories ***NOTE:** ***Work tables*** *should be of Laboratory type and fitted with taps, sinks, bunsen burners and power supply.*	i) Work tables ** (Re. side-note)*	15 m^2	30	450		
	ii) Stools	20	21	420		
	iii) Demonstration table (min. 2.00m x 1.00 m) Table rated only if it has ALL of the 4 facilities listed below : a) Tap and Sink (*Tap: graded type*)	2 m^2 1 set	120 110	220 110		
	b) Bunsen burner with gas supply	1	110	110		
	c) Power point-attached or nearby	1	110	110		
	d) 20 cms higher than work tables	-	110	110		
***NOTE:** **Conditions** Problems identified with the conditions of **Furniture and Accessories**, if any, shall be evaluated on how far they affect teaching and learning on a scale of 1 to 10 before effecting deductions on marks for conditions. The marks may be totally forfeited in case of even a single grave problem with conditions.	iv) Chair for Educator	1	150	150		
	v) White Board size (243 x 105 cm) *(below size not rated)*	1	200	200		
	vi) Tap *(graded type)* & Sink *(of appropriate material)*	5 sets	90	450		
	vii) Power Points (Free)	6	75	450		
	viii) Wall Clock	1	100	100		
	ix) Shelves and Cupboards with drawers	Sufficient for proper storage	300	300		
	Conditions of i) to ix)*			800		
			TOTAL Section A	**9 980**		Score sect A

Actual Marks Scored on Physical: Facilities (Sect. A) $\frac{\text{Score sect A}}{9\,980} \times 15\,000 = \_\_\_\_\_$

(B) INSTRUCTIONAL TOOLS & RECORDS – weightage: 30%

1. Practicals	Number of Sessions	20	250	5000		

NOTE: Reckoned pro-rata for the current academic year - max. 20 per class or group on 8.5 months.

Requirements:

a) 20 practical sessions per class for Grades 10 - 13 in the academic year spread over all three school terms.

b) 7 practical sessions per class for Grades EP & Reg.7, 8 and 9 in the academic year.

c) Records to be kept class-wise and kept in the lab.

Grade / **Class/Group**	**Ext. Prg.** 7	8	9	9+	**Regular** 7	8	9	10	11	12	13
A											
B											
C											
D											
E											
Total (Multiply by 3 for EP & Reg. Grades 7-9)											
Average Gradewise											
Overall Average											
Note for Guidance:	*Grades EP & Reg. 7, 8 and 9 to be considered only if school does not have a Science Junior Lab.*										

2. Audio Visual Sessions	Number of Sessions	10	200	2000		

NOTE: Reckoned pro-rata for the current academic year - max. 10 per class or group on 8.5 months.

Requirements:

a) 10 Audio Visual sessions per class for Grades 10 - 13 in the academic year spread over all three school terms.

b) 4 Audio Visual sessions per class for Grades EP & Reg. 7, 8 and 9 in the academic year.

c) Records to be kept class-wise and kept in the lab.

d) Audio Visual Sessions - (video lessons, Computer Assisted Learning)

Grade / **Class/Group**	**Ext. Prg.** 7	8	9	9+	**Regular** 7	8	9	10	11	12	13
A											
B											
C											
D											
E											
Total (Multiply by 3 for EP & Reg. Grades 7-9)											
Average Gradewise											
Overall Average											
Note for Guidance:	*Grades EP & Reg. 7, 8 and 9 to be considered only if school does not have a Science Junior Lab.*										

Item	Description	Quantity	Marks per unit	Marks Item-wise	Existing	Score (for PSEA use only)
3. Time-Table	Time-Table of practicals *(with school seal and year stated)*	1 displayed	100	100		
4. Stock-Book	Up to date, signed and with school seal. New acquisitions highlighted.	1	150	150		
5. Teaching and Learning Aids **NOTES:** **i) Charts topics** 1. Global Warming 2. Changes of State 3. Sources of Energy (Renewable / Non-renewable) 4. Electro-magnetism 5. The CRO 6. Types of Forces 7. Nuclear Physics 8. Electricity 9. Electronics 10. Light **ii) Charts size** Charts to be printed and of minimum size – A3. Contents should be readable with drawings and bold characters.	i) Reference Books for Theory *(Published within the past 3 years)* ii) Reference Books for Practicals *(Published within the past 5 years)* iii) Wall Charts *(re: list of topics & size in the first column)* iv) Multimedia • PC/Laptop • Internet • LCD Projector* • Screen* ***NOTE**: A connectable LED TV of 55" may replace LCD Projector and Screen.*	5 5 10 1 Connected 1 1	100 100 23 200 100 240 70	500 500 230 200 100 240 70		
			TOTAL Section B	**9090**		Score sect B

Actual Marks Scored On Instructional Tools & Records (Section B): $\frac{\text{Score sect B}}{9090} \times 15\,000 =$ _____

(C) SAFETY ITEMS – weightage: 10 %						
Item	**Description**	**Quantity**	**Marks Per Unit**	**Marks Item-wise**	**Existing**	**Score** (for PSEA use only)
1. First Aid Kit	Equipped to treat cuts, burns and eye problems	1	350	350		
2. Fire Extinguisher	Capacity 2Lor 2Kg (serviced on time)	1	400	400		
3. Fire Blanket	0.9m x 0.9 m	1	350	350		
4. Emergency Exit *(clearly indicated)*	Additional door for quick exit in case of emergency	1	400	400		
5.Safety Charts *permanently affixed at appropriate places*	Min. size: A_3 Clear instructions about safety precautions	5	80	400		
6. i) Main Switch /Circuit Breaker ii) ELCB/RCD	Separate for the Physics Lab. and located at an accessible place inside the Lab.	1 1	350 400	350 400		
7. Gas conductors **NOTE**: *Gas tank to be kept preferably outside the building*	Rubber tubings should be replaced before expiry date stated thereon.	6	60	360		
8. Storage of equipment	Safe storage, organisation and accessibility of equipment and consumables	Safe Storage Organisati-on Accessibil-ity	50 50 50	50 50 50		
			TOTAL Sect. C	**3160**		**Score sect C**

Actual Marks Scored on Safety Items (Sect.C)= $\frac{\text{Score sect C}}{3160} \times 5000$

(D) EQUIPMENT AND CONSUMABLES – weightage: 30%

UP TO GRADE 11: ITEMS 1 TO 122 UP TO GRADE 13: ITEMS 1 TO 162

Item	Description	Quantity Required	Marks per Unit/g/cm^3	Marks Item-wise	Existing	Score (for PSEA use only)
1.	Charcoal powder	400 g	0.1	40		
2.	Ethanol	1000 cm^3	0.04	40		
3.	Ammeter (0.2A, O.5A)	5	36	180		
4.	Ball (small e.g. ping pong)	10	6	60		
5.	Balloon (rubber)	20	6	120		
6.	Bands (elastic)	1 pckt.	60	60		
7.	Bimetallic strip	1	40	40		
8.	Boiling tube	20	3	60		
9.	Bucket polythene(8 Litres)	2	30	60		
10.	**Bunsen Burners – connected to gas supply *(not rated if gas conductors are expired or do not show expiry dates).***	**10**	**18**	**180**		
11.	Burette 50 cm^3	10	12	120		
12.	Candle	10	6	60		
13.	Cell holder	10	18	180		
14.	Dry cells (1.5 v)	20	9	180		
15.	Beaker pyrex, tall form 100 cm^3	20	3	60		
16.	Beaker pyrex, tall form spout 250 cm^3	20	3	60		
17.	Beaker pyrex, tall form spout 600 cm^3	20	3	60		
18.	Beaker pyrex, tall form spout 1000cm^3	10	6	60		
19.	Beaker polypropylene 400 cm^3	20	3	60		
20.	Bucket polythene capacity: 8 litres	2	60	120		
21.	Calorimeter 75 mm high, 50 mm dia. Copper	5	36	180		
22.	Calorimeter 90 mm high,50 mm diam.Al	5	36	180		
23.	Capacitors set of 5 cap assorted 100 UF, 220, 500, 1000, 2200 UF	10	6	60		
24.	Capillary tubes, dia 1mm,2mm(1meach)	5m each	12	60		
25.	Constantan wire, bare 0.71 mm Swg 24	1 reel	60	60		
26.	Constantan wire, bare 0.56 mm Swg 26	1 reel	60	60		
27.	Constantan wire, bare 0.45 mm Swg 28	1 reel	60	60		
28.	Constantan wire, bare 0.40 mm Swg 30	1 reel	60	60		
29.	Contact Key	10	6	60		
30.	Diodes-Junction type (1N 4001)	20	3	60		
31.	Electronic balance(400g x 0.01 g)	1	180	180		
32.	Filters Red/ Green/ Blue	1 set	60	60		
33.	Flash bulb 2.5 V (pk of 10)	2 pks	30	60		
34.	Flash bulb 3.5 V (pk of 10)	2 pks	30	60		
			Sub-Total	**3 000**		

Item	Description	Quantity Required	Marks per Unit/g/cm^3	Marks Item-wise	Existing	Score *(For PSEA use only)*
35.	G-clamp – opening 150 mm	5	12	60		
36.	Flash bulb 6 V (pk of 10)	2 pks	30	60		
37.	**Galvanometer 3.5 mA – 0 – 3.5 mA**	**5**	**36**	**180**		
38.	Half metre rule hard wood	10	6	60		
39.	Insulated socket terminal black	10	6	60		
40.	Insulated socket terminal red	10	6	60		
41.	Jockey	10	6	60		
42.	Lamp box	5	12	60		
43.	Lamp holder M.E.S type	20	3	60		
44.	LED Light Emitting Diode (operating voltage 6 V red & yellow)	10 each	3	60		
45.	Lens convex 50 mm diam – 100 mm focal length (FL)	10	6	60		
46.	Lens convex 50 mm diam – 150 mm FL	10	6	60		
47.	Lens convex 50 mm diam – 20 mm FL	10	6	60		
48.	Lens convex 50 mm diam – 50 mm FL	10	6	60		
49.	Lens holder, metal adjustable	10	6	60		
50.	Magnets Alnico 50 x 15 x 10 mm	5	12	60		
51.	Measuring cylinder, pyrex 250 cm^3	5	12	60		
52.	Metre rule cm/mm hard wood	20	3	60		
53.	Micrometer screw gauge	2	60	120		
54.	**Multimeter**	10	12	120		
55.	Nichrome wire bare 0.56 mm Swg 24	1 reel	60	60		
56.	Nichrome wire bare 0.45 mm Swg 26	1 reel	60	60		
57.	Nichrome wire bare 0.40 mm Swg 28	1 reel	60	60		
58.	Nichrome wire bare 0.31 mm Swg 30	1 reel	60	60		
59.	Pendulum bob 13 mm diameter	5	12	60		
60.	Perspex prism equilateral 38 mm	10	6	60		
61.	Pins for optics exp.75 mm long (20/box)	1 box	60	60		
62.	Plotting compass	5	12	60		
63.	Plane mirror, glass (pk of 10)	10	6	60		
64.	Plugs transverse hole, black	20	3	60		
65.	Plugs transverse hole, red	20	9	180		
66.	Plugs switch, one way	20	6	120		
67.	**Power supply unit (0-12 v) variable in steps of 1.0 V (max. 5 amps)**	**5**	**36**	**180**		
68.	Protractor	10	6	60		
69.	Rectangular Perspex block	10	6	60		
70.	Resistance unit 5 ohms	10	6	60		
71.	Resistance unit 10 ohms	20	6	120		
72.	Retort stand with 750 mm rod	10	12	120		
73.	Retort stand clamp padded with cork	10	12	120		
74.	Retort stand clamp with wing unit boss head	10	12	120		
			Sub-Total	**3 180**		

	Apparatus Description	Quantity Required	Marks per Unit	Marks Item-wise	Existing	Score (PSEA only)
75.	**Rheostat (wire type)min. 11 ohms**	5	36	180		
76.	Rule 30 cms, plastic or wood	20	3	60		
77.	Scissors	2	30	60		
78.	Scale pan, aluminium	20	3	60		
79.	Semi-circular Perspex block	10	6	60		
80.	Screw clips	10	6	60		
81.	Set of masses + hanger 0 – 100 g	5	12	60		
82.	Set of masses + hanger 0 – 1000 g	5	12	60		
83.	Soldering kit	1	120	120		
84.	Spirit level straight type	1	120	120		
85.	Spring balance (Newton Metre): 0-1 N 0-5 N 0-10 N	 10 10 10	 6 6 6	 60 60 60		
86.	Set Square	10	6	60		
87.	Springs extension (100 mm)	10	6	60		
88.	Springs extension (150 mm)	10	6	60		
89.	**Stopwatch digital(0-59.99s x 0.1s)**	20	6	120		
90.	Test tube pyrex 150 x 18 mm	20	6	120		
91.	Test tube pyrex 150 x 24 mm	20	6	120		
92.	Thermometer (alcohol)	10	6	60		
93.	Thermometer Hg (100 x 1) – 76 mm immersion	10	18	180		
94.	Thermometer digital	20	6	120		
95.	Tripod	10	6	60		
96.	**Vernier Callipers**	2	60	120		
97.	Volmeter dual range (0-5V) & (0- 15V)	5	24	120		
98.	Ammeter dual range (0- 1A) & (0- 5A) **OR**	5	24	120		
99.	(D.C micro-ammeter)	5	9.6	48		
100.	(Shunt 50 m A, 100 m A, 1 A, 5 A)	5	9.6	48		
101.	(Multiplier 1 V, 5V)	5	9.6	48		
102.	(Shunt 1 A, 5A)	5	9.6	48		
103.	(Multiplier 5 V, 10 V)	5	9.6	48		
104.	**Light Dependent Resistor LDR** (with connecting leads, disc type diameter 10mm/5mm; 50 Kohms in the dark)	10	12	120		
105.	**Thermistors**	**5**	**24**	**120**		
106.	Steel ball bearings	20	3	60		
			Sub-Total	**2 880**		

ADDITIONAL APPARATUS FOR DEMONSTRATION – UP TO GRADE 11

Item	Description	Quantity Required	Marks per Unit	Marks Item-wise	Exis-ting	Score For PSEA use only
107	Ball and ring	1	40	40		
108	**Cathode ray oscilloscope**	**1**	**120**	**120**		
109	**g – by free full apparatus**	**1**	**120**	**120**		
110	Liquid level apparatus	1	40	40		
111	Motor generator	1	120	120		
112	**Ray optics kit**	**1**	**120**	**`120**		
113	**Ripple tank + accessories**	**1**	**120**	**120**		
114	Smoke cell	1	60	60		
115	Signal generator	1	60	60		
116	Stroboscope (motor-driven)/ stromboflash	1	60	60		
117	Tuning forks set	1	120	120		
118	**Worcester circuit board**	1	120	120		
119	**Sound wave demo kit**	**1**	**120**	**120**		
120	Masses slotted with hanger o.500g x 50g	10	18	180		
121	Immersion Heater (12V, 50W)	5	24	120		
122	Hall Probe	1	optional	-		
			Sub-Total	**1 520**		
			TOTAL Section D Up to Gd 11	**10 580**		**Score sect D**

Actual Marks Scored on Section D (up to Grade 11) = $\frac{\text{Score sect D}}{10\,580} \times 15\,000$

ADDITIONAL ITEMS FOR PHYSICS LAB. UP TO GRADE 13

123	Metre bridge – 1 m long	10	12	120		
124	Potentiometer	10	12	120		
125	**Resistance box (0 – 1000) ohm**	10	12	120		
126	Resistance unit 1 ohm	10	6	60		
127	Resistance unit 2 ohms	20	6	120		
128	Resistors:asstd.100/1K/10K/100K/1000K ohms pack	10	6	60		
129	Resistors pack of ass. Carbon colour coded resistors with connecting leads(100,220,330,470,560,1000 ohms +/-2%(2 each in 1 pk)	10	12	120		
130	Micrometer screw gauge	+8	15	120		
131	Pendulum bob 13 mm diameter	+5	12	60		
132	Plotting compass	+5	12	60		
133	Plugs transverse hole, black	+10	6	60		
134	Plugs transverse hole, red	+10	18	180		
135	Protractor	+10	6	60		
136	Retort stand with 750 mm rod	+10	12	120		
137	Retort stand clamp padded with cork	+10	12	120		
138	Retort stand clamp with wing unit boss head	+10	12	120		

Item	Description	Quantity Required	Marks per Unit	Marks Item-wise	Exis-ting	Score For PSEA use only
139	**Rheostat (wire type)min. 11 ohms**	+5	36	180		
140	G-clamp – opening 150 mm	+5	12	60		
141	Half-metre rule hard wood	+10	6	60		
142	Magnets Alnico 50 x 15 x 10 mm	+5	12	60		
143	Measuring cylinder, pyrex 250 cm^3	+5	12	60		
144	Calorimeter 75 mm high, 50 mm dia. Copper	+5	36	180		
145	Calorimeter 90 mm high,50 mm diam.Al	+5	36	180		
146	Scissors	+6	10	60		
147	Set of masses + hanger 0 – 100 g	+5	12	60		
148	Set of masses + hanger 0 – 1000 g	+5	12	60		
149	Spirit level straight type	+4	30	120		
150	Set Square	+10	6	60		
151	Test tube pyrex 150 x 18 mm	+20	6	120		
152	Test tube pyrex 150 x 24 mm	+20	6	120		
153	**Thermistors**	**+5**	**24**	**120**		
154	Thermometer Hg (100 x 1) – 76 mm immersion	+10	18	180		
155	**Vernier Callipers**	+8	15	120		
EITHER	Volmeter dual range (0-5V) & (0- 15V)	+5	24	120		
156	Ammeter dual range (0- 1A) & (0- 5A) **OR**	+5	24	120		
	(D.C micro-ammeter)	+5	9.6	48		
OR	(Shunt 50 m A, 100 m A, 1 A, 5 A)	+5	9.6	48		
	(Multiplier 1 V, 5V)	+5	9.6	48		
157	(Shunt 1 A, 5A)	+5	9.6	48		
	(Multiplier 5 V, 10 V)	+5	9.6	48		
			Sub-Total	**3 660**		

ADDITIONAL APPARATUS FOR DEMONSTRATION – UP TO GRADE 13						
158	**A level Electronics kit**	**1**	**121**	**121**		
159	**Metal block calorimeter + heater**	**1**	**120**	**120**		
160	**Travelling microscope**	**1**	**120**	**120**		
161	**Microwave 2.8 wave equipment set**	**1**	**120**	**120**		
162	**Magnet - horse shoe**	**1**	**120**	**120**		
			Sub-Total	**601**		
			TOTAL Section D Up to Gd 13	**14 841**		**Score sect D'**

Actual Marks Scored on Section D (up to Grade 13) = $\frac{\text{Score sect D'}}{14\,841} \times 15\,000$

MARK SCHEME AND SCORE

SECTION	WEIGHTAGE SECTION-WISE	TOTAL MARKS Section-wise	ACTUAL MARKS SCORED Up to Grade 11	ACTUAL MARKS SCORED Up to Grade 13	% SCORE SECTION -WISE
A. PHYSICAL FACILITIES	**30%**	**15 000**			
B. INSTRUCTIONAL ITEMS & RECORDS	**30%**	**15 000**			
C. SAFETY ITEMS	**10%**	**5 000**			
D. EQUIPMENT AND CONSUMABLES	**30%**	**15 000**			
OVERALL	**100%**	**50 000**			

REMARKS AND SHORTCOMINGS

(With particular reference to conditions at page 1 and score obtained)

---------- ----------

Signature of PSEA Supervisor / Senior Supervisor (s) Signature of Manager

Date: ---------- Date:----------

Norms and Standards developed by the Supervision Section (2019)
NAB/DAB – updated June 2021